



# THE MANGROVE BREAKTHROUGH FINANCIAL ROADMAP

Unlocking investment at scale  
in critical coastal ecosystems

S Y S T E M I Q





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# About this Financial Roadmap



This report was developed by Systemiq for the Mangrove Breakthrough, in partnership with the UN Climate Change High-Level Champions and the Global Mangrove Alliance, in collaboration with the Financial Services Taskforce of the Sustainable Markets Initiative.



## ABOUT SYSTEMIQ

Systemiq, the system-change company, was founded in 2016 to drive the achievement of the Sustainable Development Goals and the Paris Agreement, by transforming markets and business models in five key systems: nature and food, materials and circularity, energy, urban areas, and sustainable finance.

A certified B Corp, Systemiq combines strategic advisory with high-impact, on-the-ground work, and partners with business, finance, policy-makers and civil society to deliver system change. Systemiq has offices in Brazil, France, Germany, Indonesia, the Netherlands and the UK.

## ABOUT THE MANGROVE BREAKTHROUGH

The Mangrove Breakthrough was established at COP27 as part of the Sharm El-Sheikh Adaptation Agenda, building on the Breakthrough Agenda, and the work of the Global Mangrove Alliance. The Breakthrough aims to provide a global compass for the international community, driving concerted action towards its shared goals through five critical pathways: 1. Developing a community of action; 2. Building bridges between finance and pipeline and on-the-ground action; 3. Driving a systemic approach at global and landscape scales;

4. Enhancing project transparency and accountability; and 5. Facilitating learning and knowledge exchange. The Mangrove Breakthrough directly supports the achievement of the goals of the Paris Climate Agreement, the ecosystem conservation and restoration goals under the Kunming-Montreal Global Biodiversity Framework, Ramsar resolutions, 30x30 targets, the UN Decade on Ecosystem Restoration and the UN Decade of Ocean Science.

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## ABOUT THE UN CLIMATE CHANGE HIGH-LEVEL CHAMPIONS

The UN Climate Change High-Level Champions, established in response to the COP21 United Nations Climate Change Conference in Paris, serve as vital intermediaries connecting government initiatives with the voluntary actions of non-state actors, including companies, cities, regions, financial, and educational institutions. The Climate Champions Team works to enhance global climate ambition and

engage these diverse stakeholders in support of the Paris Agreement's goals. In conjunction with these efforts, the 'Race to Zero' campaign rallies non-state actors worldwide to take immediate, rigorous actions to halve global emissions by 2030. Simultaneously, the 'Race to Resilience' campaign catalyzes a transformative shift in global climate resilience, prioritising the well-being of people and nature.

## ABOUT THE GLOBAL MANGROVE ALLIANCE

The Global Mangrove Alliance (GMA) is a rapidly growing coalition of over 50 international and locally-based civil society organizations and research institutions. The GMA was founded in 2018 by Conservation International, IUCN, the Nature Conservancy, Wetlands International, and WWF, all

of which continue to play a governance role in the Alliance through participation in its Steering Committee. Through coordination with its members, working groups, and National Chapters, the Alliance strives to drive protection and restoration and to halt loss of mangroves.

The Roadmap report has been endorsed by the founding GMA Steering Committee, as follows:



## ABOUT THIS REPORT

This paper was authored by Jennifer Ring, Marieta Stefanova, Raiditya Roebiono and Katherine Stodulka (Systemiq). We would also like to gratefully acknowledge the valuable contributions of Annabel Mahgerefteh, Moritz de Chaisemartin and Evelyn Holland (Systemiq), as well as individuals from AXA Climate; Barclays; GAWA Capital; HSBC; Nicholas Institute for Energy, Environment

& Sustainability; ORRAA; Oxford University Environmental Change Institute; Palladium; Salesforce; South Pole; The Nature Conservancy; Wetlands International; Willis Tower Watson and WWF. Nevertheless, the views provided represent the personal views of the individuals consulted, not those of the institutions listed above.





**MANGROVE FOREST**

The river path mangrove forest in Iriomote island, Okinawa, Japan.



## ENDORSEMENTS



"Mangroves offer one of the clearest illustrations of the undeniable link between climate, nature and livelihoods. Now, investment is urgently needed to halt destruction, boost protection, and accelerate restoration of this vital ecosystem. Unlocking capital at the speed and scale required is a challenge, but it is also an opportunity. I therefore welcome this Financial Roadmap, which emphasises the importance of new capital, innovation and collaboration, and which offers clear priorities for action to drive a step change in finance for mangroves."

**Dr Frannie Leautier**  
Senior Partner and CEO, SouthBridge



"Mangroves provide a triple-win for people, nature, and climate and play an outsized role in fighting our global biodiversity crisis. The Global Mangrove Breakthrough is a clarion call to secure the future of 15 million hectares of mangroves worldwide by 2030, and this financial roadmap is a first step to turning that vision into reality. We are pleased to partner in this effort—beginning with the vital work to connect locally led mangrove projects with funding to grow, replicate, and scale **their work.**"

**Cristián Samper**  
Managing Director and Leader for Nature Solutions, Bezos Earth Fund



"The significance of nature in addressing climate change cannot be understated – we must protect and restore our natural ecosystems, such as mangroves. Banks can play an important role by allocating capital to Nature-based Solutions and this roadmap explains the innovative financial solutions that can unlock capital at scale for mangrove-positive action."

**Laura Barlow**  
Group Head of Sustainability and ESG, Barclays



"The Mangrove Breakthrough provides an inspiring example of what a Public-Private-Philanthropic vehicle could look like to accelerate market action in nature. We are very proud to officially support it as one of the flagship Public-Private-Philanthropic Partnerships, under our GAEA Nature Big Bet and help rally philanthropy, governments and most importantly, corporates to unlock and turbocharge action. Congratulations to the team and we hope the Mangrove Breakthrough and its Finance Roadmap provide a template of how philanthropy, public and private can work together at different stages of the innovation and finance journey".

**Luis Alvarado**  
Global Head of GAEA at the World Economic Forum



"ORRAA's strategy focuses on incubating and accelerating an investable project pipeline from the ground up with the effective guardrails to protect coastal communities and nature; addressing the missing middle by crowding in public, private and philanthropic finance, while building the de-risking, investment and data tools – such as the Coastal Risk Index and the High Quality Blue Carbon Principles and Guidance - that are needed for better decisions and better outcomes. We support the Mangrove Breakthrough Financial Roadmap which echoes this pathway and look forward to integrating our work to pull the finance and insurance levers needed to retain and regenerate the world's mangroves at the speed that the biodiversity and climate crises require."

**Karen Sack**  
Executive Director, Ocean Risk and Resilience Action Alliance



"Accelerating financing for mangroves and other marine ecosystems such as coral reefs is critical for both people and planet, particularly in developing countries where many coastal communities rely on these ecosystems to secure food and income. Many of our investment interventions through the Global Fund For Coral Reefs will have substantial impact on mangroves ecosystems. These interventions include marine pollution interception and control, sustainable fishing and aquaculture, and conservation focused ecotourism. Through a holistic multi-stakeholder approach, we can scale financial instruments to unlock capital for these vital ecosystems. As an impact investor, we therefore welcome this report, which identifies concrete collective priorities for action, and look forward to engaging in the execution."

**Craig Cogut**  
Founder of Pegasus Capital Advisors



"Accelerating investment in mangroves is critical for people, biodiversity and planet, and this report identifies concrete priorities for action to this end. The leadership of the Mangrove Breakthrough in collaborating across stakeholders has been vital to the creation of this report and will be a crucial element now in its implementation. We welcome this report and look forward to partnering with the Mangrove Breakthrough in these next steps."

**Alfredo Giron**  
Head of the Ocean Action Agenda, World Economic Forum



"Global Ocean Trust is delighted to endorse this Roadmap. Investment into mangrove ecosystems is environmentally and economically sound. Accelerating such investment is critical for people and nature, this Roadmap shows pathways for collaboration across stakeholders to deliver financial instruments to unlock capital for these vital ecosystems. We welcome this report, offering urgent priorities for action."

**Torsten Thiele**  
Founder of Global Ocean Trust



"Securing the future of the world's mangroves is within reach, but it requires swift, purposeful, and large-scale financial coordination. This Roadmap lays out the blueprint to do just that. Now, it is our responsibility to translate these recommendations into action for the benefit of our climate and the communities that depend on this remarkable natural asset."

**Naomi Morenzoni**  
SVP, Climate & Innovation Philanthropy,  
Salesforce



"Mangrove restoration, done right, holds huge potential for nature, climate and people. Ørsted has seen this first-hand. Since 2022, we've been working with local communities in The Gambia to plant roughly 5000 hectares of mangroves, sharing the benefits of our investment with them directly. Accelerating investment into highly collaborative projects like this is critical to unlocking the benefits these unique ecosystems offer, and we welcome the ambition of this report."

**Virginia Dundas**  
Head of Global Sustainability, Ørsted



"AXA Climate is dedicated to supporting organisations in creating effective climate adaptation strategies. We recognise the critical link between preserving nature and addressing climate challenges. Ecosystems like mangroves have the potential to create a positive impact on communities, climate, and biodiversity. In line with this vision, we have taken a pioneering step by introducing insurance coverage tailored to protect nature from climate risks. However, we acknowledge that this is only a small step on the long journey ahead. In the coming years, all industries will need to commit for a nature-positive future for humanity. The Mangrove Breakthrough financial roadmap represents a crucial milestone in raising awareness and securing funds for the essential protection and restoration of mangroves."

**Ariane Kaploun**  
Nature initiatives Lead, AXA Climate

"Mangroves are one of the planet's most powerful climate solutions. The Mangrove Breakthrough Financial Roadmap is a welcome development to help us to better understand how we can support the protection and restoration of mangroves and the communities they serve, by providing tangible recommendations for how governments, public and private financial institutions, NGOs and others can join hands to help unlock investment at scale."

**Jenny McInnes**  
Group Head of Sustainability Policy  
and Partnerships, HSBC





"Mangroves, as with many nature-based solutions, are critical tools for climate mitigation and adaptation as well as for the conservation of biodiversity. Importantly, while they take time to mature, they represent an opportunity to take immediate action in building much needed resilience. Increasing financing into these essential ecosystems represents a wonderful example of how including nature into our financial system can create materially better outcomes."

**Marisa Drew**  
Chief Sustainability Officer, Standard Chartered



"My colleagues at Oliver Wyman and I are excited to do our part to make the Mangrove Breakthrough a success. Climate change is an existential threat that the global community must tackle together, and the Mangrove Breakthrough is the kind of science-based, measurable intervention at a truly global scale that's needed. With its laser focus on protecting and restoring coastal forests, with their enormous potential as carbon sinks, the initiative gives us all the opportunity to put our energy and resources behind our pledges to save the planet."

**Nick Studer**  
CEO, Oliver Wyman, a business of Marsh McLennan and Interim Chair, the Sustainable Markets Initiative's Energy Transition Task Force



"The conservation of mangroves is vital. Only a coordinated investment approach which combines and mobilizes capital from public and private sources will achieve the speed and scale needed to protect these endangered ecosystems. We welcome this report as it lays out a clear roadmap for action and paves the way for further discussions involving all key stakeholders."

**Maya Ziswiler**  
CEO, UBS Optimus Foundation

earth security

"We have come a long way in understanding the opportunities to finance mangroves as an asset in the fight against climate change. There is no one-size-fits-all approach and collaboration will be key. The roadmap has done a very good job of mapping options, showcasing innovative initiatives, and bringing these messages to the heart of the COP28 process, making the case for raising the level of ambition."

**Alejandro Litovsky**  
CEO of Earth Security

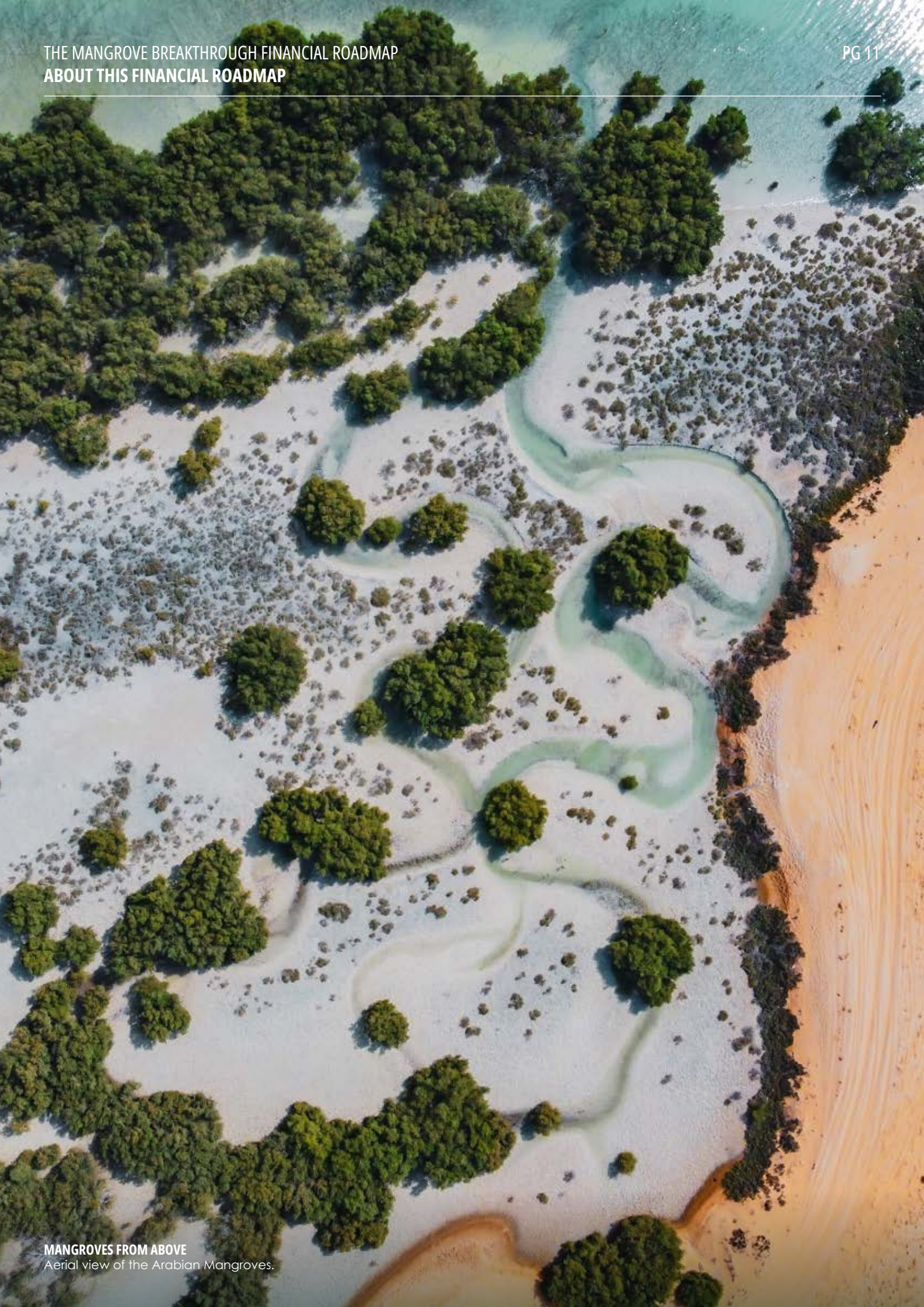
This report is also endorsed by:



"Bank of America has drawn upon our years of experience in sustainable finance to develop ground-breaking public market transactions, including debt-for-nature swaps focused on marine conservation and mangrove restoration. The Mangrove Breakthrough Financial Roadmap underscores the importance of collaboration among diverse stakeholders to scale financial instruments and unlock capital for these vital ecosystems."

**Alexandra Liftman**  
Global Environmental Executive,  
Bank of America







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# Foreword

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The resilience of our planet hangs in the balance. This year, scientists confirmed that humans have crossed six out of nine critical planetary boundaries - the limits of vital global systems. Any chance of a secure, equitable and prosperous future requires us to urgently return to a safe operating space for humanity. But nature offers us hope. Nature-based solutions provide a pathway to harness the power of the natural world to restore vital ecosystem services, reverse biodiversity loss, and foster human health and wealth within planetary boundaries.

Even among nature-based solutions, mangroves stand out as true – often unsung – champions. But mangroves are under threat. Half have already been lost. The loss of mangroves affects us all, but indigenous people and local communities living close to mangroves - overwhelmingly in the Global South - are impacted most.

It doesn't have to be this way. Progress in recent years has shown that it is possible to slow the rate of mangrove loss. In the United Arab Emirates, for example, the Mangrove National Park was planted 50 years ago, and today we have 19 square kilometres of mangroves which not only capture carbon dioxide emissions, but also serve as an important nursery for fish, birds, and other wildlife and support an emerging ecotourism industry.

Securing the future of the mangroves that remain will require urgent collective action. The Mangrove Breakthrough, an ambitious multistakeholder initiative established at COP27, aims to meet this need - by bringing together diverse

stakeholders for transformative action that can turn the tide for mangroves.

Unlocking capital at scale for mangroves will be critical. Long term flows of public, private and philanthropic capital are needed to keep healthy mangroves standing, create nature and people-positive businesses and livelihoods, and to regenerate and restore degraded mangroves. Finance providers must step up - but they cannot do so alone. Policymakers, local communities and indigenous people, NGOs and civil society will all also have a vital role to play.

This Financial Roadmap offers a guiding hand. Its recommendations are both pragmatic and ambitious, identifying opportunities to convene diverse actors around a shared direction of travel and urgent joint priorities. I call on financial institutions, governments, and partners from NGOs, philanthropy, science, and local communities to collectively drive implementation of the Financial Roadmap. Together, we can move further and faster to safeguard mangroves for the benefit of people and planet.



**H.E. Razan Khalifa  
Al Mubarak**

UN Climate Change High-  
Level Champion for COP28

Like in most tropical coastal communities around the world, the mangrove forests in the community of Awak in Pohnpei, Federated States of Micronesia, where I live, provide critical ecosystem services and resources that sustain the livelihoods of our people. As a local resource manager, I understand that mangrove forests provide vital habitat for fish and wildlife, timber, medicine and other cultural resources. Mangrove forests have long been protecting our communities from tropical cyclones and tsunamis, providing a buffer against powerful waves, winds and other natural disasters. Healthy mangroves are integral to the resilience of related ecosystems like seagrass meadows and coral reefs. They are also carbon sequestration powerhouses, converting carbon dioxide to organic carbon more effectively than any other terrestrial ecosystem on earth.

Regrettably, today, mangrove forests in my community and the ecosystem services they provide are being compromised by a dangerous combination of accelerating sea-level rise and unsustainable coastal land use practices. Dredging, the overharvest of timber, infrastructure development, and altered hydrology are just a few of the

human activities that I have witnessed already impacting mangrove ecosystems. As a community traditional leader, I must ensure that the mangrove forests that my people depend on are resilient enough to provide for their livelihoods, as well as strong enough to withstand the impacts of climate change.

I therefore pledge to be a full supporter of this Financial Roadmap, and to help bring its recommendations to life. As their traditional stewards, communities like mine play a crucial role in securing the future of mangroves, but to succeed will take our collective efforts. I invite you to join me on this journey.



### Wendolin Roseo Marquez

Community Traditional Leader, Terrestrial Program Manager and Micronesia Challenge Terrestrial Measures Champion, Micronesia Conservation Trust.



#### UNDER THE SURFACE

The dynamic life that exists below the surface within a mangrove.



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# Executive Summary

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**The world's mangroves are a vital form of natural capital.**

These coastal forests, found in more than 110 countries across the world, are indispensable to human and planetary health. They provide food and livelihoods to millions of people in coastal communities, and offer a haven for biodiversity. They are also one of the planet's most powerful climate solutions, sequestering carbon at 3 – 4 times the rate of terrestrial forests, and protecting millions of the planet's most climate vulnerable people from flooding.

**Yet the future of these critical natural assets is at risk.**

Over half of the world's mangroves have been lost to deforestation and degradation. Twenty percent were lost between 1980 and 2005 alone. Investment in traditional extractive sectors, like unsustainable aquaculture, agriculture and rapid urban expansion, has been a critical driver of mangrove loss. Now, the effects of climate change – including rising sea levels and changes in temperature and precipitation – are intensifying pressures.

**The planet cannot afford to lose mangroves and the crucial services they provide.**

Securing their future will not be easy, but with coordinated, collective action – spearheaded by global initiatives like the Mangrove Breakthrough – it is possible. Radically shifting how and how much capital flows to these vital ecosystems will be a critical piece in this puzzle. An estimated \$4 billion in investment between now and 2030 could build, prove and scale mangrove-positive

investment opportunities, unlocking a new paradigm for sustainable, long-term flows of capital. This report outlines the starting point for investment today, and tangible recommendations to make progress towards this ambitious but achievable goal.

**The good news is that a new asset class of regenerative mangrove-positive business models is already emerging.**

Financing conservation areas will remain critical. But sustainable productive businesses also have a vital role to play in creating long-term, market-driven mechanisms to ensure mangroves are more valuable standing than destroyed. Business models like blue carbon, sustainable aquaculture and fisheries, ecotourism, waste infrastructure, and technology enablers can generate real financial returns while building resilient coastal communities and creating a host of environmental benefits. The Mangrove Transition Curve – an investor tool – maps this diverse landscape of opportunities. Capital with different mandates and risk-return profiles will be required, and combining these sources of capital in “blended” mechanisms will be especially critical to mobilise investment for nascent business models and in emerging markets and developing economies (EMDEs).

**Unlocking this opportunity at the speed and scale needed must tackle structural challenges and inefficiencies in deploying capital.** Today, too little finance is flowing to mangroves. What capital there is comes predominantly

from governments and philanthropic sources. But many EMDE governments – facing weak global growth, rising interest rates and increasing debt burdens – have limited fiscal space for investment in nature. Philanthropic capital is scarce, and development and climate finance has failed to meaningfully tackle the funding gap. Meanwhile private capital for mangrove conservation and restoration remains a drop in the ocean. Barriers to investment include a limited pipeline of projects, and real and perceived risks that raise the cost of capital and mean finance is unavailable, inaccessible, or unaffordable. Despite these challenges, there are signs that the tide is turning for investment in mangroves. New markets and mechanisms, like blue carbon, are gaining ground, and natural capital investors are stepping up to capitalize on this opportunity. Innovative financial instruments that unlock new sources of investment in a sustainable ocean economy are building track record.

At the same time, awareness is growing of mangroves as a low-cost solution to build resilience and reduce physical and financial risks for coastal communities.

**Now, we must go further and faster.** Of the estimated \$4 billion investment needed by 2030, around a third – \$1.2 billion – could come from commercial sources. Philanthropic, development and public finance will deliver the rest. Much of this commercial capital will need to be de-risked through blending with grant and concessional capital. Getting the sequencing right will also be critical: grant and concessional capital have an outsized role to play in the next few years. As the foundations for a new asset class of investable mangrove-positive opportunities move into place, private capital can progressively ramp up towards 2030 and beyond.



**OYSTER HARVEST**

Overview of oyster harvesting in  
Coffin Bay, Australia.

Individual efforts will make a vital contribution to this goal, but a true step change in investment will take collective action on key interventions to build pipeline, prove innovative instruments and business models, and shift incentives. To drive this common effort, the Financial Roadmap recommends a synergistic toolbox of 7 priority financial mechanisms that can together build, prove and scale mangrove-positive investment opportunities as an asset class.

## **1 PARTNERSHIPS FOR MANGROVES**

An integrated incubator and accelerator providing grants and technical assistance to develop and scale mangrove-positive projects and market access players, with a focus on getting projects to bankability.

## **2 GLOBAL FUND FOR MANGROVES**

A blended finance fund deploying concessional and grant funding into de-risking instruments to unlock additional commercial capital for mangrove-positive business models. The fund should be structurally linked to pipeline origination mechanisms.

## **3 DEBT FOR MANGROVE-POSITIVE SMALL AND MEDIUM-SIZED ENTERPRISES (SMES)**

Supporting and incentivising commercial banks and development finance institutions (DFIs) to improve access and affordability of debt for mangrove-positive SMEs, with a focus on domestic capital mobilisation.

## **4 MANGROVE-POSITIVE MICROFINANCE**

Increasing provision of microloans to individuals and micro-enterprises linked to mangrove conservation and restoration, leveraging existing local footprints of Microfinance Institutions (MFIs).



## 5 MANGROVE-LINKED INSURANCE

Integrating mangroves as an adaptation solution into insurance pricing, and triggering more investment into mangrove restoration and protection with risk transfer solutions, including parametric insurance products.

## 6 DOMESTIC SOURCES OF PUBLIC FINANCE

Shifting tax and subsidy regimes to re-allocate financial flows away from mangrove-degrading sectors towards mangrove-positive activities.

## 7 EXTERNAL SOURCES OF PUBLIC FINANCE

Mainstreaming and replicating sovereign debt instruments, including blue bonds and debt-for-nature swaps, complemented by support for wider reform to create a more equitable, efficient and nature-positive international financial architecture.

Many of these interventions intentionally build on existing efforts. All are intended to help fill critical gaps in the investment ecosystem. Collective efforts should start today, prioritising development and scale-up of instruments that build capacity and early stage pipeline, like a Partnerships for Mangroves. Engaging and empowering local communities and institutions in design and implementation will be vital to ensure new projects and instruments are demand-led and fit-for-purpose.

**To unlock capital for mangroves at scale, financial instruments must be complemented by a supportive enabling environment.** Policymakers in mangrove countries should lead the way, focusing on clarifying regulatory and legal frameworks, especially on land tenure, implementing the Kunming-Montreal 30x30 targets, and sending clear market signals, including by integrating mangroves into Nationally Determined Contributions (NDCs). Strengthening the integrity of blue carbon on the supply and demand sides will be critical to embed effectiveness, equity, and trust in one of the leading mechanisms to unlock finance for mangroves. Capitalising on emerging innovations in data architecture and monitoring technologies can also help build investor confidence by creating proof points and track record. Finally, financial institutions and central banks can help improve transparency, drive accountability and shift capital flows by embedding mangroves in regulation, disclosure and taxonomies.



Chapter 1

# Securing the future of mangroves: **A call to action**

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## 1.1

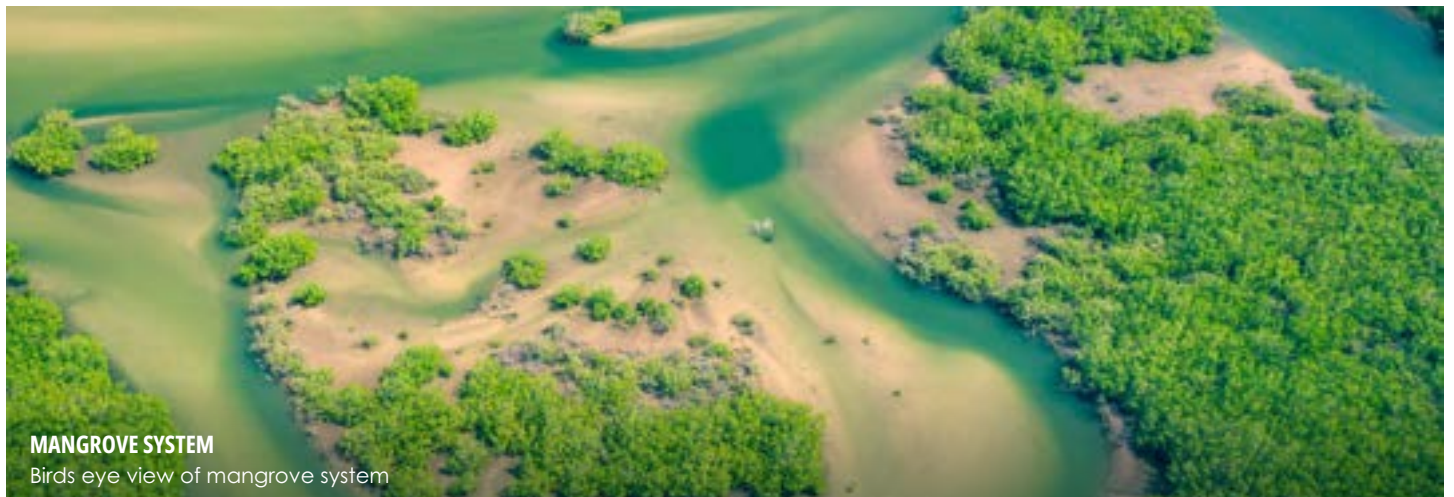
# The case for mangroves

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**Mangrove forests cover just 0.1% of the planet's land surface.<sup>1</sup> Yet these 'blue forests', found along the coasts of tropical and subtropical regions, punch far above their weight, providing vital ecosystem services to people and planet.** They offer a haven for biodiversity, help maintain the climatic conditions that sustain life on earth, and provide protection, food, and livelihoods to coastal communities. In the past, these coastal forests attracted far less attention on the global stage than their counterparts on land. This is starting to change. The world is waking up to the need to secure the future of this extraordinary nature-based solution. Defining the business models to unlock capital for these ecosystems will be critical to harnessing this momentum.

**Healthy mangrove forests directly contribute to human health and wealth.** It is estimated that every \$1 invested in mangrove conservation and restoration generates \$3 in

benefits.<sup>2</sup> For many coastal communities, mangroves are the first line of defence against floods, storms and erosion, protecting lives and property. Studies show that just 100 metres of mangrove forests along the coast can reduce wave heights by up to 66%.<sup>3</sup> Mangroves are also a critical source of food security for communities; their presence supports the production of around 1.4 trillion commercially important fish, prawns, bivalves and crabs each year.<sup>4</sup> This in turn sustains the livelihoods for an estimated 4.1 million small-scale fishers worldwide.<sup>5</sup> Beyond fisheries and aquaculture, mangroves also offer livelihood opportunities through natural resources, including timber, fuelwood, honey, and traditional medicines. Mangrove tourism is estimated to represent a multi-billion dollar industry, attracting tens to hundreds of millions of visitors annually and offering unique cultural significance as spiritual sites, scenic and therapeutic destinations.<sup>6</sup>



**MANGROVE SYSTEM**

Birds eye view of mangrove system



**Mangroves are also crucial biodiversity hotspots, offering unique habitats for terrestrial and marine wildlife, including 341 threatened species.**<sup>7</sup> On land, they provide shelter for animals ranging from Bengal tigers to monkeys and birds. Below water they serve as a nursery for many fish, mollusk and crustacean species, and provide breeding and feeding grounds for other marine dwellers including turtles, dolphins, sharks, manatees and dugongs, crocodiles and alligators. They also provide essential services like water filtration and nutrient cycling that are crucial to the health and resilience

of nearby coastal and marine ecosystems, including coral reefs and seagrass meadows.

**Finally, mangroves are carbon sequestration and storage powerhouses.** Sequestering carbon at up to four times the rate of terrestrial forests and storing carbon not only in their biomass but also in their soil and sediments, mangroves are among the most effective carbon sinks on earth.<sup>8</sup> Worldwide, mangroves currently store carbon equivalent to over 22 gigatons of CO<sub>2</sub>.<sup>9</sup>

## INTRODUCING MANGROVES

Mangroves are a collection of approximately 80 different species of trees or large shrubs that grow in coastal areas in tropical and subtropical climates. They are halophytes, which means they are salt-tolerant plants. They grow particularly well in brackish water, where saltwater and freshwater bodies meet, and where the sediment has a high mud content. Mangroves' tangled roots grow above and below ground, forming dense thickets that are home to a huge variety of plants and animals. Mangrove soils are permanently waterlogged, poor in oxygen, and have constantly changing salinities due to being alternately submerged and exposed to the air as the tide rises and falls. These anaerobic conditions and slow decomposition are also what makes mangrove forests such effective carbon sinks. Mangroves are found in all the world's equatorial regions. The largest population is in Indonesia, where mangrove trees cover almost 3 million hectares (30,000 km<sup>2</sup>), about 20% of the world's total, followed by Brazil, Australia, Mexico and Nigeria.<sup>10</sup>

## 1.2

### Mangroves under threat

Today, mangrove forests cover approximately 14.7 million hectares (147,000km<sup>2</sup>), spanning 117 countries and territories.<sup>11</sup> Yet this area is drastically smaller than it once was; between 1980 and 2005 about 20% of mangrove forests were lost globally<sup>12</sup> and overall historical loss is probably 50% or more largely driven by degradation linked to commodities like shrimp and palm oil, infrastructure expansion, illegal deforestation and pollution.

Fortunately, rates of loss have slowed substantially, with average annual net losses over the last decade of 6,600 hectares (66km<sup>2</sup>) or 0.04% of all mangroves. This decreasing rate of loss is mostly due to increased protection, changing industrial practices, expansion of rehabilitation and restoration and stronger recognition of the ecosystem services provided by mangroves.

**FIGURE 1**  
Global Mangroves Cover



Source: *The State of the World's Mangroves 2021*

**This positive news is welcome – and a testament to the power of concerted action – but it is not the full story.**

Mangroves remain at risk, threatened by a combination of direct human impacts, such as clearance and conversion, as well as by natural and climate change-induced biophysical impacts. While natural gains or large-scale rehabilitation have increased mangrove coverage in some parts of the world, other areas, such as Southeast Asia are experiencing massive loss of old-growth mangroves.<sup>13</sup>

- **Anthropogenic drivers of loss and degradation:** Analyses show that over 60% of losses since 2000 were due to direct human impacts. Of those, the leading driver (47%) is the conversion of land for the production of commodities such as shrimp, fish, rice and palm oil.<sup>14</sup> Mangroves are also destroyed by harvesting for wood and charcoal due to their high-quality timber, by pollution and fertilizer runoff from land-based activities, or by land conversion for infrastructure, urban areas and coastal tourism. Any initiatives or financial instruments that aim to address drivers of loss should take into account the complex interlinkages between drivers of mangrove degradation and wider social vulnerabilities, economic development and poverty alleviation.
- **Natural drivers of loss and degradation:** Events such as erosion, rising sea levels, storms and droughts are also causing significant loss of mangroves, and are further exacerbated by climate change and other human impacts.<sup>15</sup> Mangroves are resilient ecosystems, but the increasing pressure from ever-more frequent extreme weather events and adverse conditions is making it difficult for them to keep up.

**The planet is in the grip of a poly-crisis, facing climate breakdown, biodiversity loss, growing food insecurity, and mounting geopolitical and financial instability. Now, more than ever, we cannot afford to lose mangroves.**

- The loss of just **1%** of remaining mangroves could lead to the equivalent of the annual emissions of **50 million cars**.<sup>16</sup>
- Without healthy mangroves, annual flood damages would increase by an estimated **\$65 billion**, and **15 million more people** would experience floods every year.<sup>17</sup>
- Losing mangroves has the greatest impact on the world's most vulnerable – including indigenous people, coastal communities, and small island developing states (SIDS), where **11%** of the world's mangroves are located.<sup>18</sup>
- Mangrove depletion drives saltwater intrusion in coastal agricultural regions. In 2020, saltwater intrusion in the Mekong delta damaged or destroyed more than **one million hectares** of paddy rice fields.<sup>19</sup>
- Losing mangroves puts the **1,500 species** that depend on them<sup>20</sup> – including **341 threatened species**<sup>21</sup> – at risk.
- Approximately **800,000 hectares** of mangroves are considered restorable globally – if done successfully, this could capture almost **350 million tCO<sub>2</sub>**.<sup>22</sup>



## A RANGE OF ECONOMIC SECTORS HAVE A STAKE IN THRIVING AND RESILIENT MANGROVE ECOSYSTEMS

Mangroves provide critical ecosystem services that fundamentally underpin business models across multiple sectors, but this dependence also brings risks. Businesses are exposed to the potential loss of nature from extreme events, or longer-term shifts in the way that coastal and marine ecosystems function – or cease to function. As well as helping mitigate these risks, transitioning towards nature-positive business models can also unlock significant opportunities. These risks and opportunities can result in a financial impact on a company by increasing or decreasing revenues or expenditures (income statement impacts) or by impacting assets, liabilities or capital (balance sheet impacts).

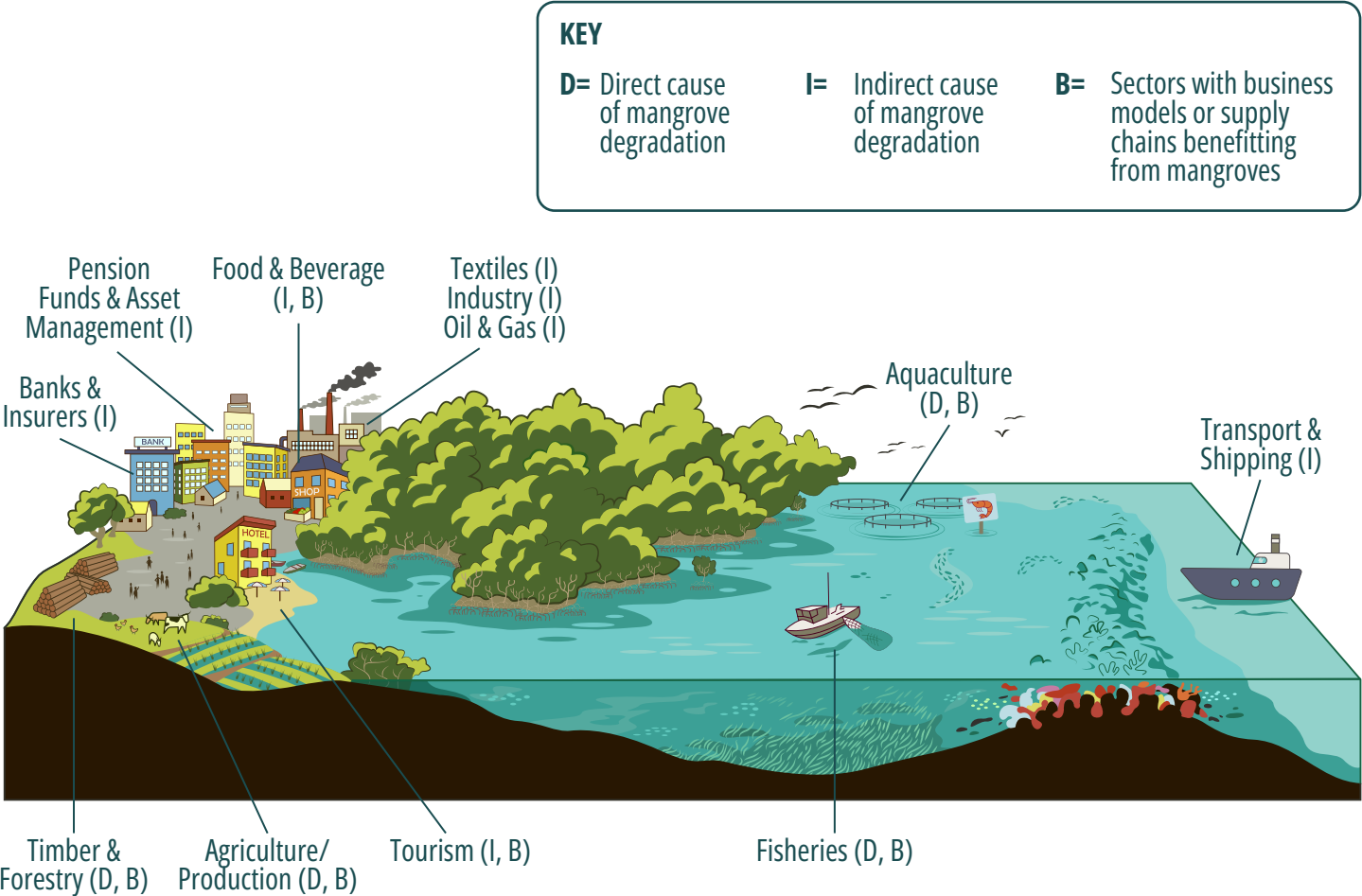
Today, it remains challenging to quantify and internalise the benefits and avoided costs that mangroves provide – or the risks from their degradation and loss. This means those who benefit most from mangroves are rarely incentivised or required to pay to protect and restore them. In many cases, as the graphic below highlights, these same sectors are leading drivers of mangrove degradation and deforestation. For example, aquaculture and fisheries benefit immensely from mangroves' role as nursery or breeding grounds for numerous economically important fish, mollusk and crustacean species, yet those sectors are known to be among the main contributors to mangrove degradation. Others, such as pension funds, asset managers and other investors, are not directly responsible for the destruction of mangroves, but could be causing damage indirectly by providing capital to mangrove-degrading companies.



### **MANGROVE ECOTOURISM**

Ecotourism by kayaking to see mangrove forest at Sam Chong Nuea village in southern Thailand.

**FIGURE 2**  
A range of economic sectors have a stake in thriving and resilient mangrove ecosystems





## 1.3

### The need and opportunity for collaborative action on mangroves

**The case for action to protect, restore and secure the future of these crucial ecosystems is clear.** But to make this possible, investment at scale is urgently needed, as is effective, multi-stakeholder collaboration. The Mangrove Breakthrough is a global initiative established to respond to these needs. Bringing together governments, financial institutions, corporates, philanthropy, NGOs, scientists, and local communities, the Breakthrough aims to mobilise \$4 billion needed to secure the future of 15 million hectares of mangroves globally by 2030, by:

- halting mangrove loss and degradation
- restoring half of recent losses

- doubling protection of mangroves globally
- ensuring sustainable long-term finance for all existing mangrove ecosystems and dependent communities

This report has been developed in partnership with financial institutions, experts and practitioners to provide a 'Financial Roadmap' that can catalyse progress towards the Mangrove Breakthrough's ambitious goals. Through the following chapters, the report lays out a strategy for a toolbox of financial instruments and enabling conditions that can together build, prove and scale mangrove-positive investment opportunities as an asset class.



**MANGROVE TREE ROOTS**

Cross section image of the network of mangrove tree roots

## INTRODUCING THE MANGROVE BREAKTHROUGH

The Mangrove Breakthrough was established at COP27 as part of the Sharm El-Sheikh Adaptation Agenda, building on the Breakthrough Agenda, and the work of the Global Mangrove Alliance. The Breakthrough aims to provide a global compass for the international community, driving concerted action towards its shared goals in five critical ways:

### PATHWAY 1

**Develop a community of action:**

Convening actors and coordinating cross-sector collaboration to catalyse transformative collective action for mangroves.

### PATHWAY 2

**Build bridges between capital and**

**on-the-ground solutions:** Supporting the development of new financial instruments, accelerating project pipeline, mobilising additional capital and ensuring that investment reaches projects aligned with the Breakthrough's goals.

### PATHWAY 3

**Drive a systemic approach:**

Designing mangrove-positive interventions holistically to account for related ecosystems (e.g. seagrass, coral reefs) and diverse stakeholders to drive action for mangroves at the landscape/seascape level.

### PATHWAY 4

**Enhance project transparency and accountability:**

Developing open-source tools and data to share evidence-based insights, track progress towards common goals, and ensure solutions are responsive to community needs.

### PATHWAY 5

**Facilitate learning and knowledge exchange:**

Offering a platform to serve as a knowledge hub and facilitate the exchange of best practices, lessons learned, and innovative solutions.

The Mangrove Breakthrough directly supports achievement of the goals of the Paris Climate Agreement, the ecosystem conservation and restoration goals under the Kunming-Montreal Global Biodiversity Framework, 30x30 targets, Ramsar resolutions, the UN Decade on Ecosystem Restoration, and the UN Decade of Ocean Science. See *Appendix 1*.





## Chapter 2

# Defining the opportunity: Pathways to deploying capital for mangroves

## 2.1

### The Mangrove Transition Curve

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**Without long-term, sustainable flows of finance, mangroves will remain at risk.** But unlocking capital at speed and scale means re-imagining the landscape of mangrove-positive investment opportunities. Financing traditional approaches like conservation areas and restoration projects will of course be critical. But regenerative, productive businesses also have a vital role to play in creating market-driven mechanisms and socio-economic incentives to secure the long-term health of these critical ecosystems.<sup>23</sup>

**The Mangrove Transition Curve – an investor tool – maps this landscape of opportunities.** It identifies the phases along which mangrove health and coverage can evolve: from undisturbed mangroves; to mangroves used productively; cleared mangroves; degraded land; and restored mangroves. For each phase, different mangrove-positive business models will be relevant. By mobilising finance that can keep or move mangroves towards 'healthy states', these business models offer pathways to positively disrupt the transition curve, and secure the future of mangroves.



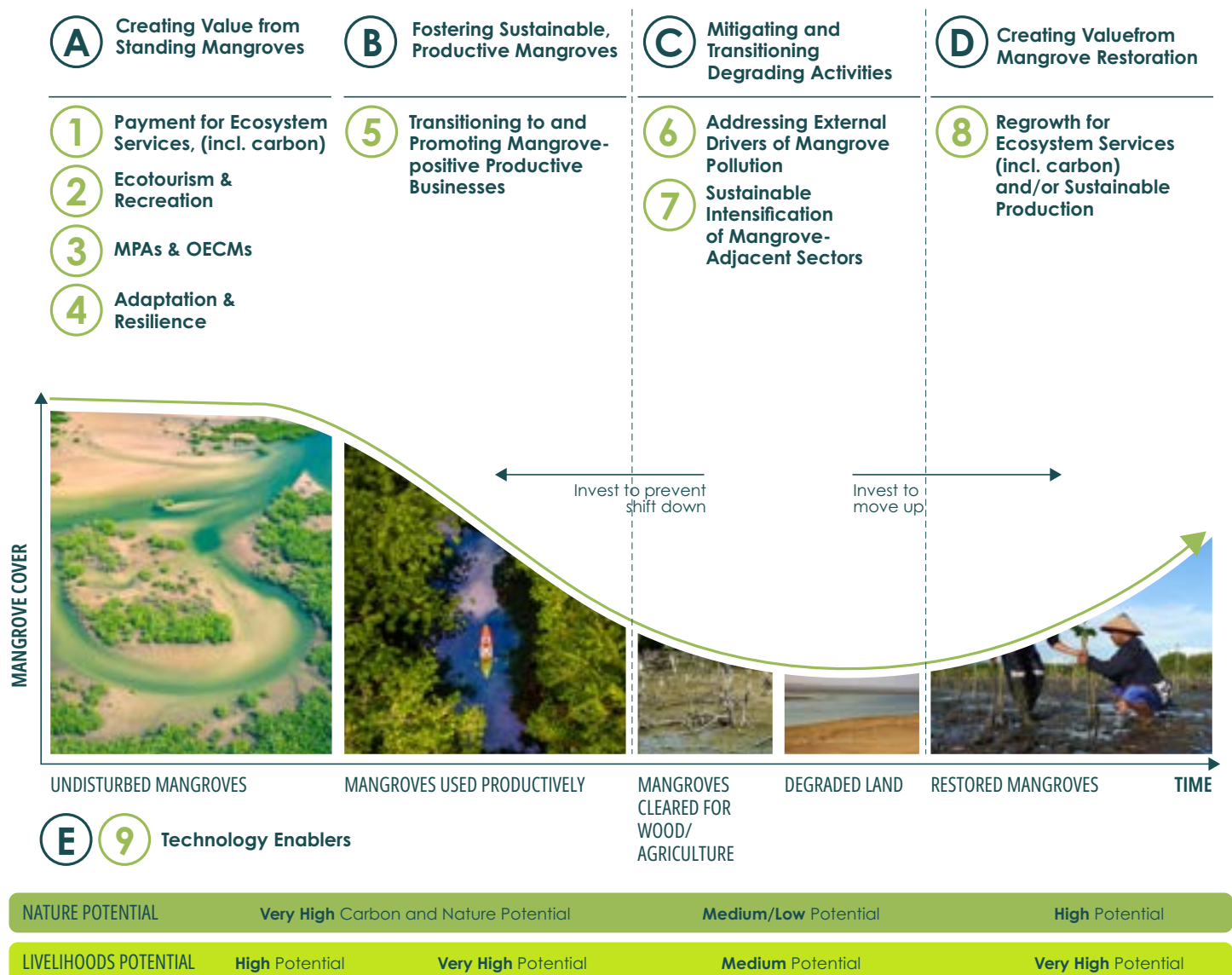
#### OSYTER REEF BALLS

A living shoreline restoration project on the shores of Tampa Bay with oyster reef balls, marsh grass and bagged fossilized shells.



The Mangrove Transition Curve maps the landscape of mangrove-positive business models

## BUSINESS MODELS ALONG THE MANGROVE TRANSITION CURVE<sup>79</sup>



The business models captured by the Mangrove Transition Curve are diverse, offering different risk-return profiles and calling for different types of capital. Despite their differences, these models have important common ground: they all exist today, and can, at scale, help secure the future of mangroves through five main pathways:

### **A** Creating Value from Standing Mangroves

For local communities and governments, there can be real trade-offs between protecting mangroves and putting land to alternative uses or deforesting for timber or firewood. Creating tangible socio-economic incentives for local people to protect mangroves is therefore vital. Archetype A captures business models that rely on intact and healthy mangroves, like carbon credits and payment for other ecosystem services, ecotourism and recreation, marine protected areas (MPAs), and mangroves as green infrastructure for adaptation and resilience.

### **B** Fostering Sustainable Productive Mangroves

Closely connected to Archetype A, Archetype B highlights productive business models that create value from mangroves through supporting livelihoods while minimizing disturbance and maintaining ecological functionality. Examples include sustainable aquaculture and fisheries, foraging of wild mangrove products such as mudcrabs, and selective timber harvesting, among others.

### **C** Mitigating and Transitioning Away from Drivers of Degradation

Investment is needed to scale solutions addressing threats to mangroves. Archetype C identifies business models that mitigate sources of degradation – such as sustainable infrastructure to address sediment flow alterations, wastewater treatment plants or plastic recycling facilities. It also identifies solutions enabling more efficient use of land

in sectors located close to mangroves, like agriculture and aquaculture, to avoid further encroachment and deforestation.

### **D** Creating Value from Restoration

Archetype D highlights the need for investment to move 'back up' the curve, by creating value from mangrove restoration on currently underperforming land. This value can be generated through specific ecosystem services outcomes (e.g. carbon credits), strengthening adaptation and resilience benefits for local people and property, or the future value generated from productive businesses benefitting from restored and healthy ecosystems.

### **E** Scaling Technology Enablers

Software and hardware solutions, as captured by Archetype E, are a transversal lever that can strengthen the sustainability and productivity of other business models along the curve, helping these opportunities reach scale and attract more investment.

Of course, while the Mangrove Transition Curve highlights opportunities to deploy capital, transitioning away from mangrove-destructive investments is as important as investing in mangrove-positive solutions. In many cases, this can and should be the first step for capital holders.

## KEY FOR BUSINESS MODEL DEEP DIVES

Throughout this chapter, symbols are used to show indicative characteristics of each of the business models identified in the Mangrove Transition Curve, building on the methodology outlined in the WEF Ocean Finance Handbook.<sup>24</sup>

In the absence of significant data on investment in the blue economy, the approach relies on subjective assessments based on literature, case studies and interviews with experts as a proxy.

### PROJECT SCALE



Subscale Large

Potential project ticket sizes are shown on a scale and describe the range of investment requirements for typical projects within each business model, going from subscale projects of <\$50,000 to large projects of >\$100 million.

### RETURN POTENTIAL



The symbol shows the typical financial return potential for each type of business model starting from 'not applicable', followed by 'low', 'conservative', 'market average' and 'high'.

### PERCEIVED RISK



The risk thermometer symbol shows perceived risk split into five categories – 'very low', 'low', 'medium', 'high' and 'very high' risk.

### BUSINESS MODEL MATURITY



The business models along the Mangrove Transition Curve are divided into 'nascent' (new and emerging models that most investors are not yet familiar with), 'growing' (sectors with increasing volume of investments building up track record) and 'established' (well-known models with sufficient track record and existing capital flows).





## PROJECT SCALE



Subscale

Large

## RETURN POTENTIAL



Market Average

## PERCEIVED RISK



Very High

## BUSINESS MODEL MATURITY



Nascent

## Payment for Ecosystem Services

### DESCRIPTION

Payment for Ecosystem Services (PES) refers to transactions where users of an ecosystem service contribute financially to the stewards of that service. In the case of mangroves, this means **payments to owners or communities living close to mangroves** for the **benefits** they provide. Examples of **services provided** include carbon sequestration, water filtration, and biodiversity protection.

The PES model is applicable where there is a **clear and direct beneficiary** of a **specific ecosystem service**, who is **willing to pay** for that service. Another notable application is blue carbon, where organisations or individuals are looking to “**offset**” a **liability** incurred elsewhere by financing protection of mangrove habitats. Revenue streams include sale of credits or alternatively direct offtake of credits by companies / countries (opportunity cost of purchasing on the Voluntary Carbon Market (VCM)).

Blue carbon is the most advanced PES market, although biodiversity credits are also gaining traction. While growing, blue carbon still faces scientific uncertainties challenges with **verification and credibility** as well as issues on **lag times, uncertain future demand, and access and land tenure**.

### EXAMPLE BUSINESS MODELS<sup>80</sup>



Corporates investing in a fund financing blue carbon projects to receive preferential access to blue carbon credits and/or a small return (~5%) from sale of those credits. A similar strategy has been adopted by the Livelihoods Carbon Funds (LCF), which finance carbon sequestration projects with significant social impact.<sup>1</sup> Through technical assistance (returnable) grants, and loans, LCF offers upfront financing to project developers for large-scale projects over 10 to 20 years. Business models include ecosystem restoration such as mangroves, agroforestry, and rural energy projects with a geographic focus on Africa, Southeast Asia, and Latin America.



## PROJECT SCALE



## RETURN POTENTIAL



## PERCEIVED RISK



## BUSINESS MODEL MATURITY



## Ecotourism & Recreation

### DESCRIPTION

Ecotourism is a growing form of tourism designed to minimize environmental impacts and support the economies of the local communities. This business model **involves investing in ecotourism businesses that pay owners of or communities living close to mangroves** for the **recreational benefits** that they provide, e.g. helping finance MPAs via user fees. This is a general approach to monetizing a public good such as biodiversity by bundling it with private goods whose value it enhances.

**Ecotourism** can both **conserve the environment** and **improve the well-being of local people and create sustainable livelihoods** (e.g. through **offtake** agreements with mangrove-positive fisheries and aquaculture businesses). **Ecotourism** is most relevant for areas that are easily accessible and have intact mangroves of outstanding natural beauty, high biodiversity or cultural heritage. Careful assessment and management of such sites are critical as **the net impact on mangroves may not be positive** if the financial contribution to mangroves is countered by an unsustainable volume of tourists and insufficient local waste infrastructure.

### EXAMPLE BUSINESS MODELS<sup>81</sup>



- Travel and Tourism corporates committing a percentage of their revenues to financing marine parks close to their operations to increase the attractiveness of their own sites.
- Corporates financing protection or restoration projects on their own land (e.g. private reserve).

A

3

PROJECT SCALE

SubscaleLarge

RETURN POTENTIAL

Conservative

PERCEIVED RISK

Very High

BUSINESS MODEL MATURITY

Nascent

# Marine Protected Areas (MPAs) and Other Effective Area-based Conservation Measures (OECMs)

**DESCRIPTION**

Marine Protected Areas (MPAs) are defined marine and/or coastal areas designated for achieving **long-term conservation** of nature with **associated ecosystem and cultural services**. Their focus is on addressing key anthropogenic stressors through legal and practical means. Levels of protection for MPAs range from strict “no-take” zones to more permissive “sustainable extraction” zone.

MPAs and OECMs, however, run the risk of becoming ‘**paper parks**’ - without effective enforcement sufficient financing, protected areas may fail to fulfil their environmental, social and economic objectives. If local communities are not effectively engaged in the set up and management of those areas, they can encounter a backlash, i.e. from those dependent on fisheries for livelihoods and food or from intersection with tenure rights.

## EXAMPLE BUSINESS MODELS

### Blue finance

Creating bankable MPAs: In partnership with IUCN and Mirova, Blue Finance has structured a \$1.2 million blended finance facility in Belize that aggregates projects to create ‘bankable’ MPAs financed through a combination of grants and loans.<sup>82</sup>

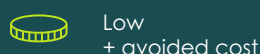




## PROJECT SCALE



## RETURN POTENTIAL



## PERCEIVED RISK



## BUSINESS MODEL MATURITY



## Adaptation and Resilience

### DESCRIPTION

Together with coral reefs and seagrass, mangroves **reduce the power of tidal waves and storm surges, containing coastal erosion and flooding**, thus protecting assets and communities. Investing in mangrove protection and restoration is essentially a form of **green coastal infrastructure**, which is often **more effective and avoids costs in comparison** to investing in **grey infrastructure** like seawalls. Mangrove forests alone **avoid an estimated \$65 billion** in flood damages each year.<sup>83</sup>

The model is applicable where businesses, properties and other infrastructure are **at risk from extreme weather** or where the **livelihoods** of local communities could be **disrupted by climate change impacts**.

While the **protection** provided by **mangroves as coastal infrastructure** has clear benefits, the avoided costs and damages are **not easily monetizable**, which makes unlocking investment challenging. But there are **emerging financial and insurance instruments** that try to align capital with the adaptation and resilience services that mangroves provide.

### EXAMPLE BUSINESS MODELS



- Infrastructure investors protecting or restoring mangroves close to their operations to achieve cost savings from increased climate resilience – a wind power project in Pakistan would save an estimated \$7 million over the project's lifetime.<sup>84</sup>
- Insurers incorporating the ecosystem services mangroves afford into catastrophe (CAT) models and into new or existing insurance products can help unlock additional sources of finance to conserve and restore mangroves.

B

5

## PROJECT SCALE



Subscale

Large

## RETURN POTENTIAL



Conservative

## PERCEIVED RISK



Very High

## BUSINESS MODEL MATURITY



Nascent

## Mangrove-positive Productive Businesses

### DESCRIPTION

Mangroves can be used **productively** to provide **valuable resources, sources of income, and livelihood opportunities** for local communities. Those uses are often based on existing traditional practices which also minimize disturbance and maintain the ecological functionality of the ecosystem.

Examples of **mangrove-positive businesses provided** include **sustainable aquaculture** such as oyster farming, **sustainable fisheries**, foraging of wild mangrove products such as **honey, alternative crops** such as salicornia, **selective timber harvesting, tannins, and traditional medicines**.

### EXAMPLE BUSINESS MODELS



- Sustainable Development of Mangrove Agriculture (DEDURAM) project in Guinea-Bissau aims to promote innovative agricultural production techniques of mangrove salt and rice sectors and improve livelihood of local coastal communities.<sup>85</sup>
- The PARFA project, a collaboration between IFAD, UNIDO, and the Government of Senegal, funded a large-scale restoration of the mangroves in the Saloum Delta, which set the stage for new agricultural ventures involving oysters and honey.<sup>86</sup>



## PROJECT SCALE



## RETURN POTENTIAL



Market Average

## PERCEIVED RISK



Medium

## BUSINESS MODEL MATURITY



Established

## Addressing External Drivers of Mangrove Pollution

### DESCRIPTION

**Pollution** is a major **contributor to mangrove loss**. While **plastics** have been the subject of increased attention in recent years, mangroves are also negatively affected by hydrology and sediment flow changes caused by **wastewater, fertilizer runoff** and **siltation** from **land-based activities**, which are primary causes of expanding hypoxic (low oxygen) zones. Investing, in particular in **sustainable infrastructure**, to counter those drivers of degradation, reduces the burden on mangroves. **Applicable sectors** include:

- Collection, sorting & recycling of waste, with a strong focus on plastic
- Wastewater treatment facilities
- Agricultural pollution management and practices
- Design of hydrological facilities & remediation of sediment flow impacts
- Clean energy reducing negative mangrove impacts

### EXAMPLE BUSINESS MODELS



- Blended finance fund providing technical assistance and debt to establish a wastewater treatment plant in a coastal city close to mangroves.
- GreenCollar's Reef Credits is a scheme paying landholders and farmers for changes in land management that reduce pollutants entering the Great Barrier Reef.<sup>87</sup>





## PROJECT SCALE



Subscale

Large

## RETURN POTENTIAL



Market Average

## PERCEIVED RISK



High

## BUSINESS MODEL MATURITY



Nascent

## Sustainable intensification of mangrove-adjacent sectors

### DESCRIPTION

**Aquaculture, agriculture and inefficient urban development** are leading causes of mangrove **degradation**. Integrating nature-based solutions, sustainably intensifying **production** on land which has already been cleared, or moving to **closed farming systems** can **reduce the burden** of these sectors on **intact mangroves** and **prevent further deforestation**. Transitioning **unsustainable aquaculture or agriculture practices** that have led to inefficiencies and mangrove damage can **improve yields**, and adopting better practices for urban planning can **reduce sprawl and encroachment into mangrove territories**.

One of the main risks with intensification models is the **potential for rebound effects**, which can **reduce the initial environmental gains** due to an increase in demand.

### EXAMPLE BUSINESS MODELS



'Climate Smart Shrimp' is an initiative developed by Conservation International in response to the plans of the Government of Indonesia to increase shrimp farming by 250% and recognizing that shrimp farms are known to be a main driver of mangrove clearing. Ultimately, this initiative will become a fund enabling small scale shrimp farmers to sustainably intensify their farms, producing more shrimp on a smaller area and supporting mangrove restoration on the unused pond area.<sup>88</sup> Conservation International is working on two pilots – in Indonesia with the start-up JALA<sup>89</sup>, and in Ecuador, and aims to raise \$100 million fund to scale the initiative in both regions.<sup>90</sup>

D

8

PROJECT SCALE

SubscaleLarge

RETURN POTENTIAL

Market Average

PERCEIVED RISK

Very High

BUSINESS MODEL MATURITY

Nascent

## Mangrove Restoration

**DESCRIPTION**

Restoration models involve **regeneration and regrowth** of mangroves on currently **underperforming lands** where historically mangroves were present. Desired outcomes and revenue streams can include:

- **Ecosystem services**, including **carbon sequestration** (i.e. generating blue carbon credits), **water filtration, creating habitats and nurseries for fish & marine life, shoreline protection** from erosion and flooding
- **Productive uses** of restored mangroves

Crucially, any restoration efforts should be based on the **best available science** to **increase the chances of survival** and **ensure no damage is done** to other critical ecosystems such as mudflats and seagrass meadows.

**Blue carbon** is a leading mechanism to **finance restoration**, but faces challenges including scientific uncertainties, wider carbon market integrity issues, long lag times between investment and sale of credits and unpredictable future demand and prices for credits.

### EXAMPLE BUSINESS MODELS



Corporates financing blue carbon projects: A blue carbon mangrove restoration project in Pakistan currently on the way is on course to deliver an estimated total of 244 million carbon credits and sequester an estimated 142 million tons of CO2 over its 60-year lifetime.<sup>91</sup> It is a landscape – scale project which aims to protect and restore the entire ecosystem and increase climate resiliency in the southern Sindh province, an area severely impacted by floods of 2022.

E

9

PROJECT SCALE

SubscaleLarge

RETURN POTENTIAL

Very High

PERCEIVED RISK

Very High

BUSINESS MODEL MATURITY

Growing

# Technology Enablers

**DESCRIPTION**

Technology enablers encompass a broad suite of **hardware and software-based solutions** supporting any activity involved in the protection or restoration of mangrove and other coastal ecosystems.

Technologies include, among others, **drones for reforestation; IOT and big data** for optimization and predictive analytics; monitoring, reporting and verification (**MRV**) **technologies** such as satellite monitoring (see Global Mangrove Watch); technology that **improves transparency** such as **blockchain for carbon transactions**; and technology such as mobile apps and platforms that **connect local communities to higher-paying markets** for their products. These areas are evolving to **address a wide range of environmental challenges** including habitat destruction, deforestation, soil degradation, water pollution, and species loss.

EXAMPLE BUSINESS MODELS



- Research grants for early-stage coastal innovation.
- Venture capital funds, incubators and accelerators providing funding and support to prove and scale emerging technological solutions related to mangroves and coastal ecosystems.



## 2.2

# Matching capital with mangrove-positive projects

Different types of capital have distinct mandates and risk-return profiles. These sources of capital are complementary, and can be deployed standalone, or combined in “blended” mechanisms that can unlock additional investment.

### SOURCES OF FUNDING

Grant funding	Concessional	Commercial
Capital that does not require repayment or financial return from donor governments and their agencies, philanthropies, Multilateral Development Banks (MDBs) and climate funds, and which is deployed to realise specific environmental or social outcomes.	Capital that is offered on terms below market rate. <sup>25</sup> Concessionality can come in various forms, including lower interest rate or longer tenor loans. Concessional capital providers include MDBs, Development Finance Institutions (DFIs) and impact investors.	Capital that requires a risk-adjusted market-based return. <sup>26</sup> Providers of commercial capital include private financial institutions such as banks, private equity and pension funds.

Deploying concessional or grant funding into de-risking instruments can help unlock additional commercial capital for nascent business models (like nature-based solutions) and geographies with higher perceived risk (especially climate-vulnerable emerging markets and developing economies). Smart de-risking instruments can lower the

cost of capital, enhance repayment security, support capacity-building efforts and boost project attractiveness. The amount of concessional or grant capital used to de-risk a project or fund should ideally get lower over time as commercial investors become more familiar with the asset class or country.<sup>27</sup>



## 2.3

# Financial instruments for investing in marine and coastal ecosystems

There are a range of financial instruments already deploying capital in the blue economy. Mechanisms with applications for financing mangroves include insurance, debt, equity, and impact-only instruments:









**FIGURE 5**

Instruments deploying capital in the blue economy

CATEGORY	INSTRUMENT	DESCRIPTION	EXAMPLES
Insurance	Parametric insurance	• Insurance cover with payments linked to a triggering event such as extreme weather, unlocking funding for restoration of insured natural capital or revenue streams linked to an ecosystem e.g. SwissRe / TNC Mesoamerican coral reef insurance (Mexico).	 
	Indemnity insurance	• Incorporating coastal ecosystems as an adaptation solution into insurance policy pricing e.g. the Restoration Insurance Service Company (RISCO) models the benefits of mangrove restoration where insurance companies pay a fee for their risk-reducing services (The Philippines, Asia).	
	Microinsurance	• Protection of low-income people against specific risks like natural disasters e.g. UNDP's microinsurance programme solution for the Pacific coastal fisheries sector (Fiji).	 
Debt	Sustainability-linked loans (SLLs)	• Loans which are contingent on or incentivise the borrower's achievement of predetermined sustainability practices e.g. ING's loan to Olam for sustainable agricultural investments (Asia).	 
	Blue bonds	• Debt instrument issued by governments, development banks or others to raise capital [from impact investors] to finance marine, ocean-based and coastal resilience projects e.g. Seychelles blue bond.	 
	Resilience & CAT bonds	• Risk-linked securities that transfer a specified set of risks from a sponsor to investors. Based on the same modelling as Catastrophe (CAT) Bonds, Resilience Bonds are designed to fund both proactive risk reduction projects and reactive disaster recovery actions.	 
	Microfinance Loans	• The application of existing debt instruments at the smallest scale, designed for Least Developed Countries (LDCs) and Small Island Developing States (SIDS) e.g. Grameen Bank.	
	Sustainability-linked bonds (SLBs)	• Borrowing instruments where financial and structural characteristics are based on whether the issuer achieves sustainability or ESG metrics within a given timeframe e.g. Enel's SGD-Linked Bonds and Chile's 20-year SLB.	 
	Municipal Bonds	• Debt instruments issued by sub-national governments to finance ongoing operations or support sub-national governments project/spending e.g. Miami (US) Forever Bond which includes fund to support projects addressing sea-level rise and flooding, including mangroves protection and restoration.	
	Revolving Loan Fund	• Provides lending to smallholders and small business owners who cannot otherwise access capital e.g. California Fisheries Fund.	
	Debt-for-nature Swaps	• Voluntary financial transactions where a country's foreign debt obligations are exchanged or forgiven for investment in, and commitment to, protection of nature e.g. Seychelles Debt-for-Nature Swap (SeyCCAT).	



## CHAPTER 2 Defining the opportunity: Pathways to deploying capital for mangroves

CATEGORY	INSTRUMENT	DESCRIPTION	EXAMPLES
Debt / Equity	Blended Funds	<ul style="list-style-type: none"> <li>Fund models that combine grants or other development funding with private capital, where the development funding reduces investment risks in the short term e.g. Global Fund Coral Reefs (GFCR) and Nature+ Accelerator Fund.</li> </ul>	 
	Emission Reduction Purchase Agreements	<ul style="list-style-type: none"> <li>(Voluntary) Emissions Reduction Purchase Agreements - (VERPAs), are binding purchase agreements signed between buyers and sellers of carbon offsets that can be used to pre-finance mangrove restoration projects, e.g., Plan Vivo forward contracts.</li> </ul>	
Equity	Impact Investing	<ul style="list-style-type: none"> <li>Investments made with the intention to generate positive, measurable social and environmental impacts alongside positive financial returns e.g. Althelia's Sustainable Ocean Fund and Sky's Ocean Ventures.</li> </ul>	 
	Venture Capital	<ul style="list-style-type: none"> <li>Private equity financing for early-stage businesses. Ocean/marine-related VC is rare and overlaps with impact investors who value the blue economy. Some hybrid entities combine VC with other tools like accelerators or clusters to invest in ocean projects e.g. Icelandic ocean cluster and Katapult Ocean's accelerator.</li> </ul>	 
	Growth Equity	<ul style="list-style-type: none"> <li>Private equity financing for relatively mature businesses that have potential for scalable and renewed growth e.g. Ocean 14 Capital.</li> </ul>	
Impact-only	Grants	<ul style="list-style-type: none"> <li>Funding given by an entity for a beneficial project e.g. Conservation International Ventures and International Climate Initiative (IKI) EbA Facility. Grants do not expect any financial return, so they can be used in contexts where commercial finance is not viable.</li> </ul>	 
	Technical Assistance	<ul style="list-style-type: none"> <li>Funding designed to improve the pipeline of investable projects through providing financial and technical assistance for the development of projects, or for supporting businesses to enhance their impact case, address ESG deficiencies etc. e.g. ADB's Ocean Resilience and Coastal Adaptation Trust Fund (ORCA-TF) and World Bank's Indonesia Challenge Fund.</li> </ul>	 
	Project Preparation Grants	<ul style="list-style-type: none"> <li>Funding designed to finance the origination and preparation of a project (e.g. feasibility studies and technical assistance) in order to prepare future investment projects e.g. ADB's Ocean Resilience and Coastal Adaptation Trust Fund (ORCA-TF) and Green Climate Fund's Project Preparation Facility (PPF).</li> </ul>	 





## Chapter 3

# Closing the gap: The investment need and opportunity for mangroves

**Despite their extraordinary potential as a nature-based solution, mangroves face a funding gap.** At the root of this under-investment is the market's failure to value critical ecosystem services that mangroves provide. Where markets fail, governments and other grant-providers must step in. Indeed, most investment in mangrove protection and restoration to date has come from public and philanthropic sources. Unfortunately, public and philanthropic funding is insufficient to meet the volumes of capital needed to protect and restore mangroves.<sup>28</sup>

**For many governments, tax revenues are insufficient to cover some basic services.** Tight fiscal conditions have been exacerbated by the impact of COVID-19, weak global growth and rising interest rates. Together, these conditions have precipitated a debt crisis in many low- and middle-income countries. More than half of EMDEs – where mangroves are overwhelmingly found – are in or facing debt distress, limiting the fiscal space for investment in mangroves and related ecosystems, despite their role as a low-cost solution to build local resilience, generate jobs, strengthen food security and reduce physical and financial risks for coastal communities.

**Donor countries, philanthropies and development and climate finance institutions can help make up the shortfall.**

The governments of Australia and Luxembourg, for instance, have launched the Blue Capital Accelerator Fund (BCAF) and the Blue Natural Capital Financing Facility (BNCFF) to develop ocean-positive pipeline in developing countries.

Philanthropic funding for SDG14, Life Below Water, more than doubled from \$0.5 billion in 2010 to \$1.2 billion in 2020, as dedicated ocean foundations, corporates and other donors with nature and climate mandates stepped up contributions.<sup>29</sup> MDBs have committed funding to ocean initiatives, such as the World Bank ocean portfolio (\$9 billion as of June 2021)<sup>30</sup>, and the Asian Development Bank (ADB) Action Plan for Healthy Oceans (\$5 billion committed for 2019-2024).

**These examples suggest movement in the right direction, but they are far from investment at the scale required.**

Annual public, philanthropic and development finance committed to SDG14 is estimated at around \$25 billion – less than any other Sustainable Development Goal, and equivalent to only 15% of the estimated \$174 billion financing that's needed each year.<sup>31</sup> In 2020, the top 25 official development assistance (ODA) providers committed a total of \$1.9 billion towards SDG14 – less than 2% of the funding need.<sup>32</sup> Of this, mangroves receive a fraction. Analysis of the OECD's biodiversity-related ODA data shows that annual commitments to projects involving mangroves between 2011–2020 came to just ~\$30 million p.a.<sup>ii</sup> Despite the ocean's vital role as a mitigation and adaptation solution for climate change, it receives a tiny share of climate finance. Only ~1% of total adaptation finance is invested in coastal protection, while less than 2% of finance provided by the Green Climate Fund goes towards marine and coastal ecosystems, and just 0.7% from the Global Environmental Facility.<sup>33</sup>

ii The analysis has been performed using keywords in the project descriptions. The OECD database used includes only ODA related to biodiversity. Any mangrove projects/funding that might not have received a biodiversity marker are not captured here. Conversely, some projects that contain the keyword “mangroves” have a broader scope, which could overstate the amount going to mangrove-related activities.



## Case Study

## FSD AFRICA

Financial Sector Deepening Africa (FSD Africa) is a UK Aid-funded specialist development organisation, headquartered in Kenya. Its sister organisation, FSDAi, is an investment vehicle backed by the UK government with more than \$140 million in investment capital. FSDAi works alongside FSD Africa to undertake coordinated action on nature-based solutions, including targeted financing interventions across the mangrove value chain. Some existing or emerging FSD Africa/FSDAi initiatives include: designing and piloting a carbon accelerator programme for project developers in partnership with Africa Carbon Markets Initiative; providing grant support to West Africa Blue for project work to design a best-in-class community benefit-sharing framework, with applications to a mangrove restoration and conservation project in Sierra Leone; and pilot investment in the West Africa Blue mangrove project to scale up the availability of early-stage project development financing via a dedicated facility deploying medium-term debt instruments de-risked with credit guarantees.

**In this context of under-investment and fiscal constraints, governments are increasingly looking to innovative mechanisms that unlock finance for mangrove and ocean-positive projects.** Blue bonds, an emerging debt instrument for governments or corporates to raise capital for projects with ocean benefits, have seen growing momentum since 2018, when the Seychelles launched the world's first sovereign blue bond. Blue bonds can also be structured alongside debt-for-nature swaps (DNS), an instrument which helps unlock conservation finance while simultaneously reducing sovereign debt risks. In just 5 years, between 2018 and 2022, 26 blue bond transactions took place, freeing up a total of \$5 billion to protect and restore marine and coastal ecosystems, and to accelerate development of a sustainable ocean economy.<sup>34</sup> This positive momentum looks

set to continue. Two new large sovereign bond issuances tied to debt for nature swaps have been announced in 2023 by Ecuador and Gabon. Despite this rising tide, blue bonds still make up less than 0.5% of the sustainable debt market<sup>35</sup>, and there are only a few existing debt-for-nature swaps. What's more, even where finance is ringfenced for the ocean, regenerative and mangrove-positive projects are often just a small proportion of the overall finance unlocked. The design and scale-up of innovative mechanisms mobilising investment specifically for mangroves is therefore key.

## Case Study

**M40**

The M40 programme, led by Earth Security, is creating a global pipeline of mangrove-positive business models, bridging the gap between commercial capital and the conservation and restoration of mangroves. It includes proposals in sectors such as sustainable aquaculture, green infrastructure, agroforestry, blue carbon, tech, and ecotourism, which will be scaled across the 40 regions with the highest concentrations of mangroves globally. In collaboration with UBS Optimus Foundation, investment pilots are being developed in key countries like Indonesia. The Global Environment Facility (GEF) is supporting the M40 pipeline's expansion in Least Developed Countries. The programme has catalysed the development of 'Mangrove Insurance' products in the Philippines and the scoping of a 'Mangrove Bond' in collaboration with HSBC Australia. Future plans include developing regional investment blueprints and a fund in 2025.<sup>37</sup>

**Private finance is the engine of the traditional ocean economy.** Capital continues to flow at scale to polluting and extractive sectors like industrial fishing, oil and gas, unsustainable wood harvesting, dredging and poorly placed port development. By contrast, private investment in regenerative mangrove-positive business models has historically been a drop in the ocean. Lack of investable project pipeline is a critical challenge. As highlighted by the Mangrove Transition Curve, sustainable mangrove-related business models offer a range of different return profiles, but in some cases these can be low or even negative. Investment ticket sizes are typically small, implying high transaction costs when deploying larger pools of capital. The expertise, capacity, and early-stage concessional funding to scale pipeline is often absent or in short supply, and significant variability in local conditions makes projects difficult to replicate. There are also barriers to investment on the cost of capital side. Many business models lack clear track record demonstrating financial returns, often coupled with a lack of impact data, especially on biodiversity and adaptation outcomes. Investors – particularly those based in

the Global North – lack familiarity with EMDE markets where mangroves are typically found, creating a heightened perception of risk. Perceived risk can be compounded by real risks, including exchange rate risks, political instability and weak regulatory environments, especially around land tenure and carbon market integrity.<sup>38</sup>

**Despite these challenges, there are signs that the tide of private finance is starting to turn.** A survey by Credit Suisse found that 75% of respondents (largely institutional investors) now consider the sustainable ocean economy investable.<sup>39</sup> Private finance flows for marine nature-based solutions are now estimated at \$2.6 billion, driven by investment in sustainable fisheries supply chains.<sup>40</sup> Early-stage private investment in ocean health is also gaining momentum. Around \$1.4 billion has been raised or committed since 2018 for investment in ocean innovation across sustainable seafood, solutions to ocean pollution, green shipping, ocean data, and habitat protection and restoration.<sup>41</sup> Blended finance funds also offer blueprints for how grant and concessional finance can de-risk and crowd in private investment for regenerative, ocean-positive projects.

**CHAPTER 3 Closing the gap: The investment need and opportunity for mangroves**

**In parallel, blue carbon is gaining ground as a high-potential mechanism to attract private investment into carbon-rich marine and coastal ecosystems like mangroves.** The

voluntary carbon market is growing exponentially – a \$2 billion market in 2021, it is expected to reach between \$15 billion and \$47 billion in 2030.<sup>42</sup> Blue carbon credits are still in their infancy, making up less than 1% of nature-based credits issued to date. But there are clear signs that their share is set to grow at pace, as science resolves uncertainties around the abatement impact of solutions, and methodologies

to report and quantify this impact gain acceptance.

Mangrove protection and restoration, which are among the most established blue carbon solutions, have much to gain from this maturing market, and natural capital investors are already taking advantage of this opportunity. Mirova, Climate Asset Management and Livelihoods Funds, and Schroders (in partnership with Conservation International) for instance, have all launched funds investing in projects generating blue carbon credits – including mangrove restoration.

## Case Study

**MIROVA**

Mirova is a dedicated sustainable investment manager managing funds for public and private investors across seven asset classes - including Natural Capital. Under this specialised strategy, Mirova targets projects that deliver returns while bolstering ecosystem conservation and restoration and strengthening sustainable livelihoods for local communities. Investment in coastal ecosystems is central to this strategy. The €50 million L'Oreal Fund for Nature Regeneration focuses on restoring and regenerating mangroves and marine areas, as well as degraded land and forests.<sup>43</sup> The Althelia Sustainable Ocean Fund, a \$132 million blended fund de-risked by a \$50 million guarantee facility from USAID invests in ocean conservation, including marine protected areas, as well as in sustainable seafood and solutions to ocean pollution that also boost the health of marine and coastal ecosystems.<sup>44</sup> Mirova's other nature funds include the Land Degradation Neutrality Fund, a \$208 million fund that brings together public and private capital to provide long-term financing to sustainable land-use projects that tackle land degradation through sustainable agriculture, sustainable forestry and other land-use related sectors, as well as the Climate Fund for Nature, a €300 million fund to finance high-quality projects that remove carbon emissions and reduce deforestation, with a particular focus on empowering women.

**To address these challenges and make progress towards the Mangrove Breakthrough's \$4 billion target, two sets of interventions are needed.** First, a complementary package of financial instruments and vehicles that can

create pipeline and mobilise capital at speed and scale for mangroves. Second, targeted interventions to create a supportive enabling environment.





**SMALL SCALE FISHING**

Small scale fishing off of the mangroves  
in Songkhla, Thailand



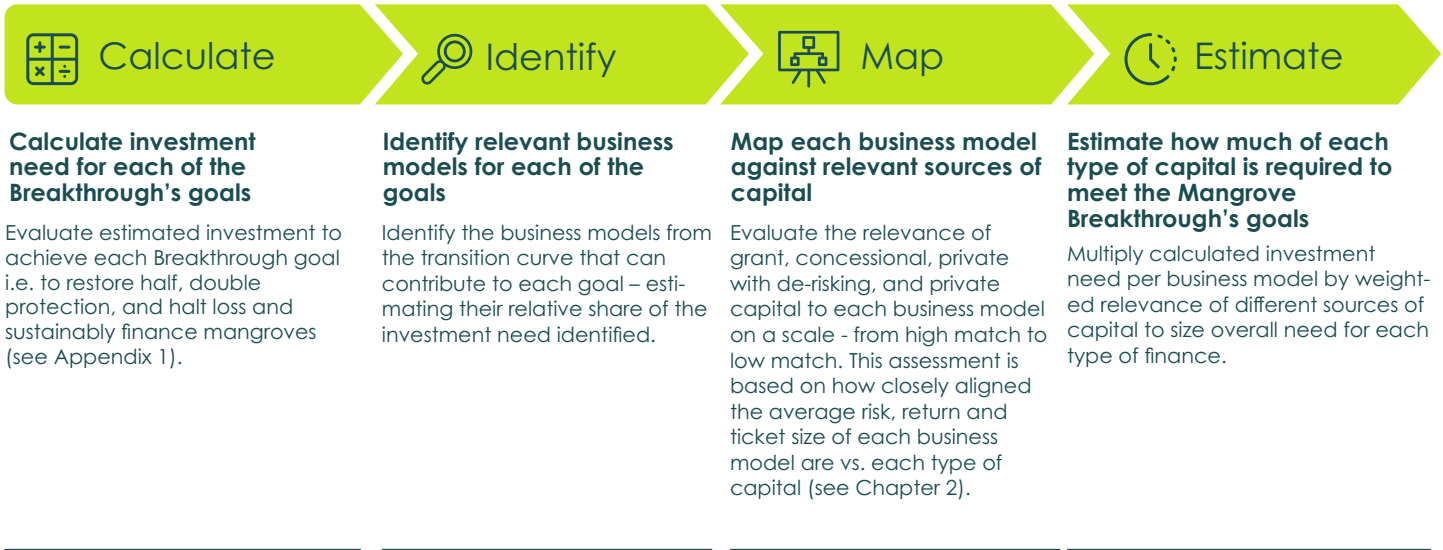
## Chapter 4

# Designing a Financial Roadmap to mobilise capital for mangroves

**There is no silver bullet to tackle the mangroves funding gap and unlock investment at scale.** Achieving the Breakthrough's goals to halt loss, restore half, double protection and sustainably finance mangroves will call for a toolbox of interventions. Business models from across the Transition Curve must be proven and scaled, and a suite of financial instruments will be needed to match different project types at varying stages of maturity. Collective action can be a powerful lever. When a critical mass of stakeholders across a sector move together, their efforts complement and enable the actions of others. With sufficient momentum, these efforts can reach a tipping point, allowing key actors to break away from the business-as-usual path, and to together deliver the needed outcomes at pace.

**No single source of capital will be sufficient to achieve this task. Of the \$4 billion investment need, an estimated ~\$2.8 billion (70%) must be met by grant and concessional capital – with the remaining ~\$1.2 billion coming from commercial capital.<sup>iii</sup>** Much of this commercial capital will need to be de-risked through blending with grant and concessional capital. Getting the sequencing of capital deployment right will be critical: grant and concessional capital have an outsized role to play in the next few years to help crystallise a new asset class of mangrove-positive investment opportunities – by building and maturing pipeline, creating proof points for nascent business models, and providing de-risking capital for blended instruments. **With these foundations in place, private capital can progressively ramp up towards 2030 and beyond.**

**FIGURE 6**  
Methodology for calculating share of \$4 billion investment need to be met by different sources of capital



iii See Appendix 2 and methodology box



**CHAPTER 4 Designing a Financial Roadmap to mobilise capital for mangroves**

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Coordinated action by diverse capital holders will be needed. This Financial Roadmap has been developed to create a shared direction of travel and joint priorities for a toolbox of financial instruments which can together achieve the Breakthrough's ambitious goals. The Roadmap presented here is, of course, not the only possible solution – there could be others. But any fit-for-purpose package of financial instruments must respond to core design principles arising from the \$4 billion investment need and funding gap facing mangroves today:

- **Diversify sources of capital for mangroves:** While public finance and philanthropy will continue to deliver the lion's share of mangrove-positive funding, impact and commercial capital is also urgently needed. Catalytic capital can provide crucial de-risking to mobilise private finance for nascent commercial opportunities.
- **Prioritise pipeline development and link to de-risking:** Increasing the availability, affordability and access to finance is key, but not enough on its own. The volume and scale of investable projects must grow first and fast to ensure capital gets deployed. Dedicated nature-based incubator, accelerator, and project preparation facilities will be key, as will linking de-risking instruments to funding for pipeline. Again, public and philanthropic capital will be a critical source of funding.
- **Scale intermediaries to accelerate investment:** Many community producers lack the scale, technical expertise and logistical and processing capacity to take their products to markets offering premiums for mangrove-positive products. Market access players (MAPs) – sustainability-conscious offtakers – can play a vital role in integrating the value chain by aggregating products to sell to high value markets, generating better returns for communities and opportunities to scale.
- **Create financial incentives to conserve what exists:** Mangrove restoration is important, but it is far less efficient than keeping existing mangroves standing. Financial mechanisms can help ensure coastal ecosystems are more valuable intact than destroyed, creating incentives for local communities, businesses and governments to steward local mangroves.
- **Embrace innovation, but replicate what works:** Instruments which build financial stability in mangrove countries, especially those on the front lines of climate change, should be prioritised. Replicating what works – including in other marine, coastal, and forest ecosystems – will be key to get to scale fast. In parallel, new mechanisms can increase resilience by targeting specific risks, diversifying revenue streams, and strengthening incentives to conserve ecosystems protecting communities. Developing pilots and track record for these emerging instruments, unfamiliar markets and nascent business models can help unlock additional capital.



- **Foreground equitable outcomes:** Instruments must respond to local needs, creating opportunities for and empowering local communities – especially indigenous people, women and other marginalized groups. Equity is also critical at a country level: financing should not unsustainably increase debt burdens, and should align with efforts to create fairer North-South finance flows for climate, nature and development.
- **Embed synergies:** The Roadmap should be designed as a package of interventions that is greater than the sum of its individual parts. This means the instruments selected, and their suggested sequencing, should recognize and leverage interdependencies between vehicles to reduce transaction costs and progressively build, prove and scale the mangrove ecosystem.

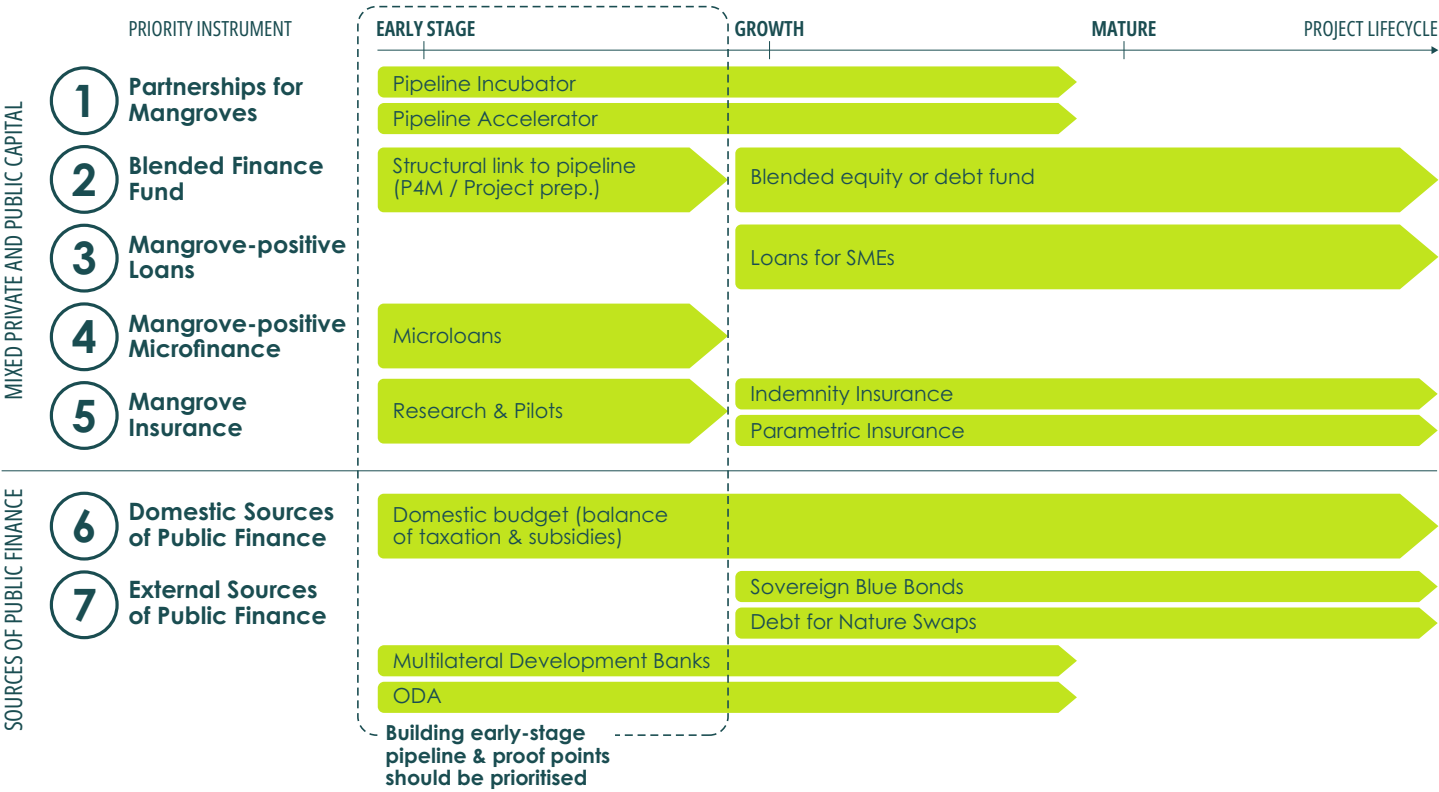
Responding to these principles, the Roadmap recommends **a package of priority financial instruments and mechanisms, and an indicative sequencing. Action to implement this Roadmap can start today, prioritising interventions building early-stage pipeline and proof points.**



#### SMALL SCALE FISHING

Small scale fishing close to a mangrove  
in Myanmar, Southeast Asia

**FIGURE 7**  
The Mangrove Breakthrough Roadmap identifies priority financial instruments and mechanisms for investment in regenerative business models across the project lifecycle



## 1

## Partnerships for Mangroves: Incubator and accelerator for mangrove-positive pipeline



### MANGROVES NEAR CITIES

Mangrove national parks existing close to cityscapes as seen in Abu Dhabi.

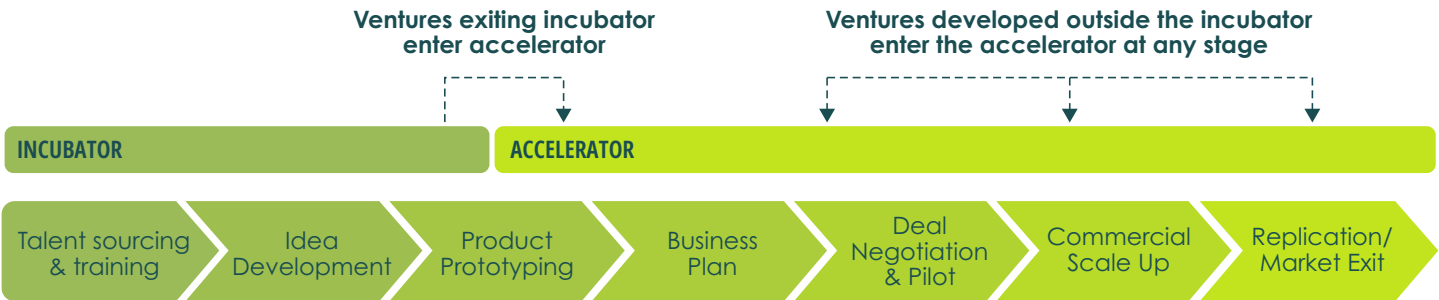
### Developing the pipeline of regenerative, mangrove-positive projects should be the first priority to scale investment for mangroves.

Targeted incubator and accelerator facilities can provide funding, support and capacity building to increase the number of mangrove-positive projects and help these ventures get to scale. Today, programmes for developing mangrove-positive pipeline are small, fragmented and typically scoped to focus on restoration projects. There is a clear need and opportunity for holistic integrated incubator and accelerator facilities for mangroves, building on blueprints pioneered in other ecosystems, like Partnerships for Forests (P4F). A new facility, 'Partnerships for Mangroves' (P4M) could provide

grants and technical assistance to develop and scale a range of regenerative, mangrove-positive business models and intermediaries, with a focus on getting projects to bankability. Support for projects could expand beyond the private sector to also work with other critical partners such as governments, communities and NGOs, especially when those projects would help create a thriving business ecosystem for new ventures.

The proposed structure for Partnership for Mangroves combines an incubator and an accelerator. These distinct but related facilities provide support to projects at complementary stages of the early venture lifecycle:

**FIGURE 8**  
Proposed Partnerships for Mangroves facility integrates an incubator and accelerator



Stages of Venture maturity

- **The P4M Incubator** would help transform ideas for mangrove-positive ventures and market access players into investable businesses, growing the number of new projects. It would offer programmes in mangrove countries to participants 'recruited' from other sectors. Participants would develop ideas for a mangrove-positive project, build teams, and pitch new ventures to investors. The programme would offer technical assistance to support entrepreneurs, as well as a stipend to increase accessibility. In return, the incubator could potentially take a small equity stake in high potential solutions. Blueprints from other sectors include Entrepreneur First, Antler, and Wavemaker Impact.
- **The P4M Accelerator** would support early-stage, post-idea businesses (including those exiting the Incubator) to scale successfully, increasing the growth rate of new mangrove-positive projects. It would offer grant funding and technical assistance over flexible time durations, tailored to suit individual ventures' needs, with a focus on helping get proven models to market and scale.



**The thematic scope of P4M could be intentionally broad, to ensure a diversified pipeline for later-stage investors.** Rather than identifying specific business models, eligibility criteria for the facility could focus on a few key dimensions, such as mangrove impact, social impact, carbon impact, and replicability potential – creating opportunities for projects across the Mangrove Transition Curve. P4M's mandate should also focus on developing an integrated value chain to help secure demand and premiums for mangrove-positive products. The facility should therefore support the development and scale up of market access players that connect local businesses to high value markets. When mature, these market access players could also act as aggregators, unlocking larger pools of commercial capital for mangrove-positive businesses by bundling projects with ticket sizes too small to attract sources of private investment.

**Reconciling the resource-intensive and highly context-specific services offered by P4M with maximum geographic scope would likely call for a hybrid model.** A central, global P4M facility could appoint local expert partners

to deliver the programme in specific countries or regions. Implementation could begin in one to two geographies, with progressive replication and scaling to new locations over time. Initial co-location or partnering with existing models, like P4F or BNCFF, could also create efficiencies and reduce lead-in time to implementation.

**A \$50 million grant-funded P4M could unlock an estimated ~\$600 million in follow-on private investment, based on mobilisation ratios for similar initiatives.**<sup>45</sup> Leadership from philanthropic, development and public capital is urgently needed to deliver this facility. But to ensure P4M realises its promise, the private sector – including banks and investment fund managers – should also be closely involved in design and implementation to ensure project pipeline generated is bankable or investable, replicable, and clearly linked to follow on sources of financing (see instruments #2 and #3). Integrated structures that 'house' accelerators within the same organisation that provides later stage investment can be particularly effective to ensure successful projects secure follow-on funding.

#### Case Study

## PARTNERSHIPS FOR FORESTS

Partnerships for Forests drives investment in regenerative land use models that combat climate change, empower communities, and conserve biodiversity. This 8-year project, funded by UK's Foreign, Commonwealth and Development Office through the International Climate Fund, facilitates collaborations among private, public, and community stakeholders to achieve mutual benefits from sustainable forests and land use. It focuses on creating sustainable, market driven solutions that mobilise private sector investment, boosts demand for sustainable forest commodities, and establishes conditions for long-term investment. Operating in Africa, Asia, and Latin America, Partnerships for Forests recently reached a significant milestone, with £1 billion in private investment mobilised from various sources, securing sustainable land use across 4 million hectares in critical landscapes.

## 2

## Global Fund for Mangroves: Blended finance vehicle, with a structural link to pipeline

**An estimated \$1.2 billion in private investment in mangroves is needed to reach the Breakthrough's goals.**

Using public, development and philanthropic capital catalytically to crowd in this investment will be vital. If done right, a new blended finance vehicle – a Global Fund for Mangroves – would de-risk private capital, bridge the funding gap that traditional financial instruments have failed to address, and help build a new asset class of regenerative, mangrove-positive business models.

Different blended finance instruments address different risks.<sup>46</sup> For mangroves, lack of pipeline is a critical risk that must be addressed first. Other risks deterring private investment today are political risk, macroeconomic risk, currency risk, credit risk, demand and offtake risk, and technical risks. The optimal structure of the fund would incorporate catalytic instruments that address these specific risks.

### Case Study

## INDICATIVE CATALYTIC INSTRUMENTS

### Grants

Concessional capital paid out over a fixed period of time to support Technical Assistance, project development and preparation to make a project bankable or investable. Grants are key for developing investable pipeline, especially in emerging market and developing economies.

### Guarantees

A form of credit enhancement, strengthening the creditworthiness of the investment because of the promise from the guarantor to complete performance in the event of default. There are many types of guarantees (including partial risk or credit guarantees and trade finance guarantees). Guarantees are among the most catalytic instruments available, mobilising \$1.5 of private capital on average for every dollar of development finance (6x the rate for junior debt and equity).<sup>47</sup>

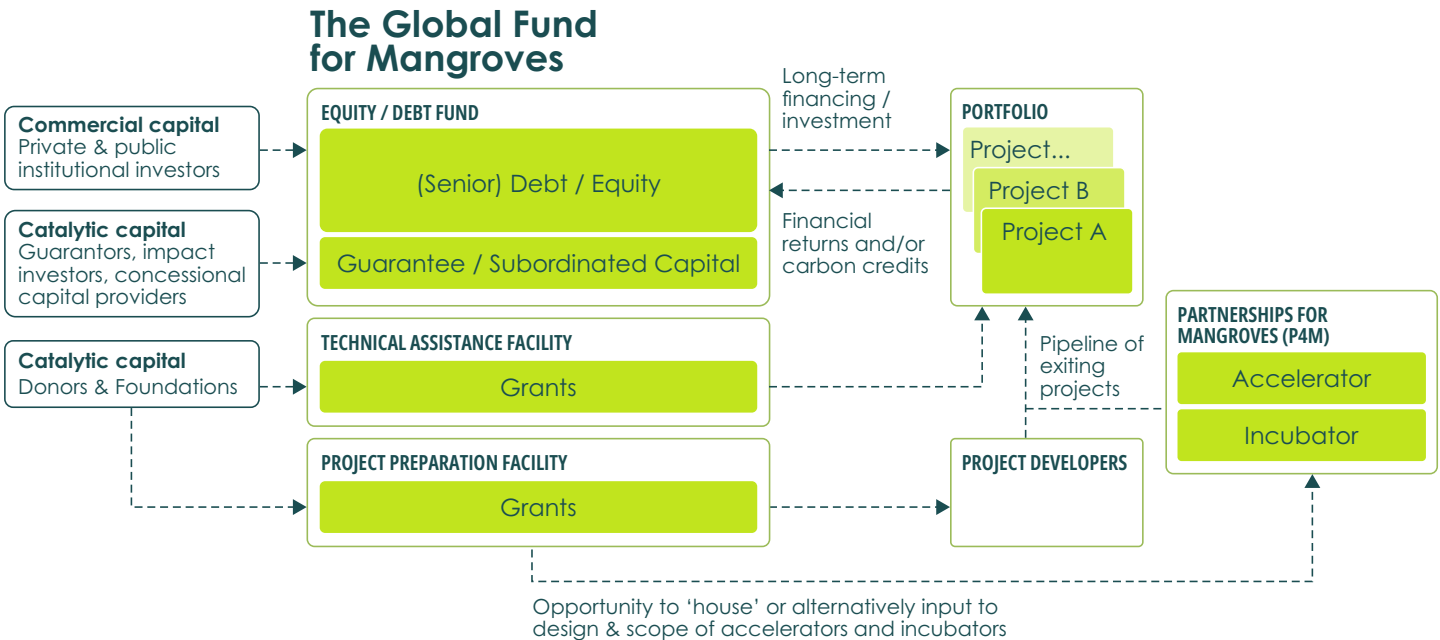
### Junior or subordinated capital

Protects senior investors by absorbing losses up to an agreed threshold on the value of the security, namely, if something goes wrong, the most junior / subordinated tranche will be paid out last. First-loss capital takes a position that will suffer the first economic loss if the assets below it lose value or are foreclosed on.

Combining instruments can be especially catalytic for mobilising private finance, although this must be traded off with additional complexity. One possible structure for the fund is outlined below. Strong and structural links to pipeline originators will be critical to ensure the fund can source investable projects. Grant funding from donor governments, philanthropies, MDBs, DFIs and/or climate finance institutions such as GCF could be allocated directly to project developers via an integrated project preparation facility. The fund could also ‘house’ integrated incubator and accelerator facilities (such as P4M), or at a minimum

have formalized relationship with and input to the design of early-stage facilities to improve the relevance of potential sources of pipeline. An additional pool of grant funding for Technical Assistance can help strengthen the impact case and address ESG deficiencies for portfolio companies. Private capital (either debt or equity) could be further de-risked via a subordinated capital or a (partial) guarantee at the fund level. Careful sequencing of instruments will be imperative to ensure that incubators, accelerators and/or project preparation funding are deployed first to create a pipeline of investable opportunities for the fund.

FIGURE 9  
Indicative potential structure for a Global Fund for Mangroves



**There is no single version of a fit-for-purpose investment thesis for a Global Fund for Mangroves.**

The Fund could invest in mangrove countries throughout the world and include project types from across the Mangrove Transition Curve. However, four key considerations can guide decisions on how to narrow the fund's scope to a targeted set of business models and geographies:

- **What is the fund's intended impact?** The scope of the fund will determine its impact. For instance, different projects will:
  - deliver different outcomes for mangroves (e.g. protecting intact mangroves vs. restoring degraded areas);
  - create impact directly or indirectly (e.g. mangrove restoration projects
- with direct impact vs. businesses that benefit from healthy mangroves and so create incentives indirectly for protection and conservation);
- generate different combinations of co-benefits (e.g. sustainable blue food production vs. diversifying livelihoods). These co-benefits are also mediated by geographic scope, (e.g. investing in EMDEs would strengthen the social, adaptation and development impact of the fund).
- **What is the fund's target return?** Projects offer variable return profiles, from negative to low, below market, market and above-market rates. Projects may



**OYSTER FARMING**

Man placing metal bag with oysters on oyster farm.



generate direct returns or carbon credits, which can be distributed to investors directly in return for investment, or sold to generate a monetary return. Indicative target returns for the fund could be ~5%+ for debt and ~10%+ for equity investments, depending on factors including the business models in scope.

- **Does the scope offer scale and flexibility?** A broader set of business models and geographic areas in scope increases the pipeline of available projects, and diversifies the portfolio. While the pipeline remains nascent, getting to scale may require a wider set of investment themes – including potentially projects for related coastal ecosystems whose health and resilience impacts mangroves e.g. seagrass.
- **What does the scope imply for capacity and expertise?** A broader set of business models and geographic areas in scope requires a correspondingly larger set of capabilities within the team, and a larger network of experts and partners on the ground, with implications for the cost of operation. This consideration is typically a trade off with scale and flexibility.

Blue carbon projects from restoration and/or conservation would likely be a key investment theme for a Global Fund for Mangroves. But the fund could also target other sectors, like sustainable aquaculture and fisheries, ecotourism, and infrastructure for hydrology and pollution management or projects providing multiple revenue streams, such as ecotourism combined with blue carbon. Relevant ticket sizes for the fund will depend on the target investment sectors and geographies. However, smaller ticket sizes are likely to be relevant in most cases (e.g. \$1-10 million). The Fund could offer debt, mezzanine / hybrid debt, equity, VC – or a combination, again, depending on the target scope. In addition to direct investment, the fund could act as a 'fund of funds', allocating capital to other vehicles generating positive impacts for mangroves, helping investors diversify their portfolio, unlocking larger ticket sizes, and overcoming constraints on in-house capacity and expertise.

#### Case Study

## THE GLOBAL FUND FOR CORAL REEFS

The Global Fund for Coral Reefs (GFCR) was launched in September 2020 to accelerate urgent action to strengthen the resilience of reefs and reef-dependent communities. It aims to mobilise \$625 million, split between a \$500 million Equity Fund and a \$125 million Grant Fund. The Equity Fund invests across 17 EMDEs and has identified three high impact target sectors to address local pressures on reefs: sustainable ocean production; sustainable ecotourism; and sustainable infrastructure for pollution management. The Grant Fund provides grants, concessional loans and technical assistance to foster a supportive enabling environment and strengthen the project pipeline for potential later stage investments by the Equity Fund. It also provides support for the investee companies to maximize their positive impact.

## 3

## Debt for mangrove-positive SMEs

To shift coastal economies to sustainable models where mangroves survive and thrive, regenerative and nature-positive businesses must be able to access the debt financing they need. Today, many small and medium-sized enterprises (SMEs), especially those in poorer and remote communities in EMDEs, face prohibitive collateral requirements, high debt costs, and must demonstrate significant track record. Without access to affordable loans and credit, these potential engines of mangrove-positive economies struggle to scale up production, expand to new geographies, integrate new technologies or meet their working capital requirements. For ventures exiting accelerator and incubator facilities like P4M, debt financing will be critical to maintain and grow their operations.

Local commercial banks and DFIs in mangrove countries (or MDBs operating in country) are best placed to bridge this gap. They are familiar with local markets and regulation, well placed to assess credit risk, are able to lend in local currency, can generate sufficient economies of scale to justify offering smaller loans, and have the relevant loan management infrastructure to manage in-country operations. These institutions could develop programmes to offer debt to early or mid-stage companies with more limited or flexible collateral requirements; access to small loans and credit (in local currency) for working capital and long-term financing; and, where possible, some limited technical assistance to borrowers, for support with documentation and reporting. Borrowers could be enterprises or individuals operating in mangrove-positive sectors, or companies in mangrove-impacting sectors, with financing provided to support their transition to more regenerative and sustainable practices e.g. aquaculture, timber.

**MANGROVE HABITAT**

Mangrove habitat split view over and under water in the Caribbean sea, Central America

Local banks in mangrove countries could be incentivised and enabled to improve access and affordability of debt for mangrove-positive SMEs. Three possible pathways include:

### A Build awareness and capacity

Lack of familiarity with mangrove ventures contributes to high debt costs and collateral requirements. Developing benchmarks and frameworks for mangrove businesses could help lenders better evaluate projects, and reduce perceived risks.

### B Create incentives for banks to lend through guarantees

Government and development capital providers could work with banks to expand their mangrove-positive portfolios by de-risking the loans they extend through guarantees. Over time, as lenders become more familiar with the sector, this de-risking capital will no longer be required.

### C Create mechanisms for international commercial banks to increase local banks' capacity and appetite for lending to mangrove-positive businesses

International commercial banks are not well suited to lend directly to mangrove-positive SMEs, given small ticket sizes and lack of familiarity with or footprint in many mangrove countries. However, global banks still have a role to play in improving access to affordable debt for mangrove-positive SMEs. First, they can lend to local commercial banks or development institutions with defined use of proceeds, for those institutions to on-lend to SMEs. Second, they can buy back local banks' portfolios of loans (through real or synthetic securitization), in exchange for the newly freed-up capital targeting lending to mangrove positive ventures. These two instruments can help build up local financial markets, overcome capital constraints and create origination incentives for local capital providers.

#### Case Study

## ACELI

**Aceli is a blended finance mechanism** that deploys donor funding to tackle the funding gap facing agricultural SMEs across Sub-Saharan Africa, with the aim of mobilising \$600 million of private finance by 2025.<sup>48</sup> It offers financial incentives to African banks and international impact investors to increase financial flows to under-served, high-impact agri-businesses. Aceli de-risks investments by providing portfolio first loss cover (2-8% of the loan amount), and through origination incentives to reduce the cost of originating and serving rural agricultural SME loans. With reliable financing, SMEs create more demand for smallholder farmers, generate jobs along value chains, and increase local food production that can replace costly and emission-intensive imports.

## 4

## Mangrove-positive microfinance

**Microfinance can be a powerful strategy to strengthen the link between financially resilient local communities and thriving mangrove ecosystems.** By boosting access to financial services for underserved populations, microfinance helps micro-businesses grow, fosters livelihoods, and empowers marginalized groups – especially women. Where microfinance is tied to regenerative activities that positively impact and benefit from mangroves, it also creates robust incentives for local communities to be stewards of nature.

**There is a clear opportunity to create a step change in mangrove-positive microfinance.** In many coastal communities, especially in EMDEs, traditional sources of finance are out of reach. Microfinance initiatives with a focus on mangroves do exist, but examples are scarce and concentrated in just a few countries. (e.g. Seacology in Sri Lanka<sup>49</sup>, NRT Coast in Kenya<sup>50</sup>). To close this gap, Microfinance Institutions (MFIs) should be supported and incentivised to develop and scale mangrove-positive microfinance programmes. These could prioritise two types of product, both extending micro-loans to coastal communities:

### A Microloans for sustainable coastal businesses, with participation in mangrove-positive initiatives

Microloans are extended to a range of coastal micro-businesses. These businesses do not need to directly generate mangrove impact, but all borrowers are required to participate in mangrove-related capacity building, protection, and restoration initiatives. Examples includes Seacology's microfinance programme in Sri Lanka, which offers microloans and alternative job training to impoverished women in coastal communities contingent on participation in mangrove protection and restoration.<sup>51</sup>

### B Targeted microloans for mangrove-positive businesses

Microloans are available for businesses or activities that inherently benefit from or contribute to healthy mangroves (e.g. ecotourism, sustainable fisheries, sustainable aquaculture, honey production, and handicrafts based on mangroves). This creates incentives for communities to steward the mangroves on which these businesses depend.



**Terms for mangrove-positive microloans could match established norms.** Microloans refer to loans of less than \$10,000,<sup>52</sup> but typical loan amounts often remain below \$2,000, with no collateral requirements. Loan cycles could span approximately 1 - 2 years, with the option for maximum loan amounts to progressively increase to strengthen repayment incentives and allow entrepreneurs to scale their businesses.<sup>53</sup> Interest rates will vary, depending in large part on specific country conditions.

**Many of the pathways to scale up debt for mangrove-positive SMEs are highly synergistic with scaling mangrove-positive microfinance.** Catalytic capital for Technical

Assistance, guarantees and/or subordinated debt can support and incentivise MFIs to develop and scale new programmes. Here, impact funds investing in MFIs, MDBs and donors have a critical role to play. In parallel, international commercial banks can develop mechanisms to lend to MFIs to on-lend as mangrove-positive microloans. Blue carbon could also be explored as a means to increase the attractiveness to MFIs of mangrove-focused microfinance programmes. Intermediaries like Acorn Rabobank, for instance, which support small-scale producers to access the voluntary carbon market, can help diversify and unlock additional revenue streams for mangrove-positive microenterprises.

#### Case Study

### CITI BANK AND COMPARTAMOS FINANCIERA

**Citi bank, a global commercial bank, and Compartamos Financiera**, Peru's leading microfinance bank, have collaborated to support female entrepreneurs in Peru. Compartamos Financiera secured a US\$20 million loan from Citi Peru, with 65% allocated to women-owned businesses. This initiative is part of Citibank NA's financial inclusion program, in partnership with the U.S. International Development Finance Corporation (DFC). Citi's Social Finance Strategy, aimed at expanding credit access in low- and middle-income nations, facilitated this loan through collaboration with high-impact investors and MDBs.<sup>54</sup>

## 5

## Mangrove-linked insurance products

**Among their myriad ecosystem services, mangroves support livelihoods and protect people and their assets in coastal communities from floods and storms.**

As climate change increases the frequency and intensity of extreme weather events, the importance of this natural infrastructure as protection for climate-vulnerable coasts is only set to grow. Yet as mangroves disappear from their natural places, so does the natural protection they provide and the livelihoods and revenue streams they support. The mangroves that remain are poorly accounted for by asset owners, municipalities, investors, and by insurers and re-insurers, given the challenges of valuing the costs and damages they avoid and the benefits they provide. This is a missed opportunity. Better incorporating the ecosystem services mangroves afford into catastrophe (CAT) models and into new or existing insurance products can help unlock additional sources of finance to conserve and restore mangroves.

### A Integrating mangroves as an adaptation solution into insurance pricing

Underwriters use CAT models to inform how they deploy capital, manage risk aggregations, and price insurance. These models reflect the vulnerability and exposure of coastal assets to natural hazards, based on historical data, but do not explicitly take into account changes in the protection provided by natural storm barriers like mangroves. As a result, insurance policies for coastal assets where coverage of nearby mangroves is changing may be effectively overpriced<sup>54</sup> (where mangroves have been restored) or underpriced (where mangroves have degraded).

Explicitly incorporating changes in the protection afforded by mangroves into CAT models, and by extension into premiums for traditional indemnity insurance mechanisms, can create incentives for corporate policy holders to safeguard them, as companies taking steps to conserve or restore the mangroves that protect their assets could qualify for cheaper policies vs. in the absence of mangroves.<sup>55</sup> Mechanisms to bring forward the benefits of discounted premiums for policy holders could strengthen these incentives.

### B Triggering more investment into mangrove restoration and protection with risk transfer solutions

Insurance directly covering mangroves as an asset in their own right can help finance restoration and protection of mangroves following climate disasters, or other threats like illegal logging and pollution. Parametric insurance is one innovative mechanism to increase liquidity, automatically paying out pre-determined amounts once a specific threshold for a pre-defined event is reached. For instance, parametric policies can insure the mangroves themselves against cyclones, and would be triggered by a related event, such as specified wind speeds. These types of policy forgo the need to assess impacts on individual assets, allowing for a rapid payout. Activities to restore the mangroves – or to purchase resources to enable this – can commence in short order (in as little as 10 working days), meaning parametric models can be a source of predictable financial assistance for mangroves providing valuable ecosystem services to coastal communities and assets. There is also growing interest in parametric products directly insuring revenue streams that depend on mangroves, like carbon credits, ecotourism and fisheries.





**MANGROVE OVERVIEW**

Abu Dhabi Mangroves during sunset.



**CHAPTER 4 Designing a Financial Roadmap to mobilise capital for mangroves**

**Both models have potential, but neither are yet ready to scale.** Research and pilots are underway. The Philippine Insurance and Reinsurance Association (PIRA) and Earth Security have launched a programme to integrate protection from natural ecosystems, including mangroves, into risk models and new indemnity insurance products.<sup>57</sup> The Mesoamerican Reef Fund (MAR Fund) has purchased insurance to finance planned reef response following storms at 11 sites across the Mesoamerican Reef.<sup>58</sup> This policy is underpinned by a 'gridded' parametric insurance product, which provides pay-outs based on the spatial distribution of maximum sustained windspeed across the covered area. Similar pilots include The Nature Conservancy's insurance program covering post-storm reef response and restoration in Hawai'i.

**More can be done to accelerate proof, development and scale up of these innovative products.** The first step is securing more and better data. Insurers should collaborate with researchers on the analysis and datasets they need

to incorporate mangroves into their risk assessments and modelling. Where possible, this data should be accessible and open-sourced to accelerate progress at an industry level. Data insights can be translated into tools like the Coastal Risk Index - developed by the Ocean Risk and Resilience Action Alliance (ORRAA) and AXA XL – which visualizes how nature-based solutions mediate flood risk over a 10 and 30 year time horizon.<sup>59</sup> New product innovations should be rapidly tested in pilot projects, to allow refinement, before replication and scale up.

**Insurers should lead the way on this agenda.** It is also in their interest to do so. Products that create mechanisms to protect and restore mangroves can, in the longer run, lower insurers' exposure to future claims and losses from the assets they protect today. Corporates and governments can take steps to accelerate progress, for instance, by engaging insurers to collaboratively develop risk tools and new products or acting as fee aggregators for parametric products.

## Case Study

**RISCO**

RISCO is a pioneering social enterprise designed by Conservation International.<sup>60</sup> It aims to unlock additional finance for mangroves by better linking the adaptation and mitigation benefits they provide to the beneficiaries, including insurance companies. In partnership with local communities, RISCO will develop mangrove conservation and restoration initiatives, prioritising locations where mangroves offer significant flood protection benefits, and quantifying the value of these benefits. Insurance companies will pay RISCO a fee for these services, to enable development and pricing of insurance products that reflect the risk-reduction values that mangroves provide. Initially, RISCO is targeting indemnity-based insurance models, especially property insurance for coastal assets. As an additional revenue stream, RISCO will sell blue carbon credits generated through its restoration and conservation projects. Currently in a pilot phase, in the short-term, RISCO will be financed through a blend of grants, equity and loans, with longer term ambitions to become financially sustainable through insurer fees and the sale of carbon credits.



## SOURCES OF PUBLIC SPENDING

**Diversifying finance for mangroves is vital, but public capital is, and will remain, a leading source of mangrove-positive investment.** Government funding will be indispensable in particular to strengthen and expand marine protected areas, restore degraded mangrove forests, and provide

de-risking to mobilise private capital. Scaling up public investment in mangroves in a challenging macroeconomic environment is far from straightforward, but there are mechanisms available to governments to unlock additional finance for this crucial agenda.



**OYSTER HARVEST**

Close-to-shore underwater oyster harvest

## 6

## Domestic Sources of Public Finance

**Not all investment in mangroves will require 'new' capital.**

Re-allocating existing financial flows away from mangrove-degrading sectors and towards mangrove-positive ones will be critical in both the public and private spheres. The removal of fisheries subsidies is one such lever. Governments around the world spend an estimated \$20 billion a year on harmful fisheries subsidies, with devastating environmental and social consequences.<sup>61</sup> Subsidies have contributed to the over-exploitation of fish stocks, biodiversity decline, and diminishing livelihood opportunities and food security for coastal communities that depend on small-scale artisanal fisheries. Eliminating these subsidies would help fish stocks recover, benefit a host of marine and coastal ecosystems, and free up resources for governments to re-deploy towards investment in mangrove-positive sectors and the creation of a sustainable ocean economy.

**Tax policies can provide financial incentives for businesses to protect and restore natural ecosystems surrounding or affected by their operations.** Direct taxes can also be used

to disincentivise harmful behaviour, with the income used to fund conservation efforts as demonstrated by Chile's National Green Tax which will be earmarked for biodiversity recovery, climate mitigation and adaptation.<sup>62</sup> Given mangroves are a driver of ecotourism demand, there is a natural fit for channeling finance into domestic conservation budgets through tourism taxes and fees. For example, airport and cruise ship entry fees in Ecuador and Costa Rica raise millions for the protection of both terrestrial and marine protected areas.<sup>63</sup>



**MUD CRAB HARVEST**

Man pictured during a mud crab harvest, Vietnam.

## 7

## External sources of public finance

**Governments of mangrove countries can also look to external sources of finance for investment in mangroves.**

Sovereign blue bonds (and other sustainable sovereign debt issuances) are one emerging solution for raising finance for investment in the sustainable ocean economy. Feasibility checks should be the first step – blue bonds are most relevant for countries with robust ocean governance, high credit rating, and sizable pipelines of loan projects. Use of proceeds for the bonds should explicitly make provision for mangrove-positive projects. In issuances so far, financing has centred on fisheries, marine renewable energy and transport, but it doesn't have to be this way. Of the eight eligible project categories for blue bonds outlined in a new practitioner's guide by the IFC and ICMA, half involve projects with direct positive impacts for mangroves.<sup>64</sup> As with other thematic bonds, transparency and accountability will be critical to build investor confidence. Issuing governments should ensure that strong regulatory frameworks, clear and measurable KPIs and targets, and regular reporting and independent verification are in place.

**For many EMDEs, however, blue bonds risk increasing already unsustainable debt burdens.** And 53% of low-income countries are in or at high risk of debt distress,<sup>65</sup> placing severe limits on public investment in nature. For such countries, an alternative financial solution could be debt-for-nature swaps. These transactions provide developing countries access to long-term, cost-efficient funding from a diversified pool of private capital while simultaneously reducing indebtedness by offering longer maturity, lower interest and/or reducing the debt stock thus freeing up finance in constrained budgets for other priorities, including investment in mangrove-positive projects.

**Although debt-for-nature swaps and use of proceeds blue bonds are issued by sovereigns, private financial institutions play an important role in mainstreaming them.** There are

good reasons for them to do so: bond holders and buyers can receive attractive risk-adjusted rates, investment banks can earn fees by structuring and marketing the new issuances, re-insurers can benefit from high grade credit risk, and civil society and non-governmental organizations can have access to long-term secured financing for on-the-ground protection work.

**As blue bonds and debt-for-nature swaps gain momentum, greater replication and standardization will be key to drive down transaction costs and maximise benefits for issuer countries.** The recent \$500 million debt-for-nature swap in Gabon, sponsored by The Nature Conservancy and structured by Bank of America, was the first public market transaction of this kind, setting an example of how mangrove restoration can be done within mainstream capital markets. It also highlights the need for a blended approach: DFC agreed to provide credit enhancement only if at least 20% of the interest savings were hypothecated for investment in marine conservation including mangrove restoration. Creating replicable blueprints, affordable de-risking, and sharing learnings – especially South-South – can help reduce transaction costs, strengthen the impact case, and accelerate execution.

**Getting the design and structure of individual mechanisms and instruments is critical – but their effectiveness and impact will also be mediated by the wider context of financial and economic systems.** The international financial architecture, designed decades ago, is failing to meet the climate and development challenges facing the world today. Calls for reform – and in some cases transformation – continue to grow, in particular for MDBs, which are vital conduits for donor finance for EMDEs, as well as sources of deep technical expertise and institutional capacity building.<sup>66</sup> Leading reform proposals, (including the Bridgetown Agenda, the World Bank Evolution Roadmap, and the review of MDBs' Capital Adequacy Frameworks) centre on securing a dramatic expansion in MDB financing, scaling up the use of catalytic instruments, increasing

risk appetite and leveraging capital headroom.<sup>67</sup> These recommendations must be implemented to create a more equitable and efficient financial architecture. In doing so, they could also help unlock capital for vital nature-based solutions such as mangroves. A stronger focus on adaptation, as well as longer term, lower interest loans from MDBs to EMDE governments could help pay for critical protection, restoration, and investment to scale mangrove-positive sectors. Deploying more concessional capital could help launch and scale more blended instruments for mangroves, while prioritising the most catalytic instruments (such as guarantees) could help ensure every concessional dollar mobilises more private investment. This means that the MDB reform agenda is also a nature (and mangrove) agenda, and private, public and philanthropic capital holders have a stake in actively supporting these reform efforts.

#### Case Study

### ECUADOR 'GALAPAGOS DEBT CONVERSION FOR NATURE'

In May 2023 Ecuador completed the world's largest debt-for-nature transaction to date.<sup>68</sup> The government exchanged over \$1.6 billion of its international debt with a \$656 million loan financed through the issuance of a 'Galapagos marine conservation-linked bond' in a deal structured by Credit Suisse, who also led the buyback of Ecuador's existing debt at a 60% discount. US International Development Finance Corp (DFC) provided political risk insurance for the entire value of the Galapagos marine bond, which was also bolstered by a \$85 million credit guarantee from the Inter-American Development Bank (IADB). A group of 11 private insurers provided >50% reinsurance to facilitate DFC's commitment, which enhanced the credit rating of the bond issuance and enabled a reduction in the annual interest rates and cost of borrowing. The deal is expected to provide \$450 million for Galapagos marine protection by 2041, with that money tied to conservation priorities identified by Ecuador and its partners for the UNESCO World-Heritage site.<sup>69</sup>



**The Mangrove Breakthrough Roadmap aims to rally public, philanthropic and private capital around priority interventions to address systemic barriers and drive positive tipping points in finance for mangroves.** But there are other financial instruments for capital holders to accelerate progress towards the Breakthrough's goals. For instance, private financial institutions can mobilise and deploy capital for mangroves through sustainability-linked financing,

corporate bonds, forward purchase agreements for blue carbon and specialized impact funds, among others. The SMI Financial Services Taskforce's new guide on Financing Coastal Nature-based Solutions offers real examples of these mechanisms in the context of a project's lifecycle, and highlights practical considerations to support commercial investors.





Chapter 5

# Critical Enabling Conditions

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**Establishing and scaling priority financial instruments is necessary to unlock capital for mangroves, but it is also insufficient.** Creating the right enabling conditions around financial frameworks, policy, markets, data and communities will also be critical to mobilise investment at scale.

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## 5.1 Enabling Policy

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**Policymakers should lead the way.** Governments can demonstrate their commitment to a supportive investment environment by integrating mangroves into climate planning, including Nationally Determined Contributions (NDCs) and transition plans, sending strong signals to the markets, and reassuring investors against policy uncertainty. Robust spatial planning will also be key. Being a coastal ecosystem, mangroves need to be accounted for by ministries with jurisdiction over both terrestrial and marine areas in the allocation and governance of land or ocean for different uses (e.g. urban development, industry, transport, or protected areas). In line with the Kunming-Montreal agreement, governments should ensure at least 30% of marine and coastal areas, especially areas of particular importance for biodiversity and ecosystem functions and services, are effectively conserved and managed through ecologically representative, well-connected and equitably governed systems of protected areas and other effective area-based conservation

measures, recognizing indigenous and traditional territories, where applicable.<sup>iv</sup> As critical nature-based solutions, mangroves' inclusion within highly protected areas should be maximised.

**Governments can also boost investment by clarifying legal frameworks and policy agendas.** Strengthening land tenure for mangrove areas – by formalizing the rights of traditional owners and users, especially indigenous people and local communities (IPLCs) – can strengthen property markets and incentives for communities to make investments in the productivity of mangroves. Legal documentation formally recognising rights to property can be used as collateral by owners or occupants to access debt for mangrove-positive activities. Besides land tenure, governments can also create confidence and unlock investment in (blue) carbon projects, by limiting sudden or unpredictable changes in carbon market policy.

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<sup>iv</sup> Convention on Biological Diversity. Kunming-Montreal Global Biodiversity Framework. Available at: <https://www.cbd.int/gbf/targets/3/>



## 5.2

### Carbon Market Integrity

**Blue carbon credits are among the most important mechanisms for investing in mangroves, and any step change in finance must see this market sustainably scale.**

But fostering integrity on both the supply and demand side will be critical. This year has seen growing scrutiny of failures in the voluntary carbon market<sup>70</sup>, with criticism levelled at project governance and effectiveness, transparency, participation of indigenous communities, biodiversity impacts, permanence, and additionality. In parallel, investor confidence has dropped, with purchases of carbon credits set to fall in 2023 for the first time in 7 years.<sup>71</sup> Adhering to robust standards which provide assurance that the purchase of a credit results in the intended

removals will be critical to rebuild trust. For mangroves, the High-Quality Blue Carbon Principles and Guidance is one leading approach.<sup>72</sup> Developed by a coalition of experts and practitioners, the guidance offers a consistent and accepted framework for blue carbon credits, relevant for purchasers, investors, suppliers and project developers. Acting on the recommendations of frameworks like this, as well as guidance from the Integrity Council for the Voluntary Carbon Market (ICVCM) and Voluntary Carbon Markets Integrity Initiative, will be crucial to embed effectiveness, equity, and trust in blue carbon projects at the national and local level.



**SUNSET ON MANGROVES**  
Beautiful view of Mangroves and swamps during early morning from Abudhabi outskirts.



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## 5.3

# Embedding Mangroves within Financial Frameworks

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**The architecture of financial regulation, disclosure and taxonomies can be a powerful lever to increase awareness of mangrove-related risks and opportunities, drive accountability, and shift financial flows towards more regenerative business models.** Today, inclusion of mangroves varies across financial frameworks. Some voluntary frameworks, such as the Taskforce on Nature-related Financial Disclosures (TNFD) and the Science-based Targets for Nature (SBTN), do include comprehensive targets to protect mangroves. Taking steps to scale adoption of these frameworks – or making them mandatory – would increase their clout. For many mandatory regulations, in particular deforestation policies, mangroves are missing all together (e.g. EU Deforestation Regulation, the US Forest Act and the UK Environment Act). These measures should be enhanced to also include drivers of mangrove deforestation. Incorporating mangroves into sustainable taxonomies would also help. Mangroves could be integrated into the classifications for environmentally sustainable activities in order to guide investments towards mangrove-positive practices and to ensure mangroves and the wider sustainable ocean economy are included in and benefit from growing ESG portfolios.

**Central banks – in countries both with and without mangroves – can be a powerful ally in shaping regulation to shift financial flows for mangroves.** Businesses and financial institutions across the world are exposed to mangroves through supply chains, portfolios, and the real assets they protect. Mangrove loss therefore may pose a risk to financial stability, and by extension price stability, credit availability, debt sustainability, credit ratings, and liquidity. Given this, central banks<sup>72</sup> should step up, first by building capacity to better analyse and understand this risk – and then taking action to respond. Interventions could include developing expectations for financial institutions on governance, risk management, strategy and disclosure as it relates to coastal ecosystems, to help shift investment away from mangrove-degrading sectors. An initiative making steps in the right direction is the Network for Greening the Financial System which recently published a Conceptual Framework for nature-related financial risks to guide policies and action by central banks and financial supervisors.

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## 5.4

### Data Architecture

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**High quality, reliable and comparable data is vital to effectively assess the coverage, resilience, and biodiversity of mangrove ecosystems over time.** In the past, compiling this data has been a challenge – nature data is inherently location-specific, complex and traditionally costly to capture. But without it, investors cannot assess whether investments deliver their intended outcomes, and projects struggle to create proof points and track record to make the case for further investments at scale.

**Opportunities are emerging to transform this data landscape, build confidence and unlock investment in resilient, nature-positive projects.** The explosion in and falling costs of new technologies for in-situ nature measurements such as low-flying drones, AI-driven image recognition software, acoustic/imaging sensors, eDNA, and proteomics, should be capitalized on – incubators and VC funds and can help scale up those solutions. Satellite data can be used to monitor landscape changes, providing rapid indications of the state of nature. There is strong potential, especially for corporates, to increase collection of data around their supply chains. Where possible, this data should be open-sourced, accessible, and transparent.

**Efforts to strengthen the data architecture can build on pioneering initiatives like the Global Mangrove Watch, an online, interactive tool developed by the Global Mangrove Alliance.** The platform offers universal access to in-situ data on topography, habitat extent, soil conditions, and the ecosystem services provided by mangroves in different locations. The tool allows users to track changes in mangrove coverage, identify priority areas for interventions. It also allows users to evaluate the success of restoration efforts. The Mangrove Restoration Tracker Tool – a newly launched product within the platform – is bringing together disparate projects and streamlining data analyses to help record and track progress and costs associated with mangrove restoration across a project's lifetime.<sup>73</sup> Other valuable platforms include the Global Resilience Index Initiative, which provides open data on social vulnerabilities, climate risks and exposures that can be used to assess the benefits of mangrove recovery.<sup>74</sup>

**Continuing to scale and expand tools like this will be critical. So too will developing harmonized KPIs, methodologies and frameworks for assessing mangrove impacts.**

Shared approaches to evaluating projects can help drive insights from data by improving comparability and better enabling aggregation of progress at a community level. Responding to this need, the Mangrove Breakthrough is developing a harmonised impact framework, to strengthen data alignment, aggregation, and communication among stakeholders.

## 5.5 Accounting for Nature

**More and better data can also help unlock another crucial enabling condition: accounting for mangroves as a valuable natural asset.** Mangroves provide myriad non-monetary benefits and avoided costs which our economic system and financial markets fail to appropriately value. With no way to internalize these benefits and costs into decision making, incentives for investments in mangrove-positive projects are distorted negatively, but positively for projects that pose risks to the ecosystem services that mangroves provide.

**The status quo is starting to shift.** There is growing understanding that natural capital provides a flow

of services to people and planet, and that their maintenance, preservation and growth are essential. In turn, new frameworks are emerging, setting out metrics and methodologies to measure and account for nature. Initiatives include the UN System of Environmental Economic Accounting, Ecosystem Accounting (UN SEEA EA), Natural Capital Protocol (NCP), Transparent Project and Accounting for Nature (AFN). While interventions like these, which aim to help translate nature into monetary values, are not without controversy, they nevertheless represent an important first step to better align economic systems and financial flows with the real benefits afforded by nature.



**MANGROVE WILDLIFE**  
Western reef heron in eastern  
mangroves Abu Dhabi, UAE.

## 5.6

### Empowering local communities as stakeholders and beneficiaries

**Engaging and empowering indigenous people and local communities is vital to ensure investment secures the long-term future of mangroves.** IPLCs are ecosystem stewards – indigenous territories with secure land tenure consistently demonstrate lower rates of deforestation and ecosystem degradation.<sup>75</sup> Traditional knowledge, passed down through generations, offers critical insights into local biodiversity, history of the ecosystem, status and stocks of fisheries, and human-nature interactions. Embedding this knowledge and practice can help ensure investments in mangroves are fit-for-purpose and targeted to the local context.

**To safeguard mangroves into the future, investments must generate benefits for communities that offer tangible incentives to keep mangroves standing.** Delivering on this promise of combined social and ecological impact calls for mangrove-positive financial instruments and projects that respond to local needs and priorities. Investments should contribute to livelihoods, build capacity, and empower marginalized groups, particularly women. Collaborating with IPLCs during design, planning, monitoring and implementation will be key, as will recognising and addressing local dependencies on mangroves, prioritising alternative income streams, and integrating benefit-sharing mechanisms.<sup>76</sup>



#### UNDER THE SURFACE

Silversides swim among the dark shadows of a mangrove forest in Komodo National Park, Indonesia.









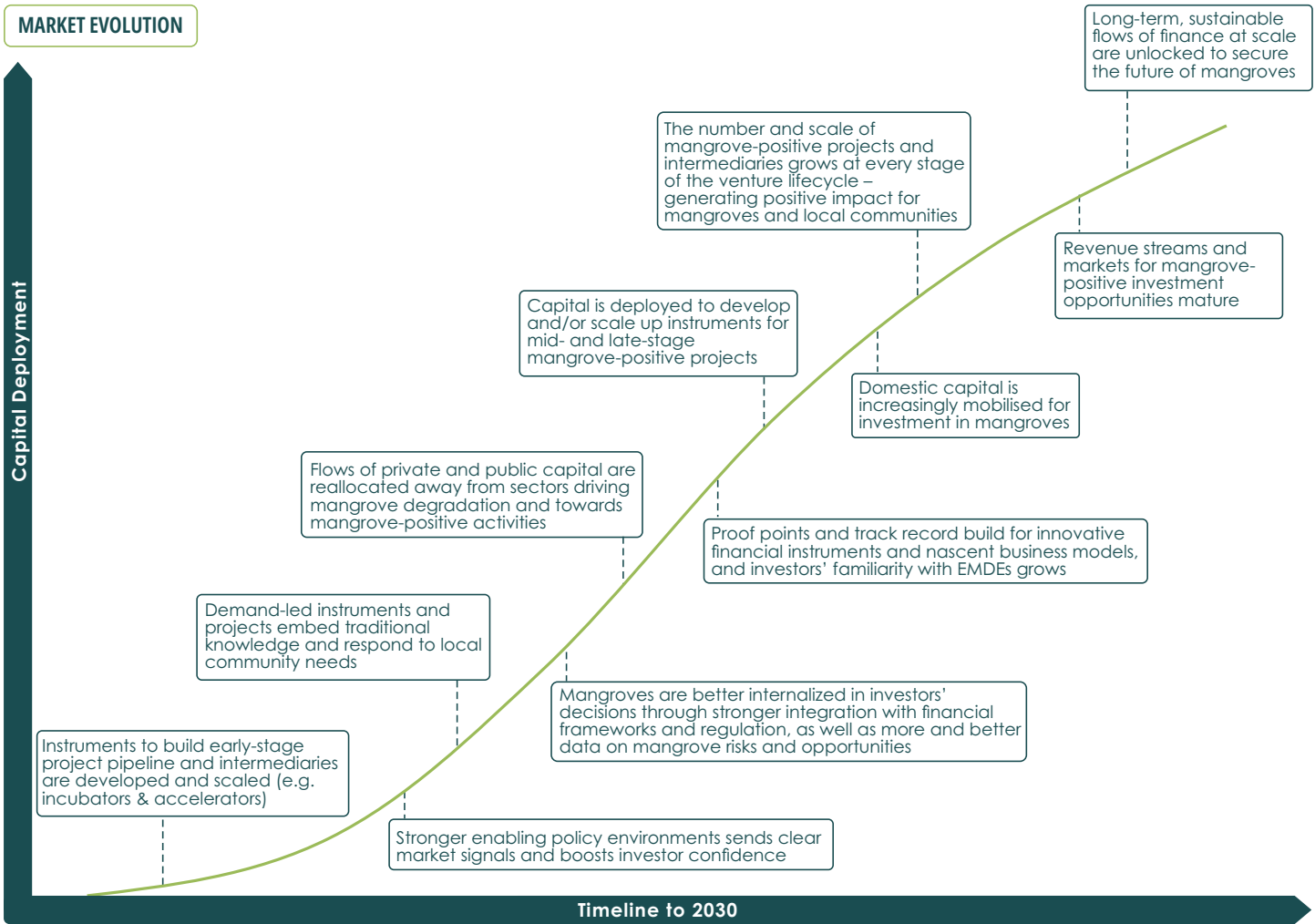
Chapter 6

# Next Steps

**The future of mangroves is at a critical juncture.** Scaling capital now into these super-ecosystems can safeguard their future, secure the vital services they provide, and help create resilient, equitable opportunities for coastal communities on the frontlines of the climate crisis. Failure to act risks losing one of our best tools to tackle the climate emergency, halt biodiversity loss, and avert a deepening food security crisis.

**The good news is that a paradigm shift in finance for mangroves is possible.** This Roadmap recommends priority financial mechanisms and core enabling conditions that, building on existing efforts, can crystallise mangrove-positive investment opportunities as an asset class and unlock capital at scale.

**FIGURE 10**  
Market evolution timeline



# STAKEHOLDERS

**Together we can go further and faster, so coordination and collaboration across these efforts will be key.** This is where the Mangrove Breakthrough can help. As a global, multi-stakeholder coalition, it is rallying diverse players in a community of action to bring this Roadmap to life. Now is the moment to unlock investment at scale, and secure the future of mangroves.

## DONOR GOVERNMENTS

Donor governments should deploy concessional capital more catalytically to build early-stage mangrove-positive pipeline and crowd in private investment, including through funding incubators, accelerators, and project developers, supporting dedicated blended finance vehicles, and providing technical assistance to governments and institutions to foster supportive enabling environments.

## CORPORATES

Corporates with business models or supply chains impacting mangroves should explore opportunities to embed mangrove conservation and restoration within their value chains. They should also develop and/or drive adoption of sector best practice to transition to more regenerative, mangrove-positive models. To address their remaining emissions beyond the internal emissions reductions they achieve as part of a science-based target, corporates in all sectors should look to invest in vehicles that support mangrove protection, including but not limited to high quality blue carbon credits.

## NATIONAL GOVERNMENTS

National governments should take steps to create a supportive enabling environment and clear market signals for investors. Policy action to boost investor confidence should focus on regularizing land tenure, clarifying the status of carbon markets, and embedding mangroves in NDCs. In parallel, governments should unlock additional public spending on mangrove conservation and restoration, including through sovereign debt instruments (blue bonds, debt-for-nature swaps), and reallocating capital currently deployed for harmful subsidies.

## MULTILATERAL DEVELOPMENT BANKS AND DEVELOPMENT FINANCE INSTITUTIONS

Multilateral Development Banks and Development Finance Institutions should accelerate implementation of proposed reform agendas to create a more equitable and efficient financial architecture (e.g. CAF review, Bridgetown Agenda, the World Bank Evolution Roadmap), strengthen their strategic focus on nature-based solutions and adaptation finance, and deploy more and more efficient catalytic instruments to de-risk private investment in mangroves.



### ACADEMIA AND NGOS

Academia and NGOs should develop robust research, frameworks and tools to help all types of capital holders design financial instruments that are truly mangrove-positive, and support more effective monitoring, evaluation and data on the environmental and social impacts of investment.

### LOCAL COMMUNITIES

Local communities should continue to steward mangroves and related ecosystems, and engage in the design and implementation of financial instruments and projects to ensure these integrate traditional knowledge and reflect local needs.

### NGOS AND CIVIL SOCIETY ORGANISATIONS

NGOs and Civil Society Organisations should build local organizational and institutional capacity, help standardize and communicate what 'mangrove-positive' impact looks like, and partner with financial institutions to ensure that financial vehicles and investments in mangroves are demand-led and create benefits for local communities.

### PHILANTHROPIES

Philanthropies should act as pathfinders, providing flexible capital to support the development of new business models and early stage mangrove-positive pipeline, build local organizational and institutional capacity, and de-risk private investment in blended instruments.

### INCUBATORS, ACCELERATORS, PROJECT DEVELOPERS, AND ENTREPRENEURS

Incubators, accelerators, project developers, and entrepreneurs should prove new mangrove-positive business models, build project pipeline, and develop and scale market access players to help connect local producers with high value markets.

### PRIVATE FINANCIAL INSTITUTIONS

Private financial institutions should rapidly scale investment in mangroves. Where financial instruments and business models are more established, financial institutions should replicate and scale what works (e.g. debt for mangrove positive SMEs, microfinance). Where they are more nascent, financial institutions should accelerate research and pilots to build proof points and track record (e.g. insurance), and partner with catalytic capital providers who can provide de-risking (e.g. blended finance instruments). In parallel, investors should integrate mangrove-related risks and opportunities into their decision processes, leveraging taxonomies, frameworks and regulation to shift portfolios away from mangrove degrading activities and towards mangrove-positive projects.

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# Appendix 1: About the Mangrove Breakthrough

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The Mangrove Breakthrough was established at COP27 as part of the Sharm El-Sheikh Adaptation Agenda. Building on the Breakthrough Agenda, and the work of the Global Mangrove Alliance, the Mangrove Breakthrough is a global initiative which aims to mobilise \$4 billion to secure the future of 15 million hectares of mangroves globally by 2030, by halting mangrove loss, restoring half of recent losses, doubling protection of mangroves globally, and ensuring sustainable long-term finance for all existing mangroves.

To achieve these ambitious goals, the Breakthrough will work with a Community of Action, a group of diverse stakeholders, from governments, financial institutions, corporates, philanthropy, NGOs, scientists, and local communities. Joining the Mangrove Breakthrough and its Community of Action provides an opportunity to showcase leadership in mangrove action and contribute to or receive financing for projects. By being part of this, stakeholders

ensure successful mangrove interventions that build on the best available science, best practices, and lessons learned.

Achieving the Mangrove Breakthrough goals is estimated to provide climate benefit of sequestering over 43.5 million tons of CO<sub>2</sub> into mangrove biomass and safeguarding or sequestering an additional 189 million tons of CO<sub>2</sub> in the soil. Restoring half of recently lost mangroves would potentially benefit 37 commercial marine species of fish, crabs, bivalves and shrimp by providing habitat for over 25 billion juveniles each year. And the coastal protection provided by mangroves against flooding and storms – securing lives, infrastructure and economic security – has been estimated to reduce flood risk for over 15 million people and over \$65 billion worth of property annually. Altogether, \$4 billion raised under the Breakthrough would have an outsized impact on benefits as total ecosystem services add up to \$700 billion.

GOAL UNTIL 2030	GOAL (HA)	TOTAL FINANCING NEED (USD)	DESCRIPTION
Halt Loss	0.02 mn	\$6.5 mn	Goal to reduce net mangrove losses driven by direct human actions to zero by 2030. It is estimated that 37,300 ha were lost due to direct human impacts between 2010-2020. Assuming a linear rate of reduction, this would save approximately 16,800 ha by 2030 compared to business as usual.
Restore Half	0.4 mn	\$450 mn	It is estimated that 818,300 ha of mangroves are considered “restorable”. The goal seeks to restore half of this area by 2030.
Double Protection	6.1mn	\$2,300 mn	Ensure long-term protection is increased from 40% to 80% of remaining mangroves. Forms of protection include traditional protected areas, but also Other Effective Area-based Conservation Measures (OECMs), which could encompass indigenous lands and areas of sustainable use where mangroves are protected from clear-felling and conversion.
Ensure Sustainable Finance	8.6mn	\$1,300 mn	Ensure finance for existing mangrove extent in order to maintain and sustain existing coverage of 14.7 million hectares.
<b>Total</b>	<b>15 million</b>	<b>\$4 billion</b>	

# Appendix 2:

# Capital Heat Map

# Methodology

The heat map aims to give an indicative view of the fit between mangrove-positive business models and different types of capital. This evaluation builds on the methodology outlined in the WEF Ocean Finance Handbook to assess the relevance of different financial instruments to business models in the blue economy.<sup>77</sup> In the absence of significant data on investment in the blue economy, the approach

draws on subjective assessment as a proxy. First, the typical scale, risk and return of each of the business models was assessed (per the business model deep dives in Chapter 2). These parameters were selected as important drivers of investment decisions. For each of these parameters, a value between 1 and 5 was given:

BUSINESS MODEL ASSESSMENT – TYPICAL CHARACTERISTICS

	SCALE 1 is small, 5 is large	RETURN 1 is low, 5 is high	RISK 1 is low, 5 is high
Payment for ecosystem services	2	3	5
Ecotourism	3	4	2
MPAs and OECMs	2	1	5
Adaptation and Resilience	4	1	4
Sustainable Productive Businesses	1	2	4
Address drivers of degradation	5	3	3
Sustainable Intensification	2	3	4
Restoration and Regrowth	2	3	5
Technology	2	5	2



These values were then compared with an assessment of the typical characteristics of investments as relevant to different types of capital:

CAPITAL ASSESSMENT – TYPICAL CHARACTERISTICS

	SCALE 1 is small, 5 is large	RETURN 1 is low, 5 is high	RISK 1 is low, 5 is high
Grants	2	1	5
Concessional	3	2	4
Commerical with de-risking	4	4	3
Commercial	5	5	1

The fit between each business model and the different types of capital was assessed for each variable by measuring the delta in the value. Smaller deltas implied a better fit, larger deltas implied a weaker fit. In this way, a heat map was developed for each of the 3 parameters. An overall heat map was developed by averaging the deltas across the different parameters.

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# THE MANGROVE BREAKTHROUGH FINANCIAL ROADMAP

Unlocking investment at scale  
in critical coastal ecosystems

S Y S T E M I Q

