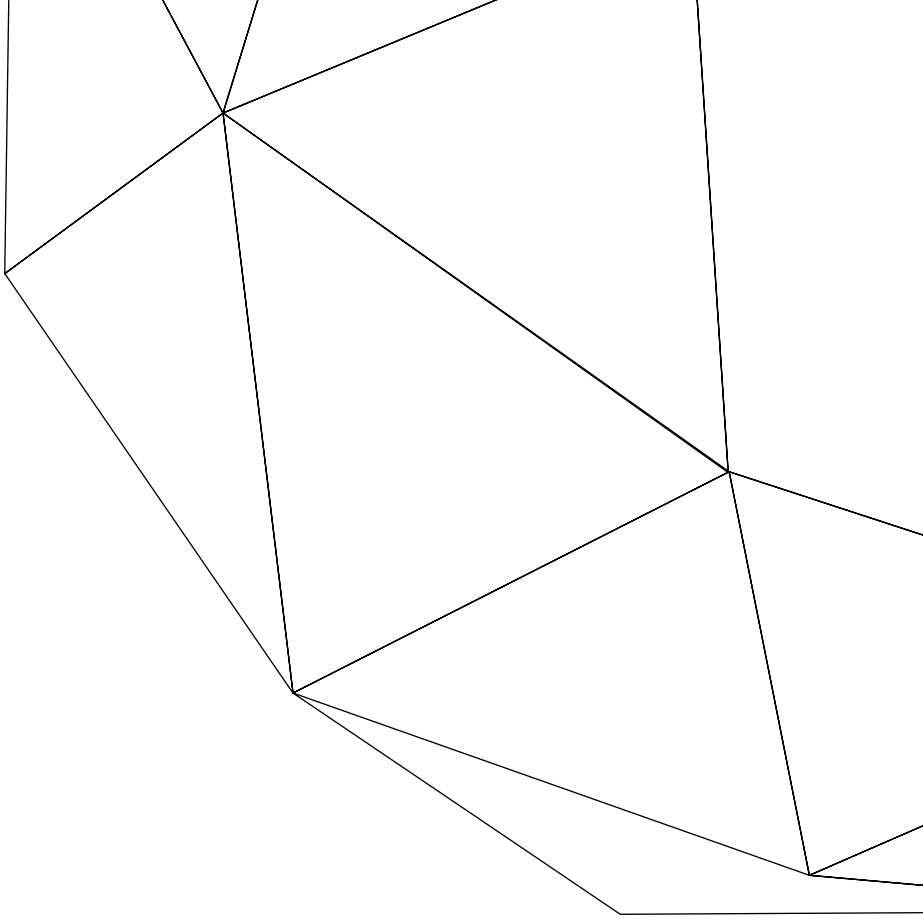

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Mobilising climate finance for oceanic and coastal resilience

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DISCLAIMER

The views expressed in this publication are those of the authors and do not necessarily represent the official views or policies of the Green Climate Fund, GIZ, or its partners.

Contents

Abbreviations and acronyms

AE	Accredited Entity
EIB	European Investment Bank
FP	Funding Proposal
GCF	Green Climate Fund
GEF	Global Environment Facility
GHG	Greenhouse Gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
ICMA	International Capital Market Association
IFRS	International Financial Reporting Standards
IPCC	Intergovernmental Panel on Climate Change
IRMF	Integrated Results Management Framework
IUCN	International Union for Conservation of Nature
KPI	Key Performance Indicator
MPA	Marine Protected Area
MRV	Measurement, Reporting, and Verification
NASA	National Aeronautics and Space Administration
NbS	Nature-based Solutions
NOAA	National Oceanic and Atmospheric Administration
OECD	Organization for Economic Co-operation and Development
OECM	Other effective area-based conservation measures
PAF	Partnership Action Fund
SDGs	Sustainable Development Goals
TCFD	Task Force on Climate-related Financial Disclosures
TNC	The Nature Conservancy
TNFD	Task Force on Nature-related Financial Disclosures
UNEP	United Nations Environment Programme
UNEP-WCMC	United Nations Environment Programme – World Conservation Monitoring Centre
WMO	World Meteorological Organization

Executive summary

Our objective is to support **Green Climate Fund (GCF) Accredited Entities (AEs)** with their preparation of impactful proposals involving the protection, conservation and sustainable use of **coastal and marine ecosystems**. *Annex I: A Resource booklet* will contribute to the same goal. Combined, these publications aim to improve the quality, relevance and alignment of proposals with GCF strategic priorities, thereby enhancing the ability of GCF to catalyse sustainable, resilient, and climate-smart investments for these ecosystems and thus benefitting the livelihoods of the people who depend on them. The content of these two works can also be relevant to other organizations developing projects and writing funding proposals in the ocean-climate nexus.

Marine and coastal ecosystems — such as mangroves, saltmarshes, seagrasses, and coral reefs—provide critical ecosystem services, including carbon sequestration, food security, provision of livelihoods such as fisheries and tourism, and protection of coastal infrastructure. However, these ecosystems are increasingly threatened — through human interference (degradation or destruction) and natural events exacerbated by climate change (e.g. cyclones, droughts, and marine heatwaves) — but they remain significantly underrepresented in global climate finance flows (IPCC -SROCC, 2019).

Targeted suggestions for **ecosystem-based management interventions for coastal and marine ecosystems** that aim to achieve concrete benefits for people and nature, mobilising climate finance within the broader context of the 2030 sustainable development goals (SDGs) are presented below. Nature-based solutions (NbS) and climate-resilient green-grey infrastructure as well as integrated sustainable fisheries, sustainable aquaculture systems and Marine Protected Area (MPA) finance, and other solutions intrinsically linked to these, are discussed. Pure ocean technology or infrastructure solutions without NbS, such as renewable energy, are mentioned here only in terms of cross-sectoral interdependencies in which green-grey approaches can be undertaken.

Current GCF thematic briefs on ocean ecosystems and ecosystem services and existing GCF papers on blended finance for NbS and debt for climate swaps will be further enhanced by this publication.

GCF frameworks

The GCF Strategic Plan 2024–2027 (GCF, 2023b) lists targeted results to be achieved within eleven **result areas**; those most relevant for ocean and coastal projects are:

- **Food:** Supporting developing countries to convert 190 to 280 million beneficiaries to low-emission, climate-resilient agricultural and fisheries practices, securing livelihoods while reconfiguring food systems.

- **Ecosystems:** Supporting developing countries to conserve, restore or bring under sustainable management 120 to 190 million hectares of terrestrial and marine areas.

- **Infrastructure:** Supporting 45 to 60 developing countries to develop or secure low-emission climate-resilient infrastructure, through systemic and/or country-driven resilience planning, funding and/or de-risking of investments, including those that draw on nature-based solutions or ecosystem-based approaches.

The GCF Strategic Plan emphasizes the GCF commitment to enhancing climate finance for developing countries, particularly least developed countries and small island developing states. The Strategic Plan underscores the importance of turning nature-based solutions and ecosystem-based approaches into **tangible investments** (targeting both public and private finance) that support the achievement of Nationally Determined Contributions, National Adaptation Plans, and Long-term Climate Strategies.

Additionally, the GCF Governing Instrument (GCF, 2011) establishes a long-term vision to drive transformational change towards low-emission, climate-resilient development. This is reflected in the GCF Investment Framework (GCF, 2023d), which guides the systemic thinking process in funding proposal development and appraisal, as well as measuring mitigation and adaptation results. This paper will focus on the first three of the six elements of the GCF Investment Framework:

1. **Impact potential:** Potential of the project or programme to contribute to the achievement of GCF objectives and result areas.

2. **Paradigm shift potential:** Degree to which the proposed activity can catalyse impact beyond a one-off project or programme investment. Three elements are reviewed when assessing the paradigm shift potential, including scalability, replicability and sustainability.

3. **Sustainable development potential:** Wider benefits and priorities: Does the project have wider benefits and priorities? Are environmental and social safeguards and gender equality an integral part of the project?

The GCF Integrated Results Management Framework (IRMF) assesses the potential impact of proposals (GCF, 2021c). Detailed instructions on how to use the indicators from the IRMF are provided in the IRMF Results Handbook (GCF, 2022c). While preparing a project, the AE must first define the **results or impact areas** and then select key indicators to determine the impact achieved. This paper seeks to inform the selection of appropriate **key indicators** to contribute to the respective results/impact areas (see section 5).

1.1. Financing opportunities and the role of GCF

The financial instruments at the disposal of the GCF — **grants, reimbursable grants, concessional loans (senior and subordinated), equity investments, guarantees and results-based payments** — can be made available to support coastal and marine ecosystem projects, including those linked to the sustainable blue economy (ecotourism, sustainable fisheries), as well as green-grey coastal infrastructure projects. Several GCF instruments may be combined to create specific and flexible financing solutions adapted to the unique requirements of each climate initiative.

Risk assessment approaches

Robust risk assessment approaches are essential for addressing the challenges of climate change, biodiversity loss, and resource management in coastal and marine ecosystems, and they must be embedded in the GCF proposal. **Annex I: A Resource booklet** provides links to resources available **to lead risk assessments and to anchor them within the Theory of Change of GCF proposals**. A practical guide for AEs to access adequate data sets, including a selection of available sources is provided in sections 1 and 2 of the **Resource booklet**. The Booklet outlines key **parameters** for conducting comprehensive risk assessments (notably habitat data, carbon stock data, vulnerability, and natural capital). These speak to the health of the ecosystems in question, their trends, relevance, and impact.

Achieving results and impacts

Building on the GCF Strategic Plan for 2024–2027 (GCF, 2023b) and with a view to scale, replicability and sustainability, AEs can use **key actions** to enable low-emission, climate-resilient development, while protecting vital coastal ecosystems as well as **key indicators** (considering the result areas defined by GCF that are linked to coastal and ocean sustainability) in the design of their proposals. Providing ideas on financing pathways towards transformational change is vital, including innovative finance instruments.

A special focus is on the effective ecosystem-based management of coastal and marine zones, as they bring transformational change to investment pathways (Johansen and Dickenson, 2021). The conservation, restoration and sustainable management of coastal and marine areas is a core targeted result of the GCF 2024–2027 Strategic Plan (GCF, 2023b).

1. Introduction

The Green Climate Fund, established in 2010 by the United Nations Framework Convention on Climate Change (UNFCCC), is the world's climate fund for developing countries. With its country-driven approach and partnership model, the GCF supports countries in designing, financing, and implementing innovative climate projects via a range of funding instruments to leverage climate finance at scale.

Our objective with this publication is to support Accredited Entities (AEs) in formulating impactful projects and in identifying risks and opportunities associated with coastal and marine ecosystems. Interactions of climate and ocean action pathways and an overview of major climate risks to marine environments and vital ecological and social functions of coastal ecosystems are explored in section 2. Financing Gaps for Ocean and Coasts (section 3) identifies the systemic underinvestment in coastal and marine ecosystems and analyses structural barriers to finance. In response, Financing Opportunities and Role of the GCF (section 4) presents a suite of financial instruments — such as blended finance, concessional loans, and guarantees — designed to unlock both public and private capital. Key Indicators (section 5) focuses on providing guidance for AEs on selecting appropriate indicators. Financing Pathways (section 6) focuses on financing mechanism examples (i.e. key ideas on blue bonds, and sustainability linked SDG bonds for the blue natural capital; local lending facilities integrating grants, technical assistance and guarantees; and blue economy impact fund for AEs and others). Finally, the Annex Resource booklet provides expert resources and data references to assist AEs in preparing proposals for GCF and other actors seeking to develop meaningful ocean and climate projects. This includes a section on Risk Assessment Approaches (see annex, section I-A) that provides practical tools and data sources for evaluating habitat conditions, carbon stocks, climate vulnerability, and ecosystem services to support climate actors in project planning.

2. Ocean and climate

The world's oceans are not only at the crossroads of major global challenges — climate change, biodiversity loss, energy transition, food security and public health — but are also one of the **greatest untapped opportunities** for delivering large-scale climate solutions. From carbon sequestration to nature-based coastal protection, sustainable fisheries to tourism and innovative ocean finance, a sustainable blue economy has the potential to drive transformative climate action all the while supporting livelihoods and resilient communities. The UNFCCC Oceans and Coastal Zones Climate Action Pathway (UNFCCC, 2021) makes ocean and coastal climate action central to climate resilience with a focus on natural resources management, fisheries, conservation and restoration.

The immense potential of oceans is increasingly recognized in global climate policy discourse. In recent years, the UNFCCC forged ocean climate pathways, working with the Marrakech Partnership for Global Climate Action to mobilize non-Party stakeholders to achieve the Paris Agreement and the SDGs, as well as establishing an ocean and climate dialogue.[1] After reading this current work, GCF AEs should be better able to prepare actionable proposals for blue economy activities within their exclusive economic zones (including transboundary activities) with a special focus on coastal and marine ecosystems in the context of the United Nations Decade for Ecosystem Restoration and the United Nations Decade of Ocean Science (2021–2030).[2]

OCEAN AND CLIMATE RISKS AND IMPACTS

The Intergovernmental Panel on Climate Change (IPCC) Special Report on the Ocean and Cryosphere in a Changing Climate (IPCC–SROCC, 2019) highlights significant climate risks arising from physical and chemical changes in ocean and cryosphere systems such as **variations in oxygen levels, sea levels and acidity (see figure 1)**. These will impact all marine and coastal ecosystems and have ripple effects on human systems and essential ecosystem services — including fisheries, tourism, transportation and shipping, cultural services, and carbon sequestration. The IPCC emphasizes that oceans have absorbed over 90 per cent of the excess heat generated by greenhouse gas (GHG) emissions since the 1970s, leading to **ocean warming, acidification, and loss of oxygen** from the surface to a depth of 1,000 meters. These changes have resulted in widespread impacts on **coastal marine ecosystems** that affect the livelihoods of local communities (including small-scale and commercial activities). Nearly 50 per cent of coastal wetlands have been lost over the last 100 years due to the combined effects of localized human pressures, warming and extreme climate events. Mangroves, seagrasses and salt marshes are **highly sensitive ecosystems**, suffering from the impacts of climate change, driven by both unsustainable human practices and natural events that include **sea-level rise, storms, erosion, intensified marine heatwaves, acidification, loss of oxygen, salinity intrusion, shifts in species distribution, coral bleaching, and reduced fish stocks**.

The melting of glaciers and ice sheets contributes to sea-level rise, increasing the vulnerability of low-lying coastal areas to **flooding and erosion**. Unsustainable human practices — such as encroachment from agriculture, destructive aquaculture, unsustainable fishing, coastal development and pollution are main drivers for **degradation and deforestation** of coastal and marine ecosystems. Mangrove forests have seen

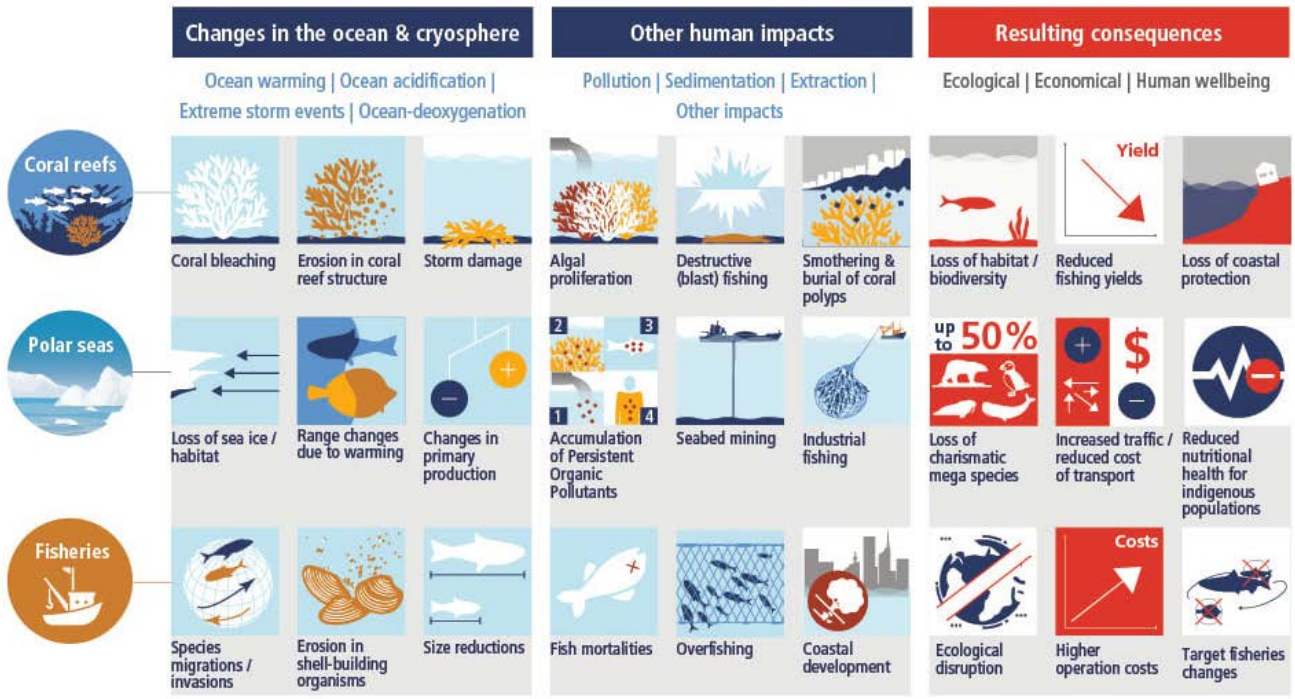
1 Ocean climate pathways are further described here: https://unfccc.int/climate-action/marrakech-partnership/reporting-tracking/pathways/oceans-and-coastal-zones-climate-action-pathway#Climate-Action-Pathway-2020 More information on the Marrakech Partnership for Global Climate Action is available here: https://unfccc.int/climate-action/engagement/marrakech-partnership.

2 Read more about these United Nations initiatives here: https://www.decadeonrestoration.org and https://oceandecade.org.

a global reduction of 5,245.24 km^2 (524,524 hectares) between 1996–2020, representing a loss of approximately 3.4 per cent over 24 years (Global Mangrove Watch, 2025) (see figure 2). Likewise, seagrass extent suffered a decrease of more than 10 per cent a decade between 1970 and 2000 (World Resources Institute, 2022). Another study notes a decline of over 50 per cent of eelgrass meadows (a common type of seagrass) between 2018 and 2022 (Normandeau Associates, Inc. 2023). Global salt marshes have declined at a rate of 0.28% per year between 2000 and 2019, resulting in a net global loss of 16.3 Tg CO2e year–1 emissions, a loss equivalent to an area of 719km^2 (71,900 hectares) (Campbell et al. 2022).

The loss of coastal ecosystems is responsible for the current **GHG release** of 0.04–1.46 GtC per year (IPCC, 2019). Since 1996, substantial variation in mangrove **carbon stocks gains and losses** have been seen across regions. From 1996 to 2016, the greatest carbon stock losses occurred in the Caribbean and Southeast Asia, particularly on the islands of Borneo and Papua. While some areas experienced net gains in mangrove carbon, these were generally smaller and only outweighed losses in a few scattered regions across Africa, South Asia, and Central America. A close examination of Central America and Southeast Asia reveals high spatial variability within these regions. For example, while certain areas experienced significant losses, others, such as Panama, the Philippines, and southern China, showed relatively small net changes (Richards, Thompson and Wijedasa, 2020). While evolutions of sea levels and precipitation may bring small positive impacts in certain regions (e.g. the slight increases of mangrove cover in Southeast Asia or on some coasts in Africa), large ecosystems such as the mangroves in the Pacific and Caribbean islands would likely decline due to little upland space to extend such mangroves as sea levels rise (FAO, 2023) (see figure 1).

Figure 1. Climate change impacts on ocean ecosystems



Sources: IPCC 2019, chapter 5, How is life in the sea affected by climate change? p. 545.

The degradation, loss, or decline of coastal and marine ecosystems, especially of crucially important coastal wetlands (see figure 2 and table 1), intensifies the effects of climate change and undermines the resilience of coastal communities. This not only limits access to potable water and food but also heightens vulnerability to storm surges, flooding, and erosion, increasing risks to lives, livelihoods, and infrastructure in low-lying areas. The rapid decline of coastal wetlands has been dramatic both for its magnitude as well as for the wealth of ecosystem services and their crucial role for climate mitigation and adaptation that has been lost. **Global hotspots** are notably concentrated in developing countries, especially in the Global South and including in small island developing states, many of which despite their small size compared to other nations, host important coastal wetland habitats.

Figure 2. Mangrove area loss and gain, by region, 2000–2010 and 2010–2020

Sources: FAO, 2023, p. 25.

Note: The FAO 2023 study does not distinguish between the causes of mangrove expansion: "natural" expansion indicates that no active restoration effort was undertaken; it does not necessarily represent a positive ecological trend. Mangrove expansion may occur in response to upstream land-use changes or increased sedimentation from degraded watersheds (e.g. in Brazil). In spite of expansion (or slower losses) in some regions, higher loss rates continue elsewhere, and since newly established mangrove stands sequester carbon more slowly than the mature forests being lost, a net loss of accumulated carbon stocks remains. For regularly updated country-specific values, see the Global Mangrove Watch website.

Table 1. Coastal wetland spatial data by ecosystem type

Ecosystem	Spatial data
Mangroves	Global mangrove distribution ranges from 14.7 to 15.2 million hectares. Mangroves are found in tropical and subtropical regions, mainly between 30°N and 30°S. Key continents and countries include: • 42% in Asia (particularly Indonesia, India, and Myanmar) • 20% in Africa (particularly in Nigeria, Mozambique, and Madagascar) • 15% in North, Central and South America (particularly in Brazil, Mexico, and the state of Florida in the United States of America) • 23% in Australia and Oceania (particularly in Australia and Papua New Guinea)
Seagrasses	Global distribution of seagrasses ranges from 30 to 60 million hectares. Seagrasses are found in shallow coastal waters from the Arctic to the tropics. Key regions and countries include: • Indo-Pacific (largest extent): Australia, Indonesia, and Philippines • Atlantic Ocean and the Caribbean region: USA (Florida), Bahamas, Gulf of Mexico • Temperate zones: Europe (including the Mediterranean), Canada
Salt marshes	Global distribution of salt marshes ranges from 5 to 40 million hectares (highly variable estimates). Salt marshes are distributed primarily in temperate and high-latitude regions. Key regions include: • North America: United States (East Coast), Gulf of Mexico, Canada • Europe: United Kingdom, Netherlands, Germany • Asia: Philippines, China, Russia, Southern Asia and Pacific • Oceania: Australia
Coral reefs	A recent study puts the global distribution of coral reefs in 42,358,890 hectares (Allen Coral Atlas, 2023) Another study (Souter et al., 2021) provides disaggregated, approximate data per key region: • Caribbean: 2,639,700 ha • East Asia: 782,720 ha • Eastern tropical Pacific: 78,000 ha • Pacific: 6,942,400 ha • South Asia: 1,094,900 ha • Western Indian Ocean: 1,517,900 ha

Sources: Wetlands International (2022); Mckenzie et al. (2020); McLeod et al. (2011); Souter et al. (2021) and Allen Coral Atlas (Bambic, 2023). All values converted from km^2.

Note: Coral reef numbers (Souter et al., 2021) include some countries that are counted within more than one region of the Global Coral Reef Monitoring Network (GCRMN). The totals reported are thus not simply the sum of all countries from which data were contributed nor the sum of all countries within each GCRMN region.

Habitat loss increases GHG emissions and poses a threat to provisional adaptation and food services. For example, climate change induces shifts in fish distribution and decreased in abundance and catch potential. The impacts occur on two levels: **directly**, habitat destruction reduces the availability of breeding and nursery grounds, causing immediate declines in local fish populations and catch potential, for example; and **indirectly**, the resulting GHG emissions and loss of carbon sequestration capacity contribute to global warming, which in turn alters ocean conditions and drives shifts in fish distribution over time. Together these are projected to affect income, livelihoods, and food security of marine resource-dependent communities (medium confidence) (IPCC, 2019). Beyond fisheries, coastal habitat loss also undermines tourism opportunities and weakens the natural protection these ecosystems provide to infrastructure and coastal assets — both critical factors for resilience and for attracting climate and adaptation finance.

Further, their long-term loss compromises the role of the ocean in cultural, recreational, and intrinsic values important for human identity and well-being. Regional trends highlight the uneven vulnerability of coastal and marine ecosystems to climate change.

In the context of fisheries, the OECD Review of Fisheries (OECD, 2025) notes that climate change exacerbates challenges in fisheries by altering fish stock productivity and distribution, leading to economic and food security implications for communities reliant on fishing industries. **To that end, policies can be crucial to either mitigate or cause unsustainable fishing risks** (see table 2). Integrating policy with conservation and climate action requires, inter alia, improving Marine Protected Area (MPA) management and expanding Other Effective Conservation Measures (OECMs) to protect ocean habitats while supporting sustainable local use (Jonas HD Wood P and Woodley S, 2024). Adaptive, climate-responsive policies that invest in monitoring, data sharing, and community engagement are also key to addressing changes in fish stocks. Economic incentives in policies need to shift away from subsidies that increase fishing capacity towards those that promote ecosystem resilience, such as those found in some forms of sustainable aquaculture. Finally, empowering ocean-dependent communities through education and alternative livelihoods should reduce pressure on coastal ecosystems and build social resilience to climate change (OECD, 2025).

Table 2. Risk of policies creating incentives for unsustainable fishing (by policy type)

Risk level	Policy type
High	Policies that directly lower operating costs, such as subsidies for vessel construction, modernization, fuel, and access to foreign waters, which can lead to excessive fishing capacity and effort if management is ineffective.
Moderate	Policies that indirectly influence fishing incentives, like vessel safety improvements, fisher income, or the buyback of vessels or licenses have an indirect and potentially less distorting impact on the economic incentives facing the sector. These may increase fishing effort and capacity if not carefully managed.
Uncertain	Policies with variable impacts depending on implementation, such as education and training or context-specific policies. These can either reduce fishing pressure (e.g. education providing new skills that create opportunities outside of fishing) or increase it (e.g. by improving fishing efficiency).
No risk	Policies that enhance fisheries management, including research, monitoring, and enforcement that help align fishing effort with resource availability and improve stock sustainability.

Sources: Authors' summary, adapted from OECD, 2025.

2.1. Ocean and coastal potential for climate solutions

NATURE-BASED SOLUTIONS

NbS provided by coastal ecosystems (such as mangroves, tidal marshes, coral reefs, sand dunes, seagrass beds and seaweed) hold great potential for restoring and enhancing the wide range of ecosystem services, including mitigation and adaptation to climate change.

The High-Level Panel for a Sustainable Ocean Economy report (Hoegh-Guldberg et al., 2023.) estimates that **ocean-based climate solutions** alone (which include NbS) could assist in **reducing the "emissions gap"** in 2050 by up to 35 per cent on a 1.5°C pathway and up to 47 per cent on a 2.0°C pathway. This equals an estimated reduction of between 1–4 Gt of carbon dioxide equivalent (CO2e) per year in 2030 and 4–14 Gt CO2e in 2050 (Hoegh-Guldberg, Northrop, et al., 2023).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MITIGATION

Vegetated coastal and marine ecosystems (mangroves, seagrass and salt marshes specifically) are often referred to as **"blue carbon ecosystems"** due to their ability to capture and store carbon dioxide from the atmosphere into the ocean ("blue" refers to the watery nature of the storage) (National Oceanic and Atmospheric Administration, 2022). Experts calculate that **mangroves** provide at least **USD 1.6 billion annually in ecosystem services**, valued at USD 33,000–USD 57,000 per hectare per year (UNEP, 2025). For comparison, the total value of temperate forests was estimated to be 2,842 USD hectare per year in ecosystem services (Grammatikopoulou and Vačkářová, 2021).

Generally, the mitigation from conservation and restoration of **marine ecosystems** could yield between 0.028 and 0.135 Gt CO2e/year in 2030 and up to 0.313 Gt CO2e/year in 2050, with the largest component of this mitigation potential coming from mangrove actions (Hoegh-Guldberg O, Northrop E et al., 2023). According to the IPCC (IPCC-SROCC, 2019) the restoration of coastal 'blue carbon' ecosystems, could provide climate change mitigation through increased carbon uptake and storage of around 0.5% of current global emissions annually (medium confidence).

Evidence shows however that naturally established (pristine) mangrove forests generally have higher carbon sequestration potential, greater structural complexity, and better resilience to climate disturbances (e.g. storms) than many restored or plantation mangroves. For example, a recent study found that natural stands exhibited significantly higher above-ground biomass and structural complexity compared to rehabilitated or regenerated stands (Sitthi et al., 2025). Another study concluded that restored mangrove forests often hold lower total ecosystem carbon stocks compared to natural mangroves, especially when they are young or poorly managed (Carnell et al., 2022). These findings underscore the importance of prioritizing conservation of intact ecosystems as well as ensuring long-term monitoring and permanence for restoration efforts.

ADAPTATION AND RESILIENCE

Coastal and marine ecosystems have utmost value for adaptation and resilience to climate change and as the foundation for livelihoods in coastal communities. Coastal vegetation helps protect shorelines and coastal zones by dissipating incoming wave energy through friction when leaves and stems interact with the water column. Mangroves, saltmarshes, and seagrasses alone can significantly reduce wave energy, attenuate storm surges, and stabilize sediments, with evidence showing up to a **72 per cent reduction in wave energy** by saltmarshes and a **66 per cent reduction in wave height** by mangroves. Moreover, these ecosystems have the potential to contribute to long-term coastal resilience through carbon sequestration, biodiversity enhancement, and shoreline stabilization (Justine and Seenath, 2025). Coral reefs can provide substantial protection against natural hazards by **reducing wave energy by an average of 97 per cent** (Ferrario et al., 2014).

Key adaptation tools include agreements with built-in triggers for pre-agreed actions in the case of unexpected changes (such as *parametric insurance* or contingency-funding mechanisms), enacting policies to promote sustainable fishing, adopting measures to strengthen resilience (e.g. risk transfer mechanisms such as social protection and insurance), and adopting adaptive, dynamic and ecosystem-based approaches to manage marine and coastal ecosystems, including fisheries (Hoegh-Guldberg, O., Northrop, E. et al. 2023).

AQUATIC FOOD SYSTEMS

Aquatic foods are responsible for feeding more than **3.3 billion people** globally, providing at least 20 per cent of the average per capita intake of animal protein. In many countries — including Cambodia, Sierra Leone, Bangladesh, Indonesia, Ghana, Mozambique and small island developing states — aquatic foods contribute half or more of total animal protein intake (FAO, 2022).

Total fisheries production globally is estimated to have risen from USD 127 billion in 2005 to USD 381 billion in 2022 (OECD, 2025). A World Bank study estimated that an increase in sustainable fisheries management could generate an additional **USD 83 billion each year** for the fisheries sector alone, creating a much-needed revenue stream in developing countries and improving global food security (World Bank, 2017).

The OECD Review of Fisheries (2025) emphasizes the need for **adaptive management strategies** that incorporate climate projections to ensure the sustainability and resilience of fisheries. Recommendations include enhancing data collection for better stock assessments, implementing flexible policies that can respond to changing environmental conditions, and investing in research and development to support innovation in sustainable fishing practices. Effective fisheries management requires coordinated policies that regulate catch limits, fleet size and gear, and fishing locations and timing, while strengthening enforcement to address illegal, unreported, and unregulated activities such as unauthorized catch offloading, transshipment, and the use of flags of convenience (OECD, 2025).

3. Financing gaps for oceans and coasts

Marine and coastal ecosystem investments play a critical role in climate resilience but face significant financing gaps. According to the UNEP State of Finance for Nature report 2023, "finance flows to NbS **must almost triple** from current levels (USD 200 billion) to reach USD 542 billion per year **by 2030** and **to quadruple** to USD 737 billion **by 2050** to meet Rio Convention targets" (UNEP, 2023). This includes scaling up both public and private finance. Similarly, the High-Level Panel for a Sustainable Ocean Economy estimates that the additional financing needed to achieve the sustainable ocean economy ranges between USD 383 billion and USD 717 billion per year, with a midpoint of USD 550 billion per year (Ocean Panel, 2025). Latest estimates of climate investment needs in coastal ecosystems in emerging markets and developing economies (other than China) were estimated at USD 35 billion in 2025 (Bhattacharya A, 2025).

A significant challenge is the limited presence of private investment in this area and NbS in general. At present, "**public finance remains the main source** of finance at 82per cent (**USD 165 billion**) of **total NbS finance flows**" (UNEP, 2023). From these, "over 71% (USD 117 billion) of public finance for NbS is directed to biodiversity and landscape protection and to sustainable agriculture, forestry and fishing" (the last category also includes non-NbS investments). By contrast, "**private finance for NbS remains modest** at **USD 35 billion**", considering investment to NbS from both restoration, sustainable land management, and protection. This number includes terrestrial NbS (large portion of finance) together with coastal and blue carbon ecosystems (specifically mangroves, seagrass). Noteworthy is that "more than half (57 per cent) of private NbS finance is channelled through biodiversity offsets credits and sustainable supply chains." (UNEP, 2023). In this context, biodiversity offsets and credits refer to market-based or compliance-driven mechanisms that generate tradable biodiversity outcomes, distinct from voluntary CSR spending or carbon crediting schemes.

Out of the total private finance flows (USD 35 billion) on NbS, it is assumed that just about **6 per cent may go to sustainable ocean economy** (this number is calculated conservatively, excluding flows to ocean-based industries, like renewable marine energy, which may not be NbS relevant), and impact investment in ocean **biodiversity conservation is no more than about USD 2.1 billion globally**[3] (UNEP, 2023; GIIN, 2020).


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3 Value calculated by authors considering data in p. 72 of UNEP 2023, which estimates, for "private NbS finance flows" that the share of annual investment of marine funds spent on biodiversity conservation" is 6% of total private flows.

The scenario is even more concerning **for developing countries**, where the **SDG investment gap stands at USD 4 trillion per year** – including funding, public or private, related to Goal 13 (Climate action), Goal 14 (Life below water) and Goal 15 (Life on land), which generally registered moderate improvements to severe deviations from the desired trajectory (United Nations, 2024).

The **finance gap** for coastal and marine NbS capital flows (alternatively coastal and marine ecosystem capital flows) has arisen due to limited access to affordable credit, the small size of many conservation projects, weak institutional support, and high investment risks. These challenges have hindered the mobilization of both public and private capital. **Key barriers** include inadequate policy and regulatory frameworks, unclear tenure rights, lack of high-quality project pipelines, and insufficient and costly risk assessment and certification mechanisms. Additional constraints include limited investment for the "missing middle" — the stage between early feasibility and full implementation — and a lack of long-term financing models that ensure sustainable revenue streams beyond short-term grants or philanthropic funding. Data scarcity, exchange rate volatility, and a lack of strong offtake agreements (including from carbon and sustainable products) can further constrain investment flows. The private sector remains hesitant to engage in coastal and marine projects due to the perceived risks and uncertainties (physical as well as regulatory), lack of clear revenue streams, small size and high due diligence costs associated with these ecosystem investments. For carbon projects, low prices and volatility increase perceived risks.

Addressing these gaps requires targeted interventions to create enabling conditions for finance, such as improving regulatory clarity, strengthening institutional capacities, and developing innovative financial instruments that can enhance the bankability of projects (see table 3). This comes on top of distorted market dynamics from harmful fiscal policies. Unsustainable fishing and aquaculture as well as non-green shipping receive an estimated annual USD 22 billion in subsidies that increase habitat pressure and crowd out sustainable investments. Most subsidies go to large-scale industrial fishing fleets, making small-scale fishing fleets less economically viable. Putting in place policy measures to shift subsidies from harmful activities to sustainable coastal and marine activities would be part of the toolbox for mobilising finance at scale for healthy coasts and oceans.

Box 1. Explore further: The Organisation of Economic Co-operation and Development (OECD) ocean websites

The Sustainable Ocean for All initiatives of the OECD provide an interactive platform for information in finance flows to the sustainable ocean economy. The OECD Data Platform on Development Finance for the Sustainable Ocean Economy (OECD, n.d.) offers vast data points and the OECD Data Explorer on the Sustainable Ocean Economy also provides country data on natural capital: threatened marine species, coastal landcover change, fish stocks; coastal flooding; policy responses and socio-economic data).

Source: OECD, 2024.

Table 3. Barriers to ocean and marine investment (summary)

Barrier	Description
Lack of targets and valuation	Difficulty quantifying restoration goals and integrating ecosystem services into financial and policy frameworks; complexity of monitoring, verification and reporting.
Estimation of risks and economic value	Limited understanding of ecosystem pressures and dependencies of functioning ecosystems for long-term economic development.
Data quality and accessibility	Lack of access to robust scientific data for impacts and risks (particularly local data); unfamiliarity with natural capital data (particularly local data); accepted carbon accounting methods limited to specific investment areas (mangroves, seagrasses and salt marshes); moderate to no familiarity with carbon accounting methodologies.
High opportunity costs	Coastal areas are often prioritized for development over ecosystem protection, and it is unclear how best to combine existing ecology or ecosystem restoration with infrastructure needs in a way that benefits climate, biodiversity, and people.
Weak policy and regulatory support	Lack of supportive policies and regulations for ecosystem-based solutions. Weak enforcement of marine protection, regulatory gaps around (blue) carbon credits and biodiversity credits.
Distorted market dynamics	Vast subsidies exist that support ecologically harmful ocean-related activities, especially unsustainable fishing and aquaculture.
Lack of expertise and support	Gaps in technical expertise and institutional frameworks for project development (especially for carbon projects) and project analysis at local/regional financing institutions.
Unclear land rights	Legal uncertainties around land and resource ownership complicate project implementation.
Financial barriers	Limited funding sources and high risks for small-scale projects. Due diligence costs too high. Low incentives from investment professionals to engage in such financing.
Weak offtake agreements	Uncertainty of ability to reliably deliver ecosystem products required by long-term agreements (e.g. sustainable fisheries or carbon credits) hinder investor confidence.
Limited access to local financing	Reduced availability of local financial institutions willing to provide loans for small projects or offer affordable capital.
Small project scale	Small projects are inherently high-risk, with limited credit volumes, exposure to low market prices, and permanence concerns. Small scale fisherfolk and similar enterprises also suffer from limited credit histories, low financial literacy, and lack of collateral. Pooling or bundling approaches can help reduce risk and improve viability.
Currency and exchange rate risks	Volatility in exchange rates can affect project viability (feasibility and profitability, particularly in cross-border coastal and marine initiatives).
Limited insurance options	Insufficient insurance availability for coastal and marine projects.
Investor preferences	Project holders and local partners have limited knowledge about international investor preferences and requirements in terms of eligibility criteria and reporting key performance indicators.
Limited local engagement	Ensuring strong community engagement and support for the project can be a barrier if there is limited trust among stakeholders and/or local presence.

Sources: Lubchenco and Haugun, 2024; OECD, 2025; Flammer, Giroux, and Heal, 2025; adapted by authors.

4. Financing opportunities and the role of the Green Climate Fund

Evolving regulatory landscapes and growing interest from sustainable investors present promising opportunities to integrate ocean finance into global climate commitments. However, key challenges persist — particularly uncertainties around governance, access, and benefit-sharing mechanisms. This is especially true for instruments like blue bonds, investment funds, debt-for-nature swaps, and carbon market–related financing structures, which have gained momentum in recent years but still require additional support to deliver financing at scale.

Expanding the range of financial tools and strengthening **public-private partnerships** can be critical in unlocking the full potential of ocean climate finance, ensuring that coastal and ocean NbS can scale effectively to meet both climate mitigation and adaptation goals. **Policy and regulatory frameworks** must evolve to create enabling conditions for investment, including clear tenure rights, institutional support for project development, and market incentives that improve the financial viability of marine and coastal NbS, sustainable fisheries, ecotourism, and green-grey infrastructure project development. Looking ahead, climate finance for coastal and marine ecosystems could be recommended to adhere to common principles laid out by the **Sustainable Blue Economy Finance Principles**, which could help to positively transform the way in which ocean ecosystems are used and managed (UNEP-FI, 2018).

To overcome these barriers, the GCF can play a catalytic role through **blended finance structuring**, absorbing risks that deter private investors. This can be done by providing support through the GCF Readiness Programme and Project Preparation Facility (PPF), **and investments including first-loss capital, concessional loans, and risk guarantees** to improve the bankability of nature-based solutions, unlocking commercial capital that would otherwise remain sidelined (GCF, 2023a).

4.1. Green Climate Fund instruments and actions

A range of financial instruments — **grants, reimbursable grants, concessional loans (senior and subordinated), equity investments, guarantees and results-based payments** — are available to the GCF to support coastal and marine ecosystem projects, including those linked to the sustainable blue economy (ecotourism, sustainable fisheries and aquaculture) as well as green-grey coastal infrastructure projects. These GCF instruments can be combined to create specific solutions adapted to the unique requirements of each climate initiative. As of 2025, out of USD 19.33 billion provided by GCF, USD 1.64 billion has been allocated to ecosystems and ecosystem services through the following financial instruments: grants (USD 1.18 billion); senior loans (USD 261 million); equity (USD 124 million); subordinated loans (USD 40 million); guarantees (USD 18 million); and reimbursable grants (USD 9 million).

Grants often are a critical financing instrument for the **implementation of coastal and marine ecosystem restoration and conservation activities**. Grant support for investments include **technical assistance, capacity building, policy reform, and the creation of an enabling environment that enhances and sustains their impact**. GCF grants can be used to finance priority public goods that do not generate financial revenue for private investors (GCF, 2022b). As outlined above, 70 per cent of the GCF funds distributed to ecosystem and ecosystem services have been in the form of grants. However, a major barrier to scaling grant-based funding is the scarcity of grants as they typically do not generate financial returns (GIZ, 2023a) and are mostly

non-reimbursable. Reliance on grant funding alone does not create long-term financing for project maintenance and scaling (UNEP FI, 2021).

Next to using grants for regulatory and policy action, GCF grants can be applied to prepare project pipelines and nurture growth companies for investment vehicles, blue bonds and financial institutions. Grants are crucial to capitalize national or regional incubators and accelerators supporting sustainable ocean companies and projects. Current GCF projects include:

- The GCF provided USD 32 million through the German Kreditanstalt für Wiederaufbau (KfW) to the Blue Action Fund to support nine adaptation sub-projects by non-governmental organizations to improve climate-resilient coastal zone management in Madagascar, Mozambique, South Africa, and Tanzania (FP 122) (GCF, n.d.a.). The programme leveraged EUR 25 million in additional co-financing from the German Federal Ministry for Economic Cooperation and Development, while grant recipients are required to provide 25 per cent of project budgets.

- GCF is working with Barbados and other partners building on the ongoing policy reforms supported by the International Monetary Fund Resilience and Sustainability Facility (RSF) on the implementation of a new Blue Green Bank for Barbados (GCF, 2023e). The first of its kind, the Government of Barbados has decided to use USD 10 million **from the fiscal space created by the RSF** as capital for a new **"Blue Green Bank"**. The **GCF intends to offer USD 1.5 million per project to prepare investment proposals** for the new bank, which aims to mobilize capital from the European Investment Bank, the Development Bank of Latin America and the Caribbean (CAF), the Inter American Development Bank (IDB) and GCF to leverage private sector finance for investment in resilient water and waste treatment infrastructure and flood and coastal protection through new financial instruments for coastal protection building on Barbados Blue Bond with the Inter-American Development Bank and The Nature Conservancy.

Debt financing is mostly offered in the form of senior concessional loans by the GCF, and to a lesser extent through subordinated, junior loans. For ecosystems and ecosystem services, concessional loans rank second, after grants, and are a key instrument for scaling investments in coastal and marine ecosystem projects. Through concessional loans, the GCF enables **public sector partners** with access to an alternative source of debt financing. This supports target entities with sufficient fiscal space and borrowing capacity by

enabling them to implement projects that address climate risks while generating revenues or avoiding future financial losses. Concessional loans can be used by **private sector entities** as seed capital in climate investment vehicles to crowd in domestic capital and finance projects while addressing climate risk without altering the shareholding structure of projects and companies (GCF, 2022b) as shown below:

- In 2024, the GCF provided a USD 30 million, lower-interest, longer-tenure, concessional loan alongside a USD 40 million grant to Barbados through the Inter-American Development Bank for a coastal sewage treatment plant to efficiently deliver reclaimed water for agricultural irrigation and aquifer recharge, **protect coastal ecosystems, and nearshore reefs from pollution**. The Barbados Climate Resilient South Coast Water Reclamation Project (SCWRP) (GCF, n.d.d.) introduces a novel financing approach through a **"Debt-for-Climate Resilience Conversion"** (EIB, 2023 December) or debt swap, which will create fiscal space and generate savings over time, allowing Barbados to invest in climate-resilient infrastructure. Through support from its international funding partners, Barbados replaced outstanding, more expensive debt with more affordable financing, generating USD 125 million in fiscal savings that will be used to enhance water resource management and increase water and food security. The debt-for-climate resilience conversion has been structured as a **Sovereign Sustainability-Linked Loan (SSLL), marking the first SSLL tied to a sovereign water security project**. The sustainability targets underpinning the loan relate to the volume and quality of reclaimed water generated by the upgraded plant. If the targets are not met, the government incurs a financial penalty that will be paid into a specialized trust for environmental investments, the Barbados Environmental Sustainability Fund. The loan was backed by USD 300 million in guarantees USD 150 million each from the Inter-American Development Bank (IDB) and the European Investment Bank (EIB), the latter under the European Union's Global Gateway Initiative (EIB, 2024). The IDB and GCF are providing a total of USD 110 million in upfront funding for the project, including a USD 40 million grant and a USD 30 million loan.

While grants and concessional loans have been the predominant tools for GCF in supporting climate projects, the GCF portfolio is moving towards the inclusion of high-impact instruments (e.g. equity and guarantees). Global trends highlight the potential of guarantees and equity to mobilize more capital than any other instrument as they expand developing countries' access to capital markets at lower cost with longer maturities.

Equity investments provide essential de-risking capital and can be applied for climate-mitigation activities (e.g. blue carbon) and adaptation activities (e.g. climate-adaptation technologies applicable in coastal resilience). The GCF can deploy all forms of equity or provide venture or seed capital for early-stage companies and projects addressing climate risks, either directly or through investing in dedicated climate funds. A major bottleneck is the lack of bankable investments, as many projects face high perceived risks, uncertain returns, and early-stage development challenges, particularly in small island developing states and least developed countries (GCF, 2022a; Eiselin et al., 2022). To address this, GCF can play a catalytic role by providing **first-loss equity** to de-risk investments, facilitating impact funds through local financial institutions for SME on-lending, while offering grants for technical assistance to both financial institutions and investees. These interventions can enhance the financial viability of ocean-climate projects, mobilize private sector investment, and align efforts with global climate and biodiversity goals (GCF, 2023b):

- As the first at-scale GCF private sector programme in the blue economy, the **Global Fund for Coral Reefs Equity Investment Window** (implemented with Pegasus Capital Advisors LP) created a private equity fund to

encourage investments in the blue economy, protecting coral reefs. GCF acts as anchor investor with its **USD 125 million first-loss equity investment commitment** (GCF, n.d.b.) encouraging further USD 375 million public and private sector investment in the following areas: sustainable ocean production, ecotourism, and sustainable infrastructure.

In the area of **guarantees**, the GCF supports investment climate risk management through the full range of financial guarantee structures. Partial- or full-risk credit guarantees help projects reduce credit losses of guaranteed loans and increase recovery rates for the lenders and allow borrowers to obtain lower funding costs and investors to reach their investment goals. Guarantees can also play a key role in enhancing the credit profile of the bond issuer by guaranteeing the partial or total repayment of the money borrowed and facilitating developing countries' access to global capital markets (GCF, 2022b). While guarantees do not eliminate risk, they reallocate a portion to entities such as the Green Guarantee Company (GGC), set up in 2024, as the first ever global institution dedicated to providing guarantees for climate bonds), backed by GCF patient capital and higher risk tolerance (GCF, 2024e). Through this approach, GCF is already providing **credit guarantees for green and (emerging) blue bonds**, usually as partial guarantees or via risk-sharing facilities. These guarantees have been used to support renewable-energy and energy-efficiency bonds, and new programmes extend this model to **sustainable ocean finance and marine ecosystem resilience**:

- The GCF is exploring options to deploy guarantees in a more efficient manner, in the absence of a credit rating. In 2022, the GCF became a founding equity investor in the world's first climate-focused guarantee company, the Green Guarantee Company (GGC). Launched in early 2024 with multi-donor support, GGC will leverage an initial USD 100 million from investors to provide USD 1 billion of **guarantees on green bonds** and loans for climate projects. By improving green loan or green bond credit quality and reducing investor's risk exposure, the GCF can effectively blend private and public funding to scale.

Risk-transfer mechanisms, such as **insurance products and catastrophe bonds**, offer protection against climate-related losses, but their adoption remains low due to cost and technical complexities. In 2022, the GCF outlined a strategic vision in document GCF/B.34/Inf.16 (GCF, 2022b) "Diversification of financial instruments for addressing climate risk" which would include options like parametric insurance for climatic events, indicating an interest in incorporating such solutions into its portfolio. In parallel, global initiatives such as the Fund for Responding to Loss and Damage (FRLD) — established under the UNFCCC to provide financial support for countries experiencing climate-induced losses — are also exploring insurance-based approaches, underscoring the growing relevance of risk transfer in climate-finance architecture.

Risk-transfer mechanisms, such as insurance and derivative products, can be vital financing instruments for ocean climate projects. These instruments help mitigate the financial risks associated with climate-related events, such as storms and sea-level rise, by transferring the financial burden to the insurance market or other risk-sharing mechanisms.


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However, a significant barrier to the widespread adoption of risk transfer in ocean climate projects is limited private sector interest. This is primarily due to the high upfront costs, complex risk assessment, and the relatively low returns on investment that do not always align with the risk appetite of private investors (GIZ, 2023a). Furthermore, the lack of data and standardization of risks in coastal ecosystems makes it difficult to model and price insurance products effectively. The GCF can assist in addressing these challenges by co-financing risk-transfer mechanisms, like the design, structuring and launch of parametric risk insurance for financing innovations in marine and coastal ecosystems alongside private sector partners. Parallels could be drawn to GCF support of parametric risk insurance provided to agro-pastoral farmers in sub-Saharan Africa, where GCF provided partial premium subsidies for farmers to bridge the affordability gap (GCF, 2022b; Eiselin et al., 2022).

Results-based payments are financial instruments used by GCF mainly for forest and land-use projects to reduce emissions from deforestation and forest degradation (REDD+). In October 2024, the GCF Board approved a new policy for results-based payments for REDD+ described in GCF/B.40/23 for setting the carbon price for REDD+ payments at USD 8 per tonne of CO_2e for the 2024-2027 programming period (Decision B.40/16[4]). The GCF employs results-based payments in other contexts as well, for example for mangroves, as illustrated by the Mangrove for Climate project (FP235) in Ecuador (GCF, n.d.c.).

GCF investments in innovative blended financing mechanisms contribute to sustainable and climate-resilient coastal and marine environments and to achieve climate and environmental goals (see box 2). Nevertheless, to address the climate and ocean finance gaps, such innovative structures need to be brought to scale. This requires collaborative efforts of public and private actors increasing the availability of de-risking mechanisms and providing technical assistance. Without adequate tools to mitigate perceived risks, such as insurance, guarantees, or guarantees on returns, private investors may remain hesitant to invest in projects involving coastal and marine ecosystems — often seen as high-risk due to their vulnerability to climate change and uncertain returns (Eiselin et al. 2022; Conservation International and Rare, 2025). To replicate innovative financing, GCF is also supporting capacity building and providing technical assistance to both project developers and private investors through its Readiness Programme and Project Preparation Facility. By enhancing the understanding of risk management tools and building the necessary skills for structuring complex financial arrangements, GCF can help bridge the gap between public and private finance (GCF 2022b).

Box 2. Results-based payments for mangroves in Ecuador

The **Mangrove for Climate project in Ecuador** includes a results-based payment system for mangrove restoration and coastal zone management. In the project, **shrimp farmers** and local communities are encouraged to restore and manage mangrove areas within or near their concessions, adopt legal, sustainable practices, and participate in long-term stewardship programmes monitored with community oversight. This engagement is supported by financial incentives and tied to measurable environmental outcomes. Unlike traditional grants, this model rewards participants only when specific outcomes are achieved — such as restored hectares or verified emissions reductions.

Source: GCF 2025.

4 GCF/B.40/16 "Financing of results-based payments for REDD+ mainstreaming proposal". Decision date 24 October 2024 at B.40.

5. Key indicators

Key indicators are considered particularly relevant for ocean and coastal climate and resilience projects. The GCF Integrated Results Handbook (IRMF Handbook) (GCF, 2022c) guides the selection of key climate indicators, setting baselines and targets and confirming monitoring methodologies; this includes relevant core indicators and supplementary indicators used to track GCF quantitative contributions to mitigation and adaptation outcomes. Positive indicators that can be used by AEs for projects in the coastal and marine sectors are explained here. The analysis is put in the context of the GCF **IRMF and its indicators, mitigation and adaptation**, and is complemented by additional indicators that are drawn from relevant finance frameworks (see Annex Resource booklet., section III. B). The selection of indicators is tailored to bridge the gap between financing instruments and coastal or marine NbS, reflecting **metrics commonly used by major stakeholders engaged in ocean-climate finance**.

Box 3. Explore further – GCF Guidance

While preparing a project, the AE first defines the results/impact areas and then selects key indicators to determine the impact achieved. The GCF Integrated Results Management Framework (IRMF) provides an overview of indicators proposed by GCF in their key results areas (GCF, 2021). The IRMF and the related IRMF Handbook (GCF, 2022c) are key documents to guide AEs in designing and tracking how projects and programmes are achieving climate mitigation and adaptation outcomes.

5.1. GCF Integrated Results Framework and common indicator guidance

When preparing a project proposal, AEs should clearly state the expected impacts of the proposed intervention — whether it targets mitigation, adaptation, or both — based on the climate context, challenges, and barriers described. AEs should then identify the relevant results areas and select the most appropriate GCF result indicators that are used to track GCF quantitative contributions to mitigation and adaptation outcomes (see table 4).

Projects and programmes should track all core indicators relevant to their interventions and must monitor at least one of the following: Core Indicator 1 (emission reductions) or Core Indicator 2 (beneficiaries). Core Indicator 1 is mandatory for mitigation-focused initiatives; Core Indicator 2 is mandatory for adaptation-focused initiatives; and both indicators are required for cross-cutting initiatives. Where applicable, Core Indicator 3 and/or Core Indicator 4 can also be included.

Next to the core **mitigation and adaptation indicators** listed above, the GCF IRMF also offers core indicators to measure important actions in improving the **enabling environment** (Core Indicators 5–9 are related to institutions, technology, markets and knowledge). These are key for advancing finance for ocean climate action.

Table 4. Core Indicators of IRMF (mitigation and adaptation)

IRMF Indicator	Indicator description	Results Areas
Core 1 indicator	GHG emissions reduced, avoided or removed/sequestered (tCO_2eq)	Mitigation
Core 2 indicator	Direct and indirect beneficiaries reached (number of individuals)	Adaptation
Core 3 indicator	Value of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions (USD)	Mitigation and/or Adaptation
Core 4 indicator	Hectares of natural resource areas brought under improved low- emission and/or climate-resilient management practices (ha)	Adaptation

The IRMF offers core indicators and sub-indicators for these results areas to guide the AEs. Specifically for coastal and marine ecosystems, the **GCF result areas of food, ecosystems and low-emission and climate- resilient infrastructure** are most relevant. Core indicators include general indicators to measure results. Sub-indicators relate to more specific measures that contribute to the achievement of core indicators. The core indicators and sub-indicators for mitigation and adaptation outcomes of ocean and coastal resilience projects and programmes are structured to align with the GCF IRMF (indicators expressly included in the IRMF and listed in table 5 are noted in the column Relevant GCF Result Area / IRMF), and are grouped into selected thematic areas that integrate the result areas of the GCF Strategic Plan 2024–2027 (e.g. Ecosystems, Food, Infrastructure) (see table 5). This list also includes some indicators relevant for the enabling environment and goes beyond the GCF IRMF indicators with a view towards scalability. Indicators proposed by the UNFCCC Ocean and Coasts Climate Action Pathway are included, as well as those commonly used by multilateral development banks, international capital market guidance and finance initiatives.

Only IRMF core indicators and their supplementary indicators may be included in Section E3 of the GCF funding proposal logical framework. Any other indicators should be placed in Section E5 (Project/Programme-Specific Indicators), unless the GCF funding proposal template is modified.

Over the past years, substantial advancement has been made in the common understanding of impact frameworks for ocean-related investments. This effort has been led by the collaboration of multilateral and regional development banks, capital market associations, and the United Nations Environment Programme in close consultation with international nature organizations. The following sources offer a collection of impact frameworks **adopted by financiers**, which include **indicators commonly used in the interface between finance and oceanic and coastal projects**. These can further support proposals by AEs, particularly in the design of actions that include blue natural capital and wider blue economy activities.

Especially noteworthy are the harmonized frameworks for impact reporting offered by the International Capital Markets Association (ICMA), which is widely used by green, sustainable, and sustainability-linked bond issuers, with recent coverage also for nature-focused bonds. The Climate Bond Initiative also publishes key sector guidance for the water sector, which can be consulted for indicator selection, including indicators for green-grey infrastructure. The ICMA, the United Nations Global Compact, the United Nations Environment Programme and the Asian Development Bank (ADB) have developed a global practitioners' guide for bonds to finance the sustainable blue economy.

Table 5. Adaptation and mitigation core indicators and sub-indicators

Thematic Area	Indicator Type	Indicator Description	Relevant GCF Result Area / IRMF
GHG Mitigation and Blue Carbon Potential	Core	GHG emissions reduced, avoided or removed or sequestered (tCO_2e)	Ecosystems (Core Indicator 1)
	Sub	Estimated GHG emissions reduced, avoided or removed or sequestered (tCO_2e) through blue carbon initiatives	–
	Sub	Hectares of coastal ecosystems (e.g. mangroves, seagrasses, saltmarshes) conserved, restored* or sustainably managed	–
	Core	Hectares of natural resource areas brought under improved low-emission and/or climate-resilient management practices	Ecosystems (Core Indicator 4) (also includes ocean use change)
Marine biodiversity and ecosystem health	Core	Hectares of terrestrial forest, terrestrial non-forest, freshwater and coastal marine areas brought under restoration and/or improved ecosystems	Ecosystems (Supplementary Indicator 4.1), relevant to coastal marine
	Sub	% or hectares of Marine Protected Areas with management effectiveness evaluations, covering planning, governance, personnel and monitoring (METT evaluations externally audited, IUCN Green List certified, Blue Park certified)	–
	Sub	Hectares of new Marine Protected Areas or areas with Other Effective Conservation Measures established, under effective implementation	–
	Sub	Biodiversity indices or species richness maintained or improved in key ecosystems	–
	Sub	Tonnes of fish stock brought under sustainable management practices	Food (Supplementary Indicator 4.3.)
Sustainable ocean-based livelihoods (incl. food)	Core	Number of beneficiaries (female/male) adopting improved and/or new climate-resilient livelihood options	Food (Supplementary Indicator 2.1), relevant to sustainable fisheries, aquaculture, ecotourism
	Core	Number of beneficiaries (female/male) with improved food security	Food (Supplementary Indicator 2.2.)
	Sub	Change in income generated from climate-adaptive marine-based economies	–
	Sub	Change in employment generated from climate-adaptive marine-based economies	–
	Sub	Number of individuals participating in ocean and coastal ecosystem management, training, or livelihood activities (with disaggregated data to include women in capacity-building, decision-making, and benefit-sharing)	–

Climate adaptation and coastal resilience (incl. infrastructure)	Core	Number of individuals (female/male) benefiting from improved climate resilience (e.g. reduced flood risk)	–
	Sub	Value (USD million) of assets protected or adapted via nature-based solutions or green-grey infrastructure (e.g. seawalls + mangroves)	–
	Sub	Value (USD million) of physical assets made more resilient to the effects of climate change and/or more able to reduce GHG emissions	Infrastructure (Core Indicator 3)
	Sub	Change in expected losses of economic assets (USD million) due to the impact of extreme climate-related disasters in the geographic area of the GCF intervention	Infrastructure (Supplementary Indicator 3.1)
Integrated governance and cross-sectoral planning	Core	Degree to which GCF projects/programmes contribute to strengthening institutional and regulatory frameworks for low-emission climate-resilient development pathways in a country-driven manner	Enabling environment, institutions (Core Indicator 5), this indicator measures institutional and regulatory frameworks for integrated ocean governance (including public-private partnerships)
	Sub	Number of coastal/marine area management plans with performance frameworks established or area-based regulations incorporating climate change mitigation and adaptation	–
Capacity-building and knowledge sharing	Core	Number of stakeholders trained in climate-resilient coastal / marine management practices	Enabling environment, knowledge-related (Indicator 9)
	Sub	Documentation and dissemination of traditional/local knowledge and practices relevant to ocean-climate action	–

Sources: Authors, drawing primarily from GCF Integrated Results Management Framework (GCF, 2021) p. 9–11 and related Handbook (GCF, 2022c); UNFCCC (2020, 2021a and 2021b); GCF IRMF (2021) and GCF (2023b); ICMA (2024a, 2024b, 2025).

* Note: For all indicators that include restoration, one should consider a five-year post-restoration survival rate as a proxy for ecological permanence and data credibility. This timeframe reflects common monitoring practice in coastal ecosystem restoration, where mangrove, seagrass, and saltmarsh recovery typically requires 3–5 years for vegetation establishment, root stabilization, and measurable ecological function (see Cadier et al., 2020; IUCN, 2021).

The International Finance Corporation is active in publishing guidelines for the blue economy with indicators for activities in key blue sectors including fisheries and aquaculture, habitat restoration and protection of coastal and marine environments, tourism and recreation, sustainable shipping, waste and water management. This specific guidance can be combined with more generic resources for indicators released by the World Bank Group, notably the World Bank Group Scorecard for the years 2024–2030 and the Multilateral Development Banks recent approach for measuring climate results. Another valuable resource for indicators is the impact guidance of the IUCN Blue Natural Capital Financing Facility, and newly released guidance from the Nature Positive Initiative to combine nature and climate impacts.

Annex Resource booklet Section III contains a list of the above-described guidance with references (see Annex Table x). AEs can further investigate a vast number of national or regional green and transition finance taxonomies to find relevant indicators established by many countries.

5.2. Relevant indicators from company-level risk-disclosure frameworks

The GCF Strategic Plan for 2024–2027 (GCF, 2023b) emphasizes the need to mobilize private sector funding, including co-financing, to reach its goals. Private sector finance is essential to contribute to healthy and productive oceans. To facilitate private finance flows, frameworks have emerged to set expectations for the accounting of project impact to increase confidence and attract impact-oriented investors. **Company-level disclosure frameworks can serve to inform about risks and opportunities and therefore support the private sector to engage in financing and co-financing of coastal and marine projects.**

Key frameworks include the Task Force for Nature-related Financial Disclosures (TNFD) and the Task Force for Climate-related Financial Disclosures (TCFD). The benefit of better disclosures includes more effective risk assessment and management of climate- and nature -related risks of companies, their suppliers and competitors. This helps businesses in strategic planning to better evaluate dependencies on nature and climate, assess exposures (in the short, medium, and long term) and risks that may affect commercial results, prepare strategies and action plans to attract capital allocation from lenders, investors and insurance underwriters.

5.2.1 Nature-related Financial Disclosures

The Taskforce for Nature-related Financial Disclosures (TNFD) helps companies in fisheries, shipping, ports, energy and coastal tourism to integrate assessments of financial material risks from ocean and coastal ecosystem degradation into their financial and strategic decision-making. Ultimately, such transparency strengthens the enabling environment for private-sector

engagement in GCF-supported coastal and marine projects by informing financial risk management and aligning nature-positive and climate-resilient investment goals.

TNFD has developed an integrated approach for the assessment and management of nature-related issues for use by a wide range of corporate and financial institutions. This approach is called LEAP (Locate, Evaluate, Assess and Prepare) and is designed for use by teams of analysts from a given organization (TNFD, 2023c). Four phases of assessment are involved: *locate* the interfaces with nature across geographies, sectors and value chains; *evaluate* dependencies and impacts on nature; *assess* nature-related risks and opportunities to your organization; *prepare* to respond to nature-related risks and opportunities, including the reporting on material nature-related issues to the primary users of financial reports and other stakeholders, aligned with TNFD recommended disclosures.

The TNFD looks at drivers of nature change from which indicators and metrics are derived. For marine and ocean ecosystems, the following drivers are relevant: climate change; ocean use change (total spatial footprint, extent of use change); and resource use/replenishment (quantity of high-risk natural commodities sourced from the ocean, water use). From TNFD recommendations (TNFD, 2023b), the indicators that may be linked to the GCF Strategic Plan 2024–2027 (climate mitigation; area conserved, restored, used; food and commodity related indicator) could be especially relevant for AEs preparing GCF proposals. Further specifications on these core indicators as well as TNFD definitions of sustainably managed (used) and sustainable use of natural resources can be found in Annex Resource booklet (especially section III table ix).

TNFD has prepared a series of guidance documents that might be relevant for AEs applying for GCF support. Especially noteworthy is the chapter on Ocean Biomes within the TNFD Guidance on Biomes (TNFD, 2023a).

Furthermore, the TNFD has recently released TNFD Guidance for the Fishing Sector,[5] allowing for the disclosure of sector-specific metrics in line with the TNFD-recommended approach.

How much of a fishing company's activities, with moderate and high dependencies and impact value chains, are in or near blue-carbon rich sediments and MPAs is of particular importance. The TNFD Fishing sector guidance provides useful datasets and tools for this assessment and presents sector-specific disclosure indicators like fishing gear modifications; certifications (Marine Stewardship Council or other credible standards that abide by the Food and Agricultural Organisation third-party assessment arrangements, are compliant with International Social and Environmental Accreditation and Labelling Alliance, or are recognized by the Global Sustainable Seafood Initiative Benchmark Tool); participation in credible fisheries improvement programmes (FIPs); biodegradable fishing gear; bycatch-reduction mechanism use; or consultation with Indigenous Peoples and Local Communities (IPLCs) (TNFD, 2025a).

The TNFD also offers specific guidance for the aquaculture sector with core disclosure indicators and metrics (TNFD, 2024, p. 84). In this sector, core disclosure indicators may include ocean-use change, especially area of natural wetlands converted, seagrass beds, eelgrass beds, mangroves, seagrass meadow(s), coral reefs, salt marshes, tidal flats, shellfish beds and estuaries converted, as well as around primary forests and other naturally regenerating (second growth) forests converted (TNFD, 2024, pp.63–75).

Useful guidance for setting targets for GCF supported coastal and ocean activities is

5 Covering the activities of capturing wild aquatic organisms, such as fish, molluscs, crustaceans and kelp, via shore-based methods or via commercial or artisanal vessels in inland coastal or offshore waters. As well as its downstream activities of processing, aggregation, storage and transport (TNFD, 2025a).

provided in the **Science Based Targets Network (SBTN) work on Ocean Targets** (SBTN, 2025). The SBTN will also release the *Protect Marine Ecosystem* target covering wild fisheries and aquaculture, helping companies avoid and reduce impacts on structural habitats in marine and transitional environments.[6]

5.2.2 Climate-related Financial Disclosures

The Task Force for Climate-related Financial Disclosures (TCFD) framework,[7] which has been integrated into the International Sustainability Standard Board (ISSB) IFRS S1 (general sustainability) and IFRS S2 (climate), is actively utilized by companies operating in coastal and marine environments to assess and disclose climate-related risks and opportunities. Given the inherent exposure of these sectors to climate change impacts, such as sea-level rise, ISSB IFRS S1 and S2 provide a structured approach for transparency and strategic planning on climate risks. Such risk assessments are frequently required by financial institutions and their regulators. The metrics and targets recommended by IFRS S1 and S2 (based on the TCFD framework elements) for companies could be relevant for AEs that apply on behalf of the private sector; especially the TCFD Guidance on Metrics, Targets and Transition Plans, which remains a useful resource for identifying KPIs (TCFD, 2021).

The TNFD is often used together with ISSB S1 and S2 by companies operating in marine and coastal zones that seek to report risks and opportunities related to climate and nature (see section 5.2.1).

6 Organizations may wish to refer to the target-setting methods developed by the SBTN and the summary guidance on SBTN methods for setting science-based targets for nature, which the TNFD co-developed. The upcoming seafood value chain science-based targets are being developed by the SBTN Ocean Hub. The characteristics of the SBTN Ocean Hub targets align with the United Nations Environment Programme Finance Initiative (UNEP FI) Turning the Tide report and Target Setting Manual.

7 The work of the Financial Stability Board, Task Force for Climate Related Financial Disclosures (TCFD) is continued by the International Financial Reporting Standards (IFRS) Foundation. Related TCFD recommendations are anchored on the International Sustainability Standards Board (ISSB) Reporting standards for climate disclosures. (IFRS, 2023).

6. Financing pathways

Long-term project and programme sustainability depends on financial feasibility, predictability and continuity. While the GCF is already providing substantial funding for climate action — including the approval of **USD 2.5 billion** for 44 new investments in 2024, extending its support to 133 developing countries (Responsible Us, 2025; Nature News, 2024) — co-financing remains essential to **scaling the impact** on coastal communities and ecosystems.

To improve scalability, it is crucial to consider a mix of financing solutions, including exploring **new financing mechanisms and tools**. This section presents financing mechanisms that can be combined with GCF finance to achieve improved ecosystems management, restoration, and conservation outcomes.

A comparison table shows financing opportunities (financial instruments able to pool and scale to achieve transformational change) and GCF roles or concessional elements (see table 6), which should be understood in the context of the GCF appetite for risk to pursue high-impact opportunities that other investors are unwilling or unable to take on. Regarding project and programme implementation risks, the GCF seeks to provide support to manage risk in the domains of project governance, execution, political and macro-economic risks, partner's technical and institutional capabilities and track record in implementing programmes as well as community readiness (i.e. awareness, preparation, commitment) as specified in the GCF Risk Appetite Statement (GCF, 2024d).

The financing instruments and case studies presented in this section have been selected because they offer ways to scale up finance, including private sector finance, for coastal and ocean NbS and climate activities overcoming barriers and allowing for transformational change. A key hurdle of financing these activities is to **bridge the gaps between small-scale project sizes and large financial instruments** and improve **the risk-return profiles** to work towards lowering the cost of capital for marine and coastal NbS and climate activities. These examples of financing mechanisms have been chosen for their replication potential and to contribute to GCF goals under the IRMF.[8]

Table 6. Financing mechanisms

Technical assistance facilities, incubators, catalytic facilities, accelerators and venture builders to strengthen and scale up pipelines of investible projects and to create an enabling environment	• Grants to cover incremental costs, prepare projects (technical, costing, legal, management, or governance) for financing, increase capacities, improve environmental and social frameworks • Small concessional loans to prepare projects, start or accelerate impact SMEs • Grants to prepare an enabling policy environment, such as marine spatial planning, and MPA design. Grants to deploy Measurement, Reporting, and Verification (MRV) tools for carbon mitigation or pollution-tracking systems to identify and stop drivers of degradation

8 Notably, IRMF goals 2.1., 2.2, 4, and 4.1.

Blue Bonds[9] (sovereign, municipal, corporate) • Use of proceeds bonds • Sustainability-linked bonds tied to blue natural capital strategy	• Guarantees for bonds to partially cover principle and coupon payments • Political risk insurance support • Parametric risk insurance support allowing debt service after natural catastrophes • Grants to prepare bonds (framework, pipelines, financing structure) • (Very restricted possibility: Repayment through results-based payments or carbon or biodiversity credits)
Local lending facilities by commercial banks, development banks	• Increased tenor of loans, reduced interest rates of loans • Grants for technical assistance, investment analysis, sustainability certification
Larger project finance structures with multilateral development banks and other large lenders for infrastructure	• Increased tenor of loans, reduced interest rates of loans • Grants for technical assistance
Impact Funds (private equity in local financial institutions for on-lending to SMEs)	• First loss position • Grants for technical assistance for local financial institutions as well as investees
Impact Funds (corporate private equity and debt)	• First loss position (first loss equity or junior loan) • Grants for technical assistance to prepare investments and capacity building for investees
Biodiversity and Blue Carbon results-based payments (RBP) and markets	• Facilitate access to these markets (e.g. grants or concessional loans for technical assistance for preparing high-quality projects, for strengthening capacities of authorities to prepare for markets) • Establishment of buyer pools (via grants or concessional loans for feasibility assessments and/or market design studies)
Debt for nature/climate swaps[10]	• Guarantee loan or bond repayments • Grants to prepare swaps
Parametric risk insurance	• Access to insurance, cover partial premium costs
National or regional platforms to connect project technical assistance facilities, incubators and accelerators with the financing instruments described above	• Grants to set up national and regional platforms that can serve as a marketplace for ocean and coastal financing instruments

6.1. Bonds for SDGs, blue-themed bonds

Bonds are fixed-income instruments issued by sovereigns, sub-national entities, financial institutions or corporates. "Blue Bonds" are often classified as green, sustainability Use of Proceeds (UoP) bonds or sustainability-linked bonds (SLB) with a dominant blue investment theme or blue natural capital objectives (see box on the following page). Blue bonds raise capital from a variety of institutional or private investors either through public listing or private placements. To date, several blue bonds have been used to finance coastal and marine ecosystems and develop sustainable blue-economy activities. They have also been applied for

9 "Blue Bonds" are green, sustainability "Use of Proceeds bonds" for activities in coastal and marine environments, or sustainability-linked bonds where the issuer has clear sustainability targets and roadmaps.

10 Debt for Nature Swaps can contain a mix of loans, bonds, grants.

the expansion of MPAs, and the designation of new marine conservation areas. About 89 labelled blue bonds have been issued as of September 2025 with a value of USD 16.79 billion. Of the 89 blue bonds, about 42 target SDG14 (Environmental Finance, 2025b). The market still faces some challenges but shows promising growth prospects, particularly in emerging markets.

The examples of blue bond financing mechanisms listed below, especially the SLB, have been selected to ensure that climate finance and SDG finance are regarded as a package (see box 4). The design of the financing mechanisms considers the needs of developing countries to get access to lower cost capital to address climate financing needs with a holistic view towards long-term sustainable development (Sachs et al., 2025).

Bonds for SDGs, blue-themed bonds
KEY FEATURES OF BONDS

1. **Issuers** can be sovereigns, regional authorities, financial institutions, corporates, or securitization vehicles.

2. **Different structures** include use of proceed bonds, sustainability-linked bonds, and debt-for-nature swaps.

Use of Proceeds bonds

A blue bond is structured as a green or sustainability bond, where the issuer has strict use of proceeds for certain types of activities. These activities can include the establishment and improved management of MPAs or the design and implementation of broader blue economy policies. The proceeds can be used to finance coastal and marine conservation and protection for priority sectors including nature-based solutions for coastal protection, sustainable fisheries, sustainable aquaculture value chains, community-based aquaculture projects with high-value species, integrated marine spatial planning and waste and wastewater management that benefits marine life. The bond issuer needs to have an adequate project pipeline ready to disburse the bond proceeds in the coming years. Smaller project pipelines can be packed into broader sustainability bonds to finance SDGs of the issuer.

Sustainability linked bonds

The sustainability linked bond (SLB) proceeds are not tied to pre-determined activities but rather can be used for general purposes to implement a strategy to achieve sustainable development objectives. The financial terms of the bond depend on the achievement of predefined key performance indicators (KPIs). Issuing SLBs allows to channel funding for broader economic transitions and sustainable development growth activities over time (e.g. blue natural capital, national biodiversity and national climate objectives). New SLB frameworks are emerging that integrate effective ecosystem conservation and management into key performance indicators. Adequate regulation, governance mechanisms and project pipelines can be established over time to generate expected outcomes to meet targeted objectives.

Debt-for-nature swaps

New bonds are issued by credit institutions to raise capital to allow them to provide a new loan to the debtor, which enables the reimbursement and cancellation of part of the existing commercial debt. In return, the debtor channels new funding into ecosystem-positive impact activities by integrating concessional and grant funding for technical assistance and risk mitigation. This structure has been used to finance MPA expansion and related livelihood activities; these structures usually put funds aside in an endowment or trust to continuously support suitable projects over time. In some specific contexts, debt-for-nature swaps can offer prospectives for achieving additional fiscal space via debt relief and earmarking some proceeds towards climate objectives, however their structuring is often very complicated and costly (Colodenco et al., 2025).

3. **Delegated proceeds manager** are issuer appointed entities (e.g. government agency, national development bank, reputable nature organization) that manage some of the proceeds to generate expected impacts and for MRV.

4. **Concessional elements:**

- Public or private grants to pay back part of the principle or the interest payments if needed.
- Investors forego some interest and principal in return for outcome-based success payments.
- Political risk guarantees, parametric risk insurance cover (for natural catastrophes) reduce the risk of non-payment; guarantees and credit enhancements reduce the cost of capital for the borrower and mobilize private capital.

5. **Technical assistance** includes grants or interest-free or interest-reduced loans and the preparation or improvement of:

- Bond structuring and issuance, blue bond framework preparation, methodological impact and MRV guidance, support for third-party verification;
- Projects to be financed in connection with the bond (project selection, environmental and social impact and risk assessment, MRV);
- Integrated Coastal Zone Management Plans, Marine Spatial Plans with sustainable use zones, MPAs, and elements needed for their design, effective implementation and management; and
- Enabling environment for investments through policy and institutional reforms and incentives.

Different bond structures can be chosen to finance marine and coastal ecosystems depending on the circumstances. They can be combined with various concessional elements and technical assistance support instruments available (see info box above). The examples below (see box 4) provide a mix of innovative bonds issued to finance marine and coastal ecosystems as well as a new concept for piloting SLB for MPA or OECM management in marine and coastal areas.

Box 4. Examples of blue bonds

1. Indonesia

Indonesia issued in 2023 a first-of-its-kind **Indonesia Blue Bond** in the Japanese debt capital market (UNDP, 2023). The bond is aligned with International Capital Market Association (ICMA) principles.

Funds raised

JPY 20.7 billion (USD 150 million) for 31 projects across 34 provinces, benefiting coastal communities and marine ecosystem by preventing disasters, rehabilitating mangrove forests and coral reefs, establishing new marine conservation areas (4.29 million hectares), managing biodiversity, and creating waste management facilities (Government of Indonesia, 2024).

Special feature

The proceeds from this issuance will be used to finance the budget deficit in 2023 and Indonesia intends to invest an amount equal to the net proceeds from the issuance of the bonds into projects that may qualify as "Eligible Expenditures" under the Republic's SDGs Framework. The eligible sectors are tracked by the "Climate budget-tagging mechanism" that tags its Eligible SDGs Expenditures with a "Blue Focus" (Government of Indonesia, 2024).

Technical assistance: Blue-bond preparation studies coordinated by UNDP and supported by multilateral donor funds, United Nations Joint Programme on Accelerating SDG Investment in Indonesia (ASSIST) (United Nations, n.d.).

Indonesia and the World Bank prepared the **Indonesia Coral Reef Bond**, the world's first outcome bond for MPAs, worth USD 100–120 million and to be issued by the World Bank.

Concessional elements

Investors carry project risks and forego fixed coupon payment; they receive an outcome linked success payment at maturity linked to achievement of performance indicators. Performance-based payments from GEF Non-Grant Instrument (NGI) and from BNP Paribas will be paid to bond investors as Conservation Success Payments according to the level of success achieved in the KPI (Government of Indonesia, 2025).

Indicators

The foregone coupon payments from the Coral Bond will be utilized to secure measurable outcomes in MPAs. The outcome indicators include an increase in coral reef fish biomass and are established and monitored through the IUCN Green List Certification Program.

Technical assistance: Blue bond preparation support from the Global Environment Facility.

2. Belize/Barbados

Blue bond as part of sustainability linked debt conversions; channel funds from reduced debt payments to marine conservation trust funds to support projects with conservation outcomes. Conservation commitments: Increase biodiversity protection zones (50 per cent high, 50 per cent medium protection), completion of marine spatial plans, designing and implementing legal, regulatory, institutional frameworks, adopting area management plans, preparing areas for IUCN Green List Certification.

Raised conservation funds

USD 180 million over 20 years for Belize, USD 50 million over 15 years for Barbados.

Concessional elements

Political risk insurance provided by the United States Development Finance Corporation and parametric risk insurance cover to allow debt service after natural catastrophes (Belize) (The Nature Conservancy, 2022b). Credit guarantees from The Nature Conservancy and Interamerican Development Bank for blue bond (Barbados) (The Nature Conservancy, 2022a).

3. Sustainability-linked bonds for Blue Natural Capital conservation, restoration and sustainable use

The sustainability-linked bond (SLB) market reached USD 36 billion in 2024 and about USD 15.8 bn to September 2025, with 77 per cent of the market focusing on SDG 13 (climate) and 2 per cent focusing on SDG 14 (life below water) (ICMA, 2025b). Data portals report about 650 SLBs issued to date, which are mostly corporate bond issuances (Environmental Finance, 2025b). Corporate SLBs have a variety of KPIs, many around greenhouse gas (GHG) emissions targets, renewable energy installations and use, green transport, energy consumption, environmental, social and governance (ESG) scores and ratings, products with sustainability certifications, supply chain sourcing with sustainable certification, reduction of disposable plastics, wastewater treatment facilities built, specific pollutants emissions reduced as well as social indicators related to gender diversity.[11]

Only four sovereigns have issued SLBs in the past years: Chile (2023), Urugay (2023), Thailand (2025) and Slovenia (2025). The KPIs used by sovereigns so far include absolute GHG emissions, number of zero-emission vehicles, share of renewable energy consumed in the national electric system, final energy consumption, native forest area and percentage of native forest maintained with respect to a baseline year and gender-equality KPIs (percentage of women in board member positions at companies that report to the Chile Ministry of Finance).

Recently, Chile and Thailand (Systainability Asia, 2025) have either updated or announced an update of their SLB frameworks to include biodiversity indicators. The biodiversity KPIs from the updated Chile SLB framework have received a very strong rating from the second party opinion provider (Morningstar Sustainalytics, 2025). In January 2026 Chile issued the a 10-year EUR 1.5 billion Sustainability Linked Bond, whose financing costs can be reduced linked to achieving two nature related sustainability performance targets, i) Land coverage under official protection, with a goal that at least 30% of the terrestrial territory is protected by 2030; and ii) Effective management of protected areas, evaluated according to four management pillars, with the aim of ensuring that at least 10% of the territory meets protection and effective management criteria by 2030. The bond was met with strong demand especially from long-term investors with a high specialisation in Environmental, Social, Governance instruments. (Government of Chile, 2025. Government of Chile, 2026). A similar approach could be taken by blue-natural-capital-rich countries to issue SLBs with KPIs and targets linked to the effective management of blue-carbon-rich MPAs and OECMs.

Effective management could be tied to science-based (Grorud-Colvert et al., 2021) and policy-oriented frameworks as illustrated in "The MPA Guide: A framework to achieve global goals for the ocean" (Grorud-Colvert et al., 2023). The MPA Guide is a framework to document the quality of an MPA through the MPA stage of establishment; the level of protection, which can predict expected ecological (biodiversity, climate); and social outcomes due to conservation, depending on enabling conditions. KPIs of sustainability linked bonds can be tied to clear designation, implementation and active management of protected areas with a focus on blue-carbon-rich ecosystems and related policy, and management and governance instruments. Such an approach is cost-conscious and does not require detailed biodiversity data for the performance of the financial instrument but will include key nature monitoring in appropriate time frames along the life of the financial product. The KPIs remain under the control of the issuer and can align with the GCF IRMF indicators and are compatible with key ICMA KPI guidance for SLBs and nature-related financial instruments.

11 Authors' research based on data accessed in June 2025 courtesy of LGX Data Hub.

A key element to advance the development of an MPA and fix the level of protection is the fulfilment of enabling conditions. These conditions include sufficient staffing and funding, adequate administrative processes, stakeholder engagement, compliance and enforcement, education and outreach, project preparation, support for livelihood development, adaptive management, capacity building and collaboration on monitoring. Grant funds, including from GCF, are well placed to help finance such enabling conditions for MPA and OECM establishment and management and to assist in preparing the baseline setting and monitoring of blue carbon rich ecosystems like mangroves and seagrasses. Key grant funding can help prepare project activities necessary for the sustainable operations of the wider blue natural capital.

The concepts of the MPA Guide can also be applied to OECMs and can find application in sustainability-linked loans. Policy-based financial guarantees (e.g. by the World Bank Multilateral Investment Guarantee Agency) could be added to guarantees by development banks or possibly the GCF to further support the creditworthiness of bond issuers or debtors, to reduce the cost of capital and to unlock finance from more commercial banks, as recently seen in the Côte d'Ivoire for a EUR 433 million sustainability-linked loan to the Ministry of Finance and Budget linked to deforestation prevention and reforestation KPIs, offered by the Standard Chartered Bank (Standard Chartered Bank, 2025b).

6.2. Local lending facilities

Multilateral and regional development banks have set up lending facilities with local development banks, commercial banks, and micro-finance institutions (see info box below). These facilities offer impact debt instruments designed to financially support businesses — including early-stage businesses — focused on marine and coastal sustainable use of natural resources.

Local lending facilities
KEY FEATURES OF LOCAL LENDING FACILITIES

Features

Capital from large development banks is channelled through local lending facilities to provide access to financing for smaller businesses and organizations active in blue economy activities.

Commercial banks invest in local impact loan facilities for MPAs and coastal and marine ecosystem conservation and restoration, fishing, aquaculture, seafood processing, and sustainable tourism activities.

Facility managers curate a pipeline of eligible businesses, design impact-aligned loan structures and ensure environmental performance monitoring.

Concessional elements

Increased tenor of loans, reduced interest rates of loans are offered to local businesses.

Technical assistance

Grants or interest-free or reduced-fee loans; anchor donors provide long-term support to:

- design and set up the lending facilities;
- assist local banks and facility managers with project assessment, project preparation, efficient disbursement and monitoring of supported businesses, especially for SMEs and communities; and
- improve the enabling environment.

Local lending facilities allow micro-, small and medium enterprises access to impact finance for marine and coastal ecosystems that would otherwise not be available. While development banks are mostly providing the initial capital for such facilities, some local blue lending facilities have been able to attract capital from international commercial banks through their impact finance window (see examples in box 7).

Box 5. Local lending facilities (examples)

1. **Tanzania**

The Tanzania Gender and Blue Economy Facility (EIB, 2023) provides intermediated financing from the European Investment Bank (EIB) that is invested through local commercial banks (CRDB, NMB, KCB Tanzania). Through this structure, the facility will channel EUR 100 million to blue economy firms and EUR 170 million to female-led companies, with a focus on micro-, small and medium enterprises. This includes innovative blended financing from the European Union, which enables the facility to provide attractive financing terms for micro-enterprises. The dedicated support to blue economy investments represents the largest EIB support for targeted blue economy business financing anywhere in the world. The investment should be compliant with the 2x Criteria, the global industry standard for gender lens investing.

2. **Global South**

The Blue Finance impact debt facility established by Blue Alliance and BNP Paribas in 2024 is supporting MPAs in the Global South. Marketed as the "first impact loan facility for coral reef conservation," it provides early-stage financing to reef-positive businesses (RPBs) that promote sustainable economic growth and marine biodiversity protection (ICRI, 2024).

The structure relies on a blended finance approach, in which philanthropic capital provided by long-term partners such as the Global Fund for Coral Reefs (GFCR), co-led by the United Nations Capital Development Fund (UNCDF), supports conservation efforts in MPAs and helps design the overall framework to attract private, impact-focused investors. The Blue Finance facility is being implemented with BNP Paribas as the first investor, but it was structured to welcome additional co-investors, with the aim of increasing the total to USD 35 million to support the development of a strong pipeline of already identified MPAs (Blue Alliance, 2024).

The facility empowers RPBs by providing capital to scale operations, enhancing sustainability practices, and supporting local economies. It strengthens MPAs' financial foundations, fosters marine friendly job creation, and establishes a replicable model for impact loans in conservation. It will first be active in Indonesia, the Philippines, Tanzania, and Cabo Verde to support the regeneration of 1.8 million hectares of coral reef ecosystems in 115 MPAs, and to directly improve the livelihoods and food security of some 110,000 local community members (Blue Alliance, 2024).

The facility addresses key barriers as traditional investment mechanisms often overlook early-stage conservation businesses. Blue Finance fills this gap by offering accessible capital to RPBs operating within MPAs (BNP Paribas, 2025). Moreover, by funding businesses that align economic interests with conservation goals, Blue Finance enhances long-term financial sustainability for protected marine areas.

6.3. Blue economy impact funds

Blue economy impacts funds are investment vehicles that pool capital to be invested via equity or debt into a variety of activities in the blue economy (see info box below). A significant number of impact funds seek to channel private, institutional and development finance into small to medium size investments and larger infrastructure investments to strengthen coastal resilience and sustainable businesses in the marine environment have emerged over the past 5–8 years.

Such impact funds often serve multiple SDGs and a large majority of these funds have, next to the SDG 14 goal, a strong focus on SDG 12 with outcome-based investment areas in sustainable production and consumption, sustainable supply chains, waste and water management and circular economy (Phenix Capital, 2025). While three quarters of these funds reportedly contain elements of ecosystem preservation (i.e. coastal green-grey infrastructure, mangroves, coral reefs, kelp forests) and many target sustainable aquaculture investments, however not many funds have a fully dedicated SDG14 investment strategy (Phenix Capital 2025). Few funds invest in small-scale fisheries.

Each fund has its own specific impact investment strategy and geographical target areas and is designed to diversify risks and achieve adequate returns through portfolio diversification. The broader, blue-themed investment fund landscape counts over 185 funds with about

EUR 69 billion capital raised for the blue economy globally over the past 10 years. About 20 of these funds are in Central and South America, 19 in Africa, and 11 in Oceania. About 60 blue economy investment funds are currently raising capital (Phenix Capital, 2025).

The volume of capital raised by pure SDG14 funds however is much smaller, with an estimated 40 different venture capital funds that have launched or are fundraising in 2025 with a focus on sustainable ocean sector activities, up from 4 funds in 2018 (ORRAA, 2025). Other sources report that 14 ocean impact funds are operational within developing countries, emerging economies with a global reach targeting around EUR 2 billion capital (Environmental Finance, 2025). While some of the first ocean-dedicated impact funds are currently launching successor funds (e.g. Ocean 14, SWEN Blue Ocean II funds), other fund managers see greater potential in embedding blue economy investments in broader investment themes, encompassing circular economy, clean energy and smart cities (e.g. Natixis, Mirova). Again, other impact funds lend directly through financial institutions to smaller businesses in tourism, fisheries, aquaculture that have received environmental and social business certifications or sustainable production labels (e.g. Finance in Motion's Ecobusiness Fund) as a streamlined way to finance climate and biodiversity impact.

The Ocean Risk and Resilience Action Alliance (ORRAA) has identified USD 550 billion of annual investment potential in regenerative and sustainable blue economy sectors by 2030. Adequately structured, these ocean impact funds or ocean-dedicated wider investment funds are well positioned to attract larger investors and capital providers and are an essential part of the effort to mobilize the large sums of capital needed for the transition to a regenerative ocean economy.

Blue economy impact funds have key features (see info box below) and depending on structure, targeted activities and geographies they may have to rely on concessional elements, like those offered by the GCF, to achieve adequate returns to attract private capital. As an example, the GCG has invested with first-loss equity in a dedicated impact fund fostering the health of coral reefs (see box 6).

Blue economy impact funds

KEY FEATURES OF BLUE ECONOMY IMPACT FUNDS

1. **Intentionality and returns:** Capital is invested with the clear intention to achieve specific sustainability outcomes and market returns. Some investors are willing to forgo returns for demonstrated impact. When important barriers exist to achieving these impacts, concessional elements will be introduced to attract investors.

2. **Common investment sub-themes:** Sustainable aquaculture, sustainable fisheries and seafood, including their value chains are regularly appearing themes. Pollution prevention and control, waste management and circular economy, sustainable tourism, coral reef, mangrove and seagrass restoration and protection, blue carbon credits, renewable energy, cleaner shipping and transport, including greener ports, coastal infrastructure and seatech (deep sea mapping, early warning, ocean monitoring data) are all included themes (Standard Chartered, 2025).

3. **Investor types:** Many of the blue impact funds have commitments from development finance institutions, family offices, fund of fund managers, corporates, foundations, banks, insurance companies, institutional commercial investors (still hesitant).

4. **Asset classes:** The most popular types of assets are private equity (venture capital, growth funds); public equity; public debt (funds buying bonds); private debt; real assets (mainly infrastructure assets); and natural capital assets (which are slowly emerging).

5. **Investment pipeline:** Funds must be able to demonstrate that they have a pipeline of projects ready to be invested in the first 3–5 years of the funds' life. The availability of mature, scalable projects is often a main challenge of the funds' capital deployment.

6. **Impact governance and MRV:** Impact funds have a clear impact generation investment strategy and governance structure in place spanning from due diligence to investment selection, operation, monitoring, reporting and exit. Exit is often after 10 years but can also be longer for blended funds.

7. **Concessional elements:** various structures to share investment risks

- First loss equity, junior equity, absorbs early losses to crowd in senior/private capital (GFCR). Layered capital structures, supported by first-loss equity, are a tested concept for impact funds.
- Guarantees provided to the principle of loans that are made by the private debt investment funds (Sustainable Ocean Fund) (GFI Hive, n.d.).
- Guarantees provided to first-loss capital (catalytic capital, non-first loss capital) (Ocean 14 Capital).

Technical assistance

- Primarily grants or interest-free or interest-reduced loans to prepare investment pipelines, strengthen investees governance and business models, especially community-based investees.
- Support for monitoring and reporting of outcomes for impact investors.
- Improvement of the enabling environment.

Box 6. Impact Fund with GCF support (Examples)

Africa, Asia, Pacific, Latin America and Caribbean

The Global Fund for Coral Reefs (GFCR) is a private equity fund dedicated to sustainable productive ocean activities, sustainable ecotourism infrastructure and waste management that protects coral reefs and coastal livelihoods. The GFCR mobilizes capital through two complementary vehicles: the GFCR United Nations-backed Grant Fund, which deploys grants for technical assistance to prepare investment pipelines that protect coral reefs and support local communities (implemented by Catalytic Finance Foundation); and the GFCR Equity Fund (managed by Pegasus Capital Advisors LP), which invests in scalable, revenue-generating enterprises using a blended finance approach to de-risk investments and attract private capital. **The GCF has invested USD 125 million as first-loss equity to mobilize private capital for the fund** (GCF, n.d.b.).

The GFCR is a key implementation vehicle for the Global Biodiversity Framework and Sustainable Development Goal 14, it takes a locally driven, ecosystem-based approach to enhance the resilience of coral reef ecosystems and the communities that depend on them. The fund also invests larger amounts (USD 20–30 million per transaction), in projects and companies focused on protecting, restoring and making reefs more resilient. GCF core performance indicators include volume of finance leveraged (target USD 375 million) by GCF funding, direct and indirect beneficiaries of GCF-funded projects and programmes (targets of 12,000 direct and 35 million indirect beneficiaries). The GCF has received private investments from the Builders Initiative and the Minderoo Foundation. By 2030, GFCR impact targets include establishing over 400 reef-positive businesses and financial mechanisms, directly supporting more than 30,000 reef-positive jobs, enhancing resilience for over 20 million community members, improving management for 3 million hectares of coral reefs, and providing sustainable financing support to 7.5 million ha of MPAs, all while aiming to leverage between USD 2–3 billion in public and private finance (Global Fund for Coral Reefs, 2025).

The financing mechanisms in this section should not be seen as standalone instruments. They are meant to work together to create a full ecosystem of support from grant-based technical facilities to develop project pipelines and catalytic facilities to grow business ideas and companies over to accelerators that can support impactful activities through concessional financing from local banks or lending facilities and blended impact investment funds. A stack of well-prepared projects and programmes can be bundled, and their implementation can be financed by use of proceeds bonds. Portfolios of local bank lending to accelerated sustainable companies or projects can be refinanced through bond issuances on national and international capital markets. Public entities could be supported with GCF grants in their preparation of sustainable ocean strategies from marine and coastal spatial planning with dedicated sustainable use zones and marine protected areas and the implementation of these strategies could be financed through such options as sustainability linked loans and bonds with concessional elements from the GCF. Over time, this ecosystem will evolve into an integrated support network to leverage finance from capital markets to scale ocean finance to the needed extent to sustain a healthy blue economy.

Annex: Resource booklet

This Resource Booklet annexed to *"Mobilising climate finance for oceanic and coastal resilience"* provides practical tools, data sources, and reference platforms to support Accredited Entities (AEs) and partners in preparing high-impact, climate-resilient projects within the ocean–climate nexus.

Building on the working paper's focus on blue carbon ecosystems and investment pathways that bring transformational change, this document curates guidance on habitat mapping, carbon stock assessment, vulnerability analysis, and nature-based risk management.

I. Risk assessment approaches

Robust risk-assessment approaches are essential to address the challenges of climate change, biodiversity loss, and resource management in coastal and marine ecosystems and to design robust and targeted financial instruments to support coastal and marine ecosystems. Risk-assessment tools lead to actionable solutions for ecosystem resilience and long-term sustainability. By integrating scientific data, scenario modelling, and ecosystem-based strategies, these assessments can inform investments in **mitigation, adaptation, and sustainable development efforts, including food security and marine resource management**.

This section is complemented by a practical guide to accessing data sets and analysis of core climate-related ecosystem services (e.g. coastal blue carbon, coastal defense) as well as related social information (e.g. impacted communities). These data points can be used as practical steps or approaches to address knowledge gaps.

The following sub-sections outline key parameters for conducting comprehensive assessments that help define the health of the ecosystems in question, their trends, relevance, and impact.

I.A. Mapping data

Careful, robust mapping is the fundamental parameter that informs all others below. The availability of up-to-date maps and other data are essential for all efforts to conserve, restore or bring coastal ecosystems under sustainable management. Maps and data aid in the design of protected areas and development of conservation actions for blue-carbon ecosystems; they provide tools for establishing restoration and conservation baselines, which are key to understanding if and how results are being achieved. In addition, such information sources aid monitoring by providing details on spatial and temporal variability (e.g. mangrove use) which helps to understand and tackle environmental and human factors driving these changes.

Annex Box A: Explore further – Mangroves

Mangroves are the most researched ecosystem within all coastal and ocean ecosystems. A good source of information is Global Mangrove Watch (GMW) which offers mangrove extent data at country levels. Mapping of seagrasses, salt marshes and other coastal ecosystems (e.g. coral reefs), relies mostly on local or regional research and data (which are harder to collect). Thus, data is often missing. For example, information on seagrass carbon storage potentials is generally limited by gaps in regional data (World Bank, 2023). For coral reefs, one could look at the Allen Coral Atlas (Bambic, 2023) which provides high-resolution global maps of coral reef extent and condition (see section 2 of the main report).

Approaches to determining mapping data

Robustness of global coastal wetland maps — especially for mangroves, seagrasses, and salt marshes — have improved significantly, but challenges remain in accuracy, consistency, and resolution. Their robustness depends on data sources, mapping techniques, and ecosystem dynamics. Strengths of current coastal wetland maps and improved satellite and remote-sensing data include high accuracy (~80–95%) for mangroves due to their distinct spectral signatures. Seagrass and salt marsh mapping is more challenging but constantly improving with better sensors.

Annex Table i. Modelling tools and approaches

Key approaches to determine habitat/ mapping data

• Remote sensing and in-situ monitoring and modelling
• Satellite data and Geographic Information Systems (GIS) mapping
  • Landsat, Sentinel-2, PlanetScope for detecting mangrove, seagrass, and salt marsh loss
  • Light Detection and Ranging (LiDAR) and Bathymetry
• Ecosystem Health Indicators: Coral bleaching surveys, seagrass biomass density, mangrove canopy cover
  • Biodiversity indices (species richness, keystone species decline)
• Modelling Tools: Dynamic Vegetation Models (e.g. InVEST, Sea Level Affecting Marshes Model) for future habitat shifts under sea-level rise and temperature rise.

Good Practice: Combine remote sensing, ground-truthing, and predictive models to track and anticipate habitat shifts due to climate and anthropogenic pressures.

I.B. Data on carbon stocks and stock changes

Quantifying and modelling changes in carbon stocks — including scenario-based modelling that projects future carbon fluxes under different intervention pathways — helps identify and trace critical intervention opportunities in coastal ecosystems, which in turn is essential for developing effective marine conservation strategies and assessing the climate change mitigation value of marine and coastal ecosystems. Coastal ecosystems – mangroves in particular, with variations across continents (see table ii) – have a higher carbon stock potential on a per-hectare basis compared to terrestrial ecosystems, both at above- and below-ground ratios – when including soil carbon.

Several **global and regional datasets** on blue carbon stocks and stock changes exist and do not require direct field sampling and ad hoc collection of activity data. These data sets rely on remote sensing, machine learning, and ecosystem modelling to estimate carbon stocks in mangroves, seagrasses, and salt marshes.

Annex Table ii. Mangrove carbon stocks by region in Mg C/ha

Region	Carbon stocks by region
West Africa	• Above-ground: 84.4 • Below-ground: 716.3 • Soils: 278.4
Asia	• Above-ground: 112.5 • Below-ground: 660.3 • Soils: 294.8
Southeast Asia	• Above-ground: 145.5 • Below-ground: 871.3 • Soils: 375.6
Central America	• Above-ground: 71.71 • Below-ground: 877.1 • Soils: 401.9
South America	• Above-ground: 125.2 • Below-ground: 346.7 • Soils: 154.9

Middle East	• Above-ground: 37.3 • Below-ground: 179.71 • Soils: 110.8

Sources: Kauffman et. al, 2020. and World Bank, 2023.

Note: All values in this table are mean values dating up to 2020.

While global datasets provide a good start, data necessary for a blue carbon or ocean restoration or conservation project needs to be tailored to the **specific location**. A few global or regional datasets may inform some projects in the initial design phase, but developers and investors will need **to consult site-specific datasets**. For example, for mitigation projects dealing with blue-carbon ecosystems (mangroves, seagrass or salt marshes), data usually varies in terms of carbon storage and sequestration across regions and within individual countries. This is due to several factors, including ecological, geomorphological, and anthropogenic drivers that influence the variability in carbon stocks through processes such as sediment supply, inundation, and biogeochemical conditions. When **site-specific datasets** (e.g. research papers) are missing, there are several data providers or tools that can be used for an initial survey. The collection and modelling of data can potentially also be supported by the GCF Project Preparation Facility.

Approaches to determining carbon stock data

The sources and guidance here can be used to understand carbon stocks at local levels (see Annex Table iii).

Annex Table iii. Approaches to evaluating carbon stock

Approaches – Carbon stock	
Global Mangrove Carbon Datasets	Global Mangrove Watch (GMW) • Provides mangrove extent maps (1996 to present) using Landsat, Advanced Land Observing Satellite Phased Array Type L-band Synthetic Aperture Radar (ALOS PALSAR), and Sentinel-2. • Carbon stock estimates can be derived using biomass allometry models.
	Global Mangrove Biomass and Carbon Dataset (Simard et al., 2019) • Uses NASA GEDI Light Detection and Ranging (LiDAR) from the Ice, Cloud, and land Elevation Satellite-2 for aboveground biomass (AGB) estimates. • Provides carbon stock maps at 30-metre resolution globally.
	Global Mangrove Soil Carbon Dataset (Sanderman et al., 2018) • Modelled soil organic carbon (SOC) estimates for mangroves using environmental proxies + machine learning. Covers 137 countries with a 1 km resolution.
Seagrass Carbon Datasets	United Nations Environment Programme -World Conservation Monitoring Centre Seagrass Dataset (UNEP-WCMC, n.d.). • Maps seagrass extent using satellite + in-situ data for 100+ countries. • Carbon stock estimates are based on regional averages.
	Seagrass Blue Carbon Mapping Review (Macreadie et al., 2021) • Combines remote sensing + machine learning models to estimate belowground carbon stocks. Global-scale coverage with country-specific assessments.

	Coastal Wetland Carbon Stocks (Holmquist et al., 2018) (Hosted on the NASA Oak Ridge National Laboratory Distributed Active Archive Center) • Provides global estimates of salt marsh carbon stocks at 250m resolution. • Uses machine learning models trained on field samples.
Multi-ecosystem blue carbon models and tools	Blue Carbon Lab: Mapping Ocean Wealth (The Nature Conservancy, n.d.) • Combines remote sensing + ecosystem models to assess carbon sequestration potential for mangroves, seagrasses, and salt marshes.
	InVEST Blue Carbon Model (Natural Capital Project, n.d.) • Uses spatial data to estimate blue carbon storage and sequestration rates. Useful for scenario analysis of restoration vs. degradation impacts.
Good Practice	

Combine remote sensing, ground-truthing, and predictive models to track and anticipate habitat shifts due to climate and anthropogenic pressures.	Specific guidance for:
	• **Blue Carbon Stock Assessments:** Field sampling of soil organic carbon (SOC) in mangroves, salt marshes, and seagrass meadows. Aboveground biomass surveys using allometric equations.
	• **Carbon Sequestration Models:**
	  • Blue Carbon Initiative protocols for sequestration rate estimates.
	  • Process-based models (e.g. CENTURY, Blue Carbon models) to assess long-term changes.
	• **Scenario Analysis (IPCC-Aligned):**
	  • Assess carbon fluxes under IPCC Representative Concentration Pathway 2.6, 4.5, and 8.5 climate scenarios.
	  • Consider impacts of deforestation, restoration, sea-level rise, and acidification on carbon sinks.
	• **Modelling Carbon Stock Changes due Project Intervention:**
	  • Use tools like the InVEST Blue Carbon Model (Natural Capital Project, n.d.), and CENTURY (Natural Resource Ecology Laboratoy, n.d.) to simulate sequestration rates and emissions under various land-use and climate scenarios (e.g. IPCC Representative Concentration Pathways).
	Integrate remote sensing, ground-truthing, and geospatial modelling to enable estimation of net carbon gains or losses

Apply Tier 3 IPCC methodologies with in-situ sampling, remote sensing, and scenario-based sequestration forecasting. For wetlands, use the IPCC Wetlands Supplement (IPCC, 2014).	

I.C. Vulnerability data

Climate change risk and vulnerability assessments analyse how climate hazards, exposure, and vulnerability interact to produce impacts on species, ecosystems, and coastal populations (including infrastructure and housing). In the Sixth Assessment Report (AR6) framework, vulnerability is the disposition to be adversely affected, shaped by sensitivity and capacity to cope and adapt; hazards (e.g. sea-level rise, storms, heatwaves) and exposure (who or what is in harm's way) are assessed alongside vulnerability as distinct determinants of risk. This integrated perspective is essential for identifying potential impacts, designing targeted adaptation measures, and strengthening resilience.

Understanding vulnerability therefore focuses on local characteristics that drive sensitivity and adaptive capacity — including ecosystem health, species traits and life history, socioeconomic conditions, governance and institutional capacity, and the physical attributes of assets. In parallel, assessments characterize hazards and exposure to determine where and in relation to whom risks and subsequent impacts are likely to manifest. These assessments inform adaptation strategies, help prioritize habitat protection and restoration, and guide fishery and habitat management decisions.

Assessing climate risk in coastal and ocean systems requires a multi-hazard approach that evaluates sea-level rise, storm surge and waves, marine heat events, salinity and sedimentation changes, and related biogeochemical stressors; maps exposure of communities, ecosystems, and assets; and appraises vulnerability (sensitivity and adaptive capacity) of species, habitats, and human systems. Ocean ecosystem-based approaches need to be carefully planned to account for hazards such as flooding and extreme events, the exposure of critical ecosystems and infrastructure, and the vulnerability of those systems, recognizing that impacts emerge from interactions and can hinder progress.

Approaches to determine vulnerability data

These sources and guidance can be used to understand vulnerability data (climate change) and how it affects projects.

Annex Table iv. Approaches – vulnerability

Approaches – vulnerability to climate change
Risk and Vulnerability of People and Communities • Social-ecological vulnerability index • Participatory risk mapping • Climate resilience modelling
Good Practice: Combine quantitative exposure modelling with qualitative participatory assessments to capture localized adaptation needs.
Specific guidance for:
Community exposure and sensitivity assessments: • Geospatial overlays of sea-level rise projections, storm surge models, and population density. • Socioeconomic dependency metrics (fisheries, tourism reliance).
Livelihood resilience indicators: • Household surveys on income diversification, resource dependency, and adaptation capacity. • Access to alternative livelihoods and early warning systems as key indicators.
Risk mapping and adaptation pathways: • Use InVEST Coastal Vulnerability Model, ADAPTool, and social resilience indices. • Develop nature-based adaptation pathways to reduce community exposure.

I.D. Natural capital data

Natural capital data gauges the importance and use of coastal and marine resources. Such data **measure the tangible value of services provided by natural resources**, such as carbon sequestration, flood control, and fisheries support, allowing for comparison of the monetary value of these benefits with the cost of investing in conservation and restoration. Understanding ecosystem valuation of coastal ecosystems

assesses the economic rationale behind marine and coastal management plans and ecosystem services, supporting the development of more resilient coastal economies (Milligan and Mohammad, 2016). In other words, such data are fundamental to understanding **cost-benefit approaches and local stakeholders' needs**.

Data on natural capital is dispersed among local and regional data sources, although there are important global values from global sources such as FAO and the World Bank. For example:

- **Coastal protection/ adaptation:** The number of people living in coastal areas in low-income countries benefiting from mangrove coastal protection services (flood protection) on a per hectare basis increased by more than 3,000 per cent from 1995 to 2020. In upper-middle- and high-income countries that number increased by about 1,000 per cent. Over this period, mangrove extent declined by 700,000 hectares globally. If deforestation of mangroves continues at the same pace, our next generations could have less than half of the mangrove coastline protection service value that was available in 1995, leaving inhabitants more exposed to flooding and climate change impacts (World Bank, 2024a). Healthy ecosystems can provide a range of coastal protection/ adaptation benefits, including against storms, erosion, extreme weather events, etc. (FAO, 2023)

- **Mitigation:** Recent data indicates that the generally elevated carbon sequestration and storage (mangrove, salt marsh, and seagrass) is valued at roughly USD 190 billion/ year (about USD 580 per person in the US) in terms of global Blue Carbon wealth. This estimate is based on a global mean social cost of carbon of USD 640.30 per tonne of CO2 emitted (Bertram et al. 2021).

- **Fisheries:** An estimated 4.1 million small-scale fishers globally rely on mangroves for fishing (World Bank, 2023). At the same time, marine fish stock value has dropped by more than 25 per cent since 1995, equivalent to a USD 70 billion decline in 2019 US dollars (mostly driven by overexploitation) (World Bank, 2024a).

- **Tourism:** Coral reefs drive up to an estimated USD 36 billion per year in revenue globally (TNC, 2018). This value extends to job creation as well. For example, in Belize, more than 50% of the population (about 190,000 people) are supported by income generated through tourism and fisheries (Nawaz, Bood, and Shal, 2017).

Furthermore, natural capital data is best sourced locally, as it reflects the specific environmental, social, and economic conditions of a country or region. This helps to understand needs and plan locally relevant ocean ecosystem-based approaches. Below are examples of natural capital data at country levels (see Annex Table v) and general guidance on how to obtain it.

Annex Table v. Natural capital examples

Country	Natural Capital
Indonesia	Mangrove ecosystems in Indonesia provide valuable services, including coastal protection, climate regulation, and fisheries support, averaging benefits of USD 15,000 per hectare per year, with some areas providing nearly USD 50,000 per hectare per year (World Bank, 2022b).
Bangladesh	The Sundarbans Reserve Forest, the world's largest mangrove forest, provides various ecosystem services, including tourism. A study estimated the annual economic contribution of tourism in the Sundarbans to be approximately USD 53 million (Nobi et al., 2021).
Benin	The total annual monetary value of mangroves in Benin was estimated at USD 1.29 billion, averaging USD 195,223.69 per hectare. Key services to communities include temperature regulation, water purification, and ecotourism (Sinsin et al., 2023).
Sri Lanka	A study estimated the direct economic benefit of preserved mangrove forests in Sri Lanka to be $12,229 per hectare per year (Hamilton and Collins, 2013).

Approaches to determine natural capital data

Natural capital can be assessed using different approaches. Table vi offers a broad summary of key concepts.

Annex Table vi: Approaches – natural capital valuation

Approaches – natural capital valuation
Natural Capital and Ecosystem Services Valuation • Ecosystem Service Valuation • Economic Impact Modelling • Policy Use InVEST, Artificial Intelligence for Ecosystem Services, The Economics of Ecosystems and Biodiversity (TEEB) models to assess economic benefits of natural systems
Good Practice: Use hybrid economic-ecological models to integrate natural capital into climate policy and sustainable finance strategies. *Specific guidance:* **Integration valuation of coastal protection and fisheries productivity:** • Quantify storm protection value of mangroves and reefs in USD per km^2. **Tourism and recreation valuation:** • Geographic Information Systems- visitor data and Willingness-to-Pay (WTP) surveys. **Monetizing carbon sequestration for policy integration:** • Use social cost of carbon (SCC) and carbon market valuation. • Link to blue carbon credit mechanisms and Payment for Ecosystem Services (PES).

II. Further information

II.A. Key documents and databases

A non-exhaustive list of documents is presented here that can be consulted by GCF proponents to substantiate their proposals (see Annex Table vii). Other actors engaged in ocean and coastal actions targeted in this report may also benefit. Global key data providers and sources are listed here, including further references for ecosystem-specific, sectoral and regional deep dives. To the extent possible, both regional and local providers are included, although global datasets can be relevant to provide a first layer of information when regional or local data are missing.

Annex Table vii. Summary of key data providers and sources

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
1. Green Climate Fund.	• Green Climate Fund. 2022. Sectoral Guide Consultation Version 1: Ecosystem and ecosystem services (EES). • Green Climate Fund. Climate-resilient infrastructure: an annex to GCF sectoral guides – version 1 • Updated Strategic Plan -2: Strategic Plan for the Green Climate Fund 2024–2027 (GCF, 2023b). • Integrated results framework: » IRMF: Integrated results management framework | Green Climate Fund (GCF, 2018) » IRMF guidance: Draft results handbook (GCF, 2022c).		X		X	X	X	X			X	X	X	X	X	X	X	

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
2. Intergovernmental Panel on Climate Change (IPCC)	IPCC reports, including the Special Report on the Ocean and Cryosphere in a Changing Climate (SROCC) (IPCC, 2019) and the Sixth Assessment Report (AR6) (IPCC 2023), and the 2013 Wetlands Supplement (IPCC 2013) offer comprehensive scientific assessments of climate change impacts on coastal ecosystems. They draw on global data and research, providing insights into degradation trends and potential future climate scenarios, including sea-level rise.		X		X	X	X	X			X	X	X	X	X			
3. World Bank - and World Bank Climate Knowledge Portal and datasets (CCKP)	The World Bank offers a variety of datasets, including those available through the World Bank Climate Knowledge Portal (CCKP), providing global data on historical and future climate, vulnerabilities, and impacts. • CCKP work also includes valuations of "blue natural capital" with a focus on mangroves and fisheries (see CWON below). CCKP provides global data on historical and future climate, vulnerabilities, and impacts. • The World Bank Climate Change and Resilience Unit focuses on assessing the socioeconomic impacts of climate change on vulnerable communities. • World Bank also frequently releases relevant finance papers. Some recent examples include: Local Governments Climate Finance Instruments: Global Experiences and Prospects in Developing Countries (2024); Blueprints for Private Investment in Ecosystem Restoration (2024); Scaling up Finance for Nature (2022); Unlocking Blue Carbon Development: Investment Readiness Framework for Governments. (2023). See also questionary tool: Blue Carbon Readiness Framework; The Economics of Large-scale Mangrove Conservation and Restoration in Indonesia (2022.); New World Bank Group Scorecard FY24-30. Driving Action, Measuring Results, with indicator selection guidance. (2024.) Common approach for measuring results for climate change. (2024).	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
4. Global Mangrove Watch	Global Mangrove Watch (GMW) has an online platform that provides remote sensing data and tools for monitoring mangroves (incl. data on extent / hectares)	X	X	X	X	X	X	X		X	X	X	X	X	X	X	X	

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
5. Ocean Risk Resilience and Action Alliance (ORRA)	• Ocean Risk and Resilience Action Alliance (ORRA) has released a relevant report on finance (ORRA, 2024), which provides a roadmap for the United Nations Framework Convention on Climate Change • The Sea Change Impact Financing Facility (SCIFF) of ORRAA supports the blue economy by developing investment vehicles to finance a regenerative and sustainable blue economy that bridge the space between grant funding and investment finance			X	X	X	X	X	X	X	X	X	X	X		X		
6. GIZ	• GIZ hosts an up-to-date platform that shows its **Project Data Portal** and project descriptions for current projects and projects that have been completed. On these pages, project developers can find a host detailed information. These can serve as examples of good practices and contribute to new projects. • Another relevant source is **GIZ Data Lab**: Focused on hands-on experiments and testing, the GIZ Data Lab collaborates with partners worldwide to explore data-driven methods and AI applications. • The report **Catalysing Finance and Insurance for Nature-based Solutions** (GIZ, 2023a) explores mechanisms to enhance financial and insurance support for nature-based solutions (NbS). It examines strategies to mobilize investment, reduce risks, and incentivize private-sector engagement in NbS.	X	X	X	X	X	X	X	X	X	X	X						
7. Ocean+ Habitats, hosted by UNEP	Ocean+ Habitats provides global information on marine and coastal habitats, aiming to support decision makers and communities in managing and conserving ocean ecosystems. The site includes data on habitat extent, spatial data, and statistics, searchable by country and territory.	X			X	X	X	X	X	X	X							

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
8. United Nations	United Nations datasets include platforms and other resources that provide biodiversity data for decision-making. • Tools and frameworks for ecosystem service valuation are available from the **UNEP-World Conservation Monitoring Centre (UNEP-WCMC, n.d.).** • UNEP-WCMC 2023–2024. **Impact Report.** Putting nature at the heart of decision-making. • UNEP-WCMC **Ocean Data Viewer** offers global distribution of mangroves, seagrass, coral reefs and salt marshes including maps. • **United Nations Biodiversity Lab for spatial data** on nature. Specific **data on nature-based solutions for Climate Change:** Data Collection Sets, including information on above ground biomass carbon and soil organic carbon. • UNEP has released the **Sustainable Blue Economy Finance Principles** (UNEP FI, 2018). as the foundational keystones to invest in the ocean economy. Launched in 2018, they are the world's first global guiding framework for banks, insurers and investors to finance a sustainable blue economy. They promote the implementation of SDG 14 (Life Below Water), and set out ocean-specific standards, allowing the financial industry to mainstream sustainability of ocean-based sectors. • UNFCCC documents on their website. For example: *Technical Supplement: Accessing the Green Climate Fund for the Process to Formulate and Implement National Adaptation Plans (NAPs)*. Nairobi Work Programme (NWP) and Least Developed Countries Expert Group (LEG). (UNFCCC n.d.)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
9. Center for International Forestry Research (CIFOR)- International Centre for Research in Agroforestry or the World Agroforestry Centre (ICRAF)	Center for International Forestry Research (CIFOR)- International Centre for Research in Agroforestry or the World Agroforestry Centre lists a range of global datasets focusing on forestry, agroforestry, and environmental research. These datasets encompass various themes, including deforestation rates, biodiversity assessments, climate change impacts, and sustainable land management practices.	X	X	X	X						X	X	X					
10. The Nature Conservancy (TNC)	TNC Mapping Ocean Wealth – shows data on ecological, social and economic impacts of ocean productivity that can help stakeholders understand ocean value.	X		X	X	X	X	X			X							
11. Conservation International (CI)	Conservation International (CI) has expertise in mapping and monitoring coastal ecosystems like mangroves, seagrasses, and salt marshes. The Moore Center for Science conducts groundbreaking research to inform conservation strategies. Their study "Global hotspots for coastal ecosystem-based adaptation" (Jones et al 2020) identifies critical areas where conserving coastal ecosystems can significantly aid in climate adaptation efforts. CI offers resources such as the Biodiversity Hotspots Revisited dataset (CI 2021), which provides valuable information on global biodiversity hotspots, including coastal regions. Additionally, CI maintains an active presence on GitHub (CI n.d.a.), where they share various tools and datasets pertinent to conservation science.	X	X			X	X	X			X	X	X	X	X	X	X	

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
12. The World Resources Institute (WRI)	WRI works on coastal habitat data. Some of its resources include: • Aqueduct Water Risk Atlas (WRI n.d.a) – Assesses water-related risks, including stress, droughts, and floods. • Global Forest Watch (WRI n.d.b) – Provides data on global forest cover, deforestation rates, and land use changes. • Resource Watch (WRI n.d.c) – Aggregates environmental data on air quality, biodiversity, human well-being, and more. • WRI is also partner of GIZ in Climate Watch, which features data on greenhouse gas emissions, climate policies, and nationally determined contributions (NDCs).	X	X			X	X	X			X	X	X	X	X	X	X	
13. Blue Carbon Initiative	Specializes in coastal blue carbon ecosystems, including degradation trends and restoration efforts. They have released a Blue Carbon Manual (Howard et al 2014) (standardizing protocols for sampling methods, laboratory measurements, and analysis of blue carbon stocks and fluxes). Other contributions can be seen at the Blue Carbon Library on the website of the Blue Carbon Initiative website (Conservation International n.d.b).	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
14. Ocean Panel	The High-Level Panel for a Sustainable Ocean Economy publishes several resources for the blue economy such as: • The ocean as a solution to climate change: Updated opportunities for action. Special Report (Hoegh-Guldberg, Northrop et. al., 2023). • The Blue Compendium (Lubchenco J, Haugun P. 2024), commissioned by the Panel, is a comprehensive resource guide for sustainable ocean economy action.																	

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
15. International Union for Conservation of Nature (IUCN)	IUCN focuses on mangrove conservation and coastal ecosystem restoration. It has resources such as: • **International Blue Carbon Institute (IBCI)** (CI, n.d.c). Releases updated reports and factsheets. IBCI advances science and support systems (incl. policies and initiatives). Active especially in Southeast Asia and the Pacific islands. • **IUCN Red List of Threatened Species** (IUCN 2025) provides the conservation status of marine species, including fish, mammals, and corals. • **IUCN Global Protected Areas Programme** (IUCN n.d.b) offers data on protected marine areas and their effectiveness in biodiversity conservation. • See also report developed with IUCN **Financing Nature-based solutions for coastal protection**: A practical review of blended finance approaches with carbon credits from blue carbon sources)(Eiselin, et al 2022.)	X	X		X	X	X	X	X	X	X	X	X	X		X		
16. United Nations Educational, Scientific and Cultural Organization and the Intergovernmental Oceanographic Commission (UNESCO–IOC)	Provides data on marine and coastal ecosystems and related biodiversity trends. Some resources include: • UNESCO IOC **International Oceanographic Data and Information Exchange (IODE)** (UNESCO-IOC n.d.) provides access to a wide range of ocean data, including marine biodiversity, oceanography, and climate change information. • **Global Ocean Science Report** (UNESCO-IOC 2020) offers data on the state of ocean science and trends in marine ecosystem research. • **UNESCO Global Geoparks** (UNESCO 2025) offers information on a network of protected areas considered to have valuable coastal ecosystems and their conservation status.		X		X				X		X	X	X	X	X	X	X	

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
17. Global Mangrove Alliance (GMA)	• Focused on mangrove conservation and restoration globally, with detailed datasets and tools. It also has a **Mangrove Restoration Potential map** (GMA, 2018) which calculates the availability (hectares) of mangrove areas for restoration in each country. It also launched the **Mangrove Ecosystem Restoration** Guidelines, which include guidelines and data on effective mangrove restoration practices and success stories (Beeston et al 2023). • The **Mangrove Breakthrough** (GMA, 2022b) also has a financing workstream focusing on identifying sources to increase access to local financing	x	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
18. Finance Earth	• Fisheries Improvement Fund (Finance Earth, n.d.a) • Blue Catalyst Fund (Finance Earth, n.d.b) • European Investment Bank Investment in Fisheries, Identifying investment opportunities for EIB to support improvements in fishery sustainability (Finance Earth, 2024) • Business models for marine conservation, (Finance Earth, 2023) • Social KPIs for the Blue Economy, Development of Social KPIs for the Financing of a Blue Economy in the Caribbean (IDB Invest, 2025).			X		X	X			X	X							
19. The Biodiversity Finance Initiative (BIOFIN)	The Biodiversity Finance Initiative (BIOFIN), launched by UNDP, has created a database called Finance Resources for Biodiversity (FIRE) (BIOFIN n.d.). The platform lists over 300 biodiversity finance solutions and funding opportunities from public and private sources. These cases can serve as background ideas to new projects worldwide								X	X	X							
20. Conservation Finance Alliance (CFA)	The Conservation Finance Alliance (CFA) has recently launched a pilot tool for governance institutions to brainstorm, define, and prioritize suitable finance solutions. Identifying and Prioritizing a Portfolio of Marine and Coastal Conservation Finance Solutions (CFA 2024).						X	X	X	X	X							
21. The Economics of Ecosystems and Biodiversity	TEEB specializes in valuing coastal and marine natural capital.			X	X	X	X	X	X	X	X							

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
22. Wealth Accounting and Valuation of Ecosystem Services (WAVES)	Wealth Accounting and Valuation of Ecosystem Services (WAVES) Partnership (by the World Bank) – Focuses on integrating natural capital into policy and development planning.			X	X	X	X	X	X	X	X	X	X	X	X	X	X	
23. Now Capitals Coalition	Natural Capital Coalition (Now Capitals Coalition) works on frameworks and data for valuing natural ecosystems.			X	X	X	X	X	X	X	X							
24. Environmental Defense Fund (EDF)	The Environmental Defense Fund (EDF) works on incorporating ecosystem valuation into climate resilience planning.			X	X		X			X	X							
25. Global Ocean Accounts Partnership (GOAP)	The Global Ocean Accounts Partnership (GOAP) focuses on advancing ocean accounting, including natural capital assessments.			X	X		X			X	X	X	X	X	X	X	X	
26. Changing Wealth of Nations (CWON)	The Changing Wealth of Nations (CWON, World Bank Program) provides a database on the world's wealth. CWON recently presented its first valuation of "blue natural capital," with a focus on mangroves and fisheries. (World Bank 2024g)	X	X	X	X	X	X			X	X	X	X	X	X	X	X	
27. United Nations Development Programme (UNDP)	The United Nations Development Programme (UNDP) Provides insights into community vulnerability and resilience-building strategies.	X	X	X	X	X	X			X	X	X	X	X	X	X	X	
28. International Institute for Environment and Development (IIED)	The International Institute for Environment and Development (IIED) specializes in community-based approaches to climate resilience, especially in the Global South.				X	X	X		X	X	X	X	X	X		X		

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
29. Blue Nature Alliance	Blue Nature Alliance developed the MPA Finance Toolkit (Blue Nature Alliance n.d.) (with the collaboration of the Reef Resilience Network) which is "a resource for marine managers and practitioners interested in generating sustainable financing for their MPAs". The online toolkit features six videos, an extensive glossary of potential finance mechanisms (including grant-based, compensation-based, investment-based, and ecosystem value-based mechanisms), and the Blue Nature Alliance's three-step methodology for identifying and prioritizing MPA financing opportunities.					X	X	X	X	X	X							
30. Biodiversity Credit Alliance (BCA)	BCA provides guidance for the establishment of a credible and scalable market that stands up to the scrutiny of multiple stakeholders.			X		X	X		X	X	X							
31. CARE International	CARE International focuses on climate vulnerability and adaptation at the community level.				X	X	X				X							
32. Institute for Social and Environmental Transition (ISET)	The Institute for Social and Environmental Transition (ISET) works on community vulnerability and adaptation in urban coastal contexts.				X	X	X				X							
33. International Federation of Red Cross and Red Crescent (IFRC)	The International Federation of Red Cross and Red Crescent Societies (IFRC) focuses on disaster risk reduction and community resilience.				X	X	X				X							
34. Climate Impact Lab	Climate Impact Lab combines socioeconomic and climate data to assess vulnerabilities				X	X	X				X							
35. ND-GAIN	The ND-GAIN Country Index (Notre Dame University n.d.), assesses countries' vulnerability to climate change and their readiness to adapt. It helps policymakers and researchers identify risks and opportunities for resilience.				X	X	X	X	X	X	X	X	X	X	X	X	X	

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
36. National Aeronautic and Space Agency (NASA)	The NASA Sea Level Change team provides cutting-edge satellite data and modelling tools on sea-level rise trends.				X	X	X				X							
37. National Oceanic and Atmospheric Administration (NOAA)	The National Oceanic and Atmospheric Administration (NOAA) supplies global and regional sea-level data, especially for coastal flood projections: • Sea Level Rise Viewer: This tool allows users to visualize potential impacts of sea level rise on coastal communities of the United States, providing maps and simulations of future flooding scenarios – **NOAA Coast Survey** (NOAA n.d.a) • Coastal Flood Exposure Mapper. This online tool helps communities assess their exposure to coastal flooding by mapping people, places, and natural resources at risk – **NOAA Coastal Maps** (NOAA n.d.b) • The Sea Level Rise Technical Report offers the latest sea-level rise projections for all states and territories of the United States, aiding decision-makers in assessing potential changes in tide heights and flood frequencies (**National Ocean Service**) (Sweet el al 2022)				X	X	X				X	X	X	X	X	X	X	
38. European Space Agency (ESA)	The European Space Agency (ESA) Climate Change Initiative offers sea-level and other climate datasets: • *Sea-Level Data:* The Sea Level CCI project offers various altimeter-based sea-level products, accessible through the CCI Open Data Portal. These datasets support studies on sea-level anomalies, trends, and coastal impacts • *Climate Datasets:* Beyond sea-level data, the CCI Open Data Portal hosts a range of Essential Climate Variable (ECV) datasets. These datasets cover various climate aspects, such as sea surface temperature, soil moisture, and more, all derived from satellite observations				X	X	X				X							

Resource	Description	Themes									Geographic coverage						
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
39. World Meteorological Organization (WMO)	The World Meteorological Organization (WMO) focuses on global climate data, including sea-level rise and coastal weather extremes: • World Climate Data and Monitoring Programme (WCDMP): guidance on climate data, assessments, and authoritative reports on global climate status, including oceanic parameters (see platform **WMO Climate Data and Monitoring**). • Global Surface Temperature Data Sets: This resource provides access to datasets on global surface temperatures, encompassing sea surface temperature measurements from various observation platforms like ships and buoys, crucial for oceanographic studies (see **WMO Global surface temperature data sets**). • Ocean Observations and Services provides insights into WMO coordinated efforts in ocean monitoring, data management, and forecasting systems, essential for maritime activities and understanding oceanic impacts on climate (see WMO **Ocean**)				X	X	X				X	X	X	X	X	X	X	
40. Global Facility for Disaster Reduction and Recovery (GFDRR)	The Global Facility for Disaster Reduction and Recovery (GFDRR) and the World Bank have developed the Nature Based Solutions Opportunity Scan (NBSOS) (World Bank, 2024h). The NBSOS is a geospatial tool utilizing large global datasets to map the potential benefits of NbS and to identify coastal protection investment opportunities worldwide. The tool has been implemented in 20 countries, including in Small Island Developing States, to inform coastal protection solutions.				X	X	X			X	X	X	X	X	X	X	X	
41. Biodiversity Finance Trends	Biodiversity Finance Trends tracks current trends in international biodiversity financial flows, as well as public and private-led actions that drive the mobilisation of nature finance. This with a view towards understanding funding gaps and facilitating decision making				X	X	X	X		X	X							

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
42. Carbon standard entities	Carbon Standards are publicly available documents that can offer insights into available baseline datasets and insights into regulatory systems that can be used to replicate initiatives – particularly at carbon-project level but also jurisdictional approaches and perhaps beyond (i.e. ecosystem-based approaches). This can be relevant for REDD+ (mangroves) but also ocean projects (e.g. VM0033/Verified Carbon Standard methodology applicable to blue carbon ecosystems). The list includes standards such as the Verified Carbon Standard (VCS/ Verra), Gold Standard, Plan Vivo, Climate Action Reserve (CAR), REDD+ Environmental Excellence Standard (ART-TREE), among others.								X	X	X	X	X	X	X	X	X	X
43. Carbon Integrity councils/coalitions	Institutions providing principles and criteria to help carbon projects in leveraging funds and chasing high-quality impacts, including launching principles such as: • **High-Quality Blue Carbon Principles and Guidance** (ORRA 2022). Developed in 2023 by ORRAA, The Nature Conservancy, Conservation International, WWF, the International Blue Carbon Institute, and Meridian Institute. Provides a global benchmark for integrity and transparency in blue carbon projects and markets. • **Shared Principles for Growing High Integrity Use of Carbon Credits by Companies and other Buyers** (The Coallition to Grow Carbon Markets, 2025) A multi-stakeholder initiative that creates international alignment on critical questions about the role of carbon credits and will inform national guidance, policies and incentives to unlock private sector investment in climate solutions							X		X	X							X
44. National ocean and environmental policies	Country REDD+ policies: Forest reference emission levels (FRELs) can offer baselines for REDD+ approaches and other deforestation data (drivers, etc), particularly for mangrove forests. Marine Spatial Planning and related ocean policies are another key sources at local levels	X	X	X	X	X	X	X	X	X								X
45. GHG inventories	GHG inventories, particularly biennial transparency reports (BTRs) often include GHG data on blue-carbon ecosystems (mangrove mostly, but sometimes seagrass and salt marsh).	X	X	X	X	X	X	X	X	X								X

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
46. State and local government environmental agencies	State and local government environmental agencies: many local and state governments collect and provide environmental data, including coastal habitat maps, water quality data, and information on protected areas.	X	X	X	X	X	X	X	X	X								X
47. Universities/ communities	University research programmes or community-based monitoring programmes: Universities with marine science programmes often have datasets related to local coastal ecosystems, including research on restoration projects, species monitoring, and habitat assessments. Local environmental groups and research institutions can also conduct monitoring programmes that generate valuable data One example is the University of Oxford, which hosts the Nature-based Solutions Evidence Platform, a compilation of literature and case studies demonstrating the effectiveness of NbS in addressing climate-change impacts. This acts as an evidence base of the value and co-benefits of NbS. You can narrow the search by ecosystem type (e.g. coastal, wetland, mangrove) and climate change impact (e.g. storm surge).	X	X	X	X	X	X	X	X	X								X
48. Climate Central	Climate Central develops visual tools and data specific to sea-level rise risks.				X	X	X				X							
49. Future Earth Coasts	Future Earth concentrates on transdisciplinary research for coastal systems under global change.		X		X	X	X	X	X		X							
50. Global Fund for Coral Reefs (GFCR)	Provides indicators and paradigm shift ideas for enabling coral reef funds. See: Coral Reef Finance: Insights from the Global Fund for Coral Reefs Investment Principles (GFCR, 2025). See also: Coral Triangle Conservation Fund (CTCF) – CFA is working closely with WCS, the Coral Triangle Initiative for Coral Reefs, Fisheries, and Food Security (CTI-CFF), and other partners to support titshe creation, funding and operationalization.					X	X		X	X	X							

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
51. Finance Institutions	Finance institutions often offer practitioners guides for enabling financing instruments. For example, see the "Bond to Finance the Sustainable Economy: A Practitioners Guide" (ICMA, 2023), developed by the Asian Development Bank (ADB), International Capital Market Association (ICMA), International Finance Corporation (IFC), United Nations Environment Programme – Finance Initiative (UNEP FI), and United Nations Global Compact (UNGC).	X	X	X	X	X	X	X	X	X	X							
52. Other on finance	• Sustainable Finance Guidance for indicator selection compatibility ◦ Task Force for Climate-related Financial Disclosure (TCFD) ◦ Task Force on Nature-related Financial Disclosure (see section 5.2.1 in the main report). ◦ International Sustainability Standards Board (ISSB), ◦ Climate Change EU Corporate Sustainability Reporting Directive (CSRD) ◦ European Sustainable Reporting Standards (ESRS) ◦ Materiality Map, Sustainability Accounting Standards Board (SASB) ◦ Green, Sustainability Bond Harmonized Impact Framework (ICMA) ◦ Green Taxonomy Guidance • European Investment Bank Green Eligibility Checker for intermediaries to assess alignment to EU taxonomies and impacts. • Increasing Infrastructure Resilience with Nature-Based Solutions (NbS) (IDB 2020). • BNC+ Framework Blue Natural Capital Positive Impacts Framework. (Wilson, Baldwin and Herr, 2019). • Increasing Infrastructure Resilience with Nature-Based Solutions (NbS) (IDB, 2020). • IUCN. Blue Infrastructure Finance: A new approach, integrating Nature-based Solutions for coastal resilience. (Thiele et al, 2020) • Blue Bonds: Financing Resilience of Coastal Ecosystems– Key Points for Enhancing Finance Action. A technical guideline prepared for IUCN GMPP (Roth, Thiele, et.al., 2019), • A Practical Guide to Implementing Green-Gray Infrastructure (Conservation International, 2019).	X	X	X	X	X	X	X	X	X	X	X						

Resource	Description	Themes									Geographic coverage							
		Carbon stocks/ extent	Deforestation/ degradation	Ecosystem valuation	Vulnerability	Coastal protection	Adaptation	Mitigation	Biodiversity	Finance	Global	Asia	Africa	Americas	Central America and Caribbean	South America	Middle East	Local
53. The Organisation for Economic Co-operation and Development (OECD)	• **(OECD) Data Platform on Ocean Finance** offers vast data for the Sustainable Ocean Economy (OECD 2021) • OECD Data Explorer for Sustainable Ocean Economy: provides country data on natural capital: threatened marine species, coastal landcover change, fish stocks; coastal flooding; policy responses and socio-economic data (OECD 2024)	X	X	X	X	X	X			X	X							X
54. World Economic Forum (WEF)	• WEF has recently released a comprehensive guidance reviewing the Finance x Nature Landscape to facilitate the nature-positive transition, with many useful links to tool, frameworks. • See: Financing Nature Positive Transition (WEF, 2024a)				X	X			X	X	X							

Annex Box B. Task Force for Climate-related Financial Disclosure

Task Force for Climate Related Financial Disclosure (TNFD) Guidance

The TNFD has developed an integrated approach for the assessment and management of nature-related issues for use by a wide range of corporations and financial institutions. This approach is called LEAP (for Locate, Evaluate, Assess and Prepare). It is designed to be used by a team of analysts in an organisation and involves four phases of assessment (TNFD, 2023c).

- **Locate** the interfaces with nature across geographies, sectors and value chains;
- **Evaluate** dependencies and impacts on nature
- **Assess** nature-related risks and opportunities to your organisation; and
- **Prepare** to respond to nature-related risks and opportunities, including reporting on nature-related issues to the primary users of financial reports and other stakeholders, aligned with TNFD-recommended disclosures.

This TNFD guidance provides tools and methodologies for the first step of LEAP, "Locate" to allow companies to determine their localized interface with nature under their direct control:

- Polygons and GPS coordinates can be identified for fixed facilities, such as wind farms and fisheries, and activities in a specific area, such as fishing. See: Aquamaps; and Global Fishing Watch.
- Ocean+ can be used to source data on coral reefs, mangroves, seagrasses and critical habitats. See: Ocean Plus
- Data on protected areas can be found in sources such as the World Database on Protected Areas. See: World Database on Protected Areas (WDPA)
- The IUCN Red List species distributions or Aquamaps can be used to source data on distributions of threatened marine species and on ecological integrity, such as the richness of species, status of fish stocks and pollution levels. See: IUCN Red List
- Other tools include Hub Ocean.

The TNFD additional guidance builds on existing frameworks:

- Dependency, impact, risk and opportunity analysis:
  - Partnership for Biodiversity Accounting for Financials (PBAF)
  - Capitals Coalition Biodiversity Guidance
  - United Nations System of Environmental Economic Accounting (SEEA) for global and national accountability for nature (see: Ecosystem Accounting)
  - United Nations, WCMC, WWF, IUCN
  - Recommended sources of metrics include:
  - CDSB Biodiversity Climate Disclosure Standards Board
  - Sustainability Accounting Standards Board (SASB), including for materiality assessment
  - Carbon Disclosure Project (CDP), Global Reporting Initiative (GRI), World Economic Forum, European Financial Reporting Advisory Group (EFRAG)
- Definitions of risk and approach to scenarios
  - Network for Greening the Financial System (Central Banks and Supervisors)
  - University of Cambridge Institute for Sustainability Leadership, ISO Standards
- Sector and biome classification:
  - SASB

IUCN Global Standard for Nature Based Solutions: IUCN Global Ecosystem Typology 2.0

II.B. Drivers of paradigm shift

An overview of potential actions that could contribute to a paradigm shift – specifically tailored to ocean and coastal projects/ programmes are drivers that are outsourced and compiled from various high-level guidance such as the 2019 IPCC Special Report on Oceans (SROCC), the UNFCCC Climate Action Pathway: Oceans and Coastal Zones (UN, 2021 and UN, 2020), and the GCF Updated Strategic Plan (GCF, 2023b) (see Annex Table viii).

Annex Table viii. Paradigm shift for ecosystem-based management of coastal and marine ecosystems

Sector	Actions across the Drivers of Paradigm Shift of the GCF Strategic Plan			
Ecosystems and Ecosystem Services (Coastal and Ocean)	**Transformational planning and programming**	**Catalysing climate innovation**	**Mobilization of finance at scale**	**Coalitions and knowledge to scale up success**
Paradigm Shift Pathway Ecosystem-based management of coastal and marine environments: • Mitigation (blue carbon) • Adaptation (i.e. green-grey infrastructure) • Sustainable livelihoods (i.e. food) • Ecosystem health and biodiversity • Integrated governance and cross-sectoral planning (i.e. through behaviour-centred solutions as a lever for transformational change) • Finance mobilization and sustainability • Capacity building and knowledge sharing	• Integrate blue carbon and other coastal/ marine ecosystems into Nationally Determined Contribution, NAPs, and coastal development plans • Mainstream ecosystem-based adaptation in Marine Spatial Planning and ICZM • Establish new MPAs and improve the management of existing MPAs (including creating networks of protected areas to help maintain ecosystem services) • Establish/ improve legal and policy frameworks for MPAs (incl. specifically targeting mangrove, seagrass protection or avoided conversion) • Restore coastal and marine ecosystems (mangroves, saltmarshes, seagrasses, coral reefs, etc.)	• Pilot scalable blue carbon crediting methodologies and Measurement, Reporting, and Verification (MRV) systems (including piloting technological advancements in MRV, including AI and eDNA) • Promote and pilot hybrid coastal protection infrastructure that integrates ecosystem-based (green) and engineered (grey) solutions — e.g. mangroves combined with sea walls — to enhance erosion control, disaster risk reduction, and long-term climate resilience • Develop sustainable aquaculture technologies adapted to climate change • Promote sustainable business models, NbS models, certified seafood, aquaculture, agriculture	• Leverage blue use-of-proceeds bonds, sustainability-linked bonds for blue natural capital, impact investment, and insurance schemes for climate-resilient coastal projects • Engage private finance community on NbS, ocean science and ocean change observation • Blend public and private finance for ecosystem restoration and sustainable fisheries, including for small-scale fisheries • Establish long-term mechanisms and access to funding/finance for small-scale fisheries and aquaculture • Establish long-term funding mechanisms for MPA management (e.g. trust funds, user fees) • Enhance certification and de-risking, building with nature	• Strengthening regional ocean governance platforms for climate-coordinated action • Facilitate South-South cooperation on coastal and marine NbS • Document and share indigenous/ local knowledge on ocean-climate resilience • Strengthening and facilitating access of marginalized groups and gender initiatives into finance or decision-making roles in sustainable blue economy sectors • Leverage multi-stakeholder partnerships for innovative finance • Increase domestic institutional capacity for large-scale funding programmes

Sector	Actions across the Drivers of Paradigm Shift of the GCF Strategic Plan			
Ecosystems and Ecosystem Services (Coastal and Ocean)	**Transformational planning and programming**	**Catalysing climate innovation**	**Mobilization of finance at scale**	**Coalitions and knowledge to scale up success**
	• Boost sustainable use and resilient supply chains/ blue economy (e.g. climate-resilient fisheries, including small-scale fisheries and aquaculture, sustainable tourism) • Improve coastal resilience (green-grey infrastructure (erosion control, asset protection, disaster prevention and pollution control) • Improved coastal zone mapping (e.g. ridge-to-reef approach) • Explicit linkage with upstream watershed management and land-based pollution sources	• Harness advanced remote sensing or AI for transparent reporting of ecosystem services, financing flows, and biodiversity outcomes • Develop transition assistance for industries facing decline from climate impacts or regulatory tightening • Create novel value chains in niche markets (e.g. fisheries, circular economy to reduce sea pollution)	• Reduce high-impact, nature-negative[12] production or consumption activities (assessment and disclosure frameworks used for greening finance)	• Promote advocacy and participatory platforms that allow local stakeholders to influence global ocean-climate policies • Strengthen ocean tenure and rights-based approaches (including carbon rights, access, use, and benefits), adapting lessons from terrestrial REDD+ and indigenous engagement • Enforce concrete gender-responsive safeguards and youth-engagement mechanisms • Create and boost data-sharing platforms for real-time ocean health, pollution tracking, and restoration progress foster rapid learning and response • Improved understanding of market and nonmarket financing options for blue carbon ecosystems

12 Nature-negative activity is defined as "any activity with a direct negative impact on nature" and it includes a negative impact on biodiversity, land quality or climate interconnected with the societal repercussions for the most disadvantaged (UNEP 2023, State of Nature Finance, p. 11). UNEP (2023) refers to the following definition from Deutz et al. (2020): "Nature-negative financial flows refer to financial flows for activities that could potentially have a negative effect on nature. Financial flows in the form of subsidies are those that induce production or consumption activities that exacerbate nature loss."

III. Indicator specifications

This section can be used by AEs in defining indicators for their projects and programmes. For further guidance on GCF indicators please refer to the Results-based management (GCF, 2023).

III.A. Taskforce for Nature-related Financial Disclosures

Selected **core global disclosure indicators** and metrics from the Taskforce for Nature-related Financial Disclosures (TNFD) relevant in this context are presented here (see Annex Table viii).

Annex Table ix. Global disclosure indicators

Driver of nature change	Indicator, Metric	Methodology
Climate change	GHG emissions	International Sustainability Standards Board International Financial Reporting Standards Foundation - (IFRS, 2023) IFRS S2 Climate related financial disclosures
Ocean-use change *Total spatial footprint*	Total spatial footprint (km^2) which is the sum of: • Total surface area controlled/ managed by the organisation, where the organisation has control (km^2) • Total disturbed area (km^2) and • Total rehabilitated/restored area (km^2)	Ocean use change: source: change from one ocean use category to another, referred to by TNFD 2023b, p. 83. Adapted from Science Based Targets Initiative (2022) Forest, Land and Agriculture. (Anderson, 2022) TNFD definitions (TNFD Glossary). (TNFD, 2025b): Sustainably managed (used): The use of components of biological diversity in a way and at a rate that does not lead to the long-term decline of biological diversity, thereby maintaining its potential to meet the needs and aspirations of present and future generations. European Commission (2023) Annex 2 to the Commission Delegated Regulation, supplementing Directive 2013/34/EU as amended by Directive 2022/2464 (CSRD), as regards sustainability reporting standards. (European Commission, 2023) Sustainable use of natural resource opportunity: Substitution of natural resources by recycled, regenerative, renewable and/or ethically responsibly sourced organic inputs.
Ocean-use change *Extent of ocean use change*	Extent of ocean ecosystem use change (km^2) by: • Type of ecosystem* and type of business activity. Extent of ocean ecosystem conserved or restored (km^2), split into: • Voluntary and required by statutes or regulations. Extent of ocean ecosystem that is sustainably managed (km^2) by: • Type of ecosystem* and Type of business activity.	Referred to by by TNFD 2023b, p. 83. For type of ecosystem refer to IUCN global ecosystem typology: IUCN Global Ecosystem Typology - resource | IUCN. (IUCN, n.d.a).

Resource use/ replenishment	Quantity of high-risk natural commodities* (tonnes) sourced from ocean, split into types, including proportion of total natural commodities. Quantity of high-risk natural commodities* (tonnes) sourced under a sustainable management plan or certification programme, including proportion of total high-risk natural commodities. *Users should refer to the Science Based Targets Network (SBTN) High Impact Commodity List (HICL) and indicate what proportion of these commodities represent threatened and CITES listed species.	SBTI High Impact Commodity List (HICL) https://sciencebasedtargetsnetwork.org/wp-content/uploads/2024/07/High-Impact-Commodity-List-v1-1.xlsx CITES listed species list: https://cites.org/eng/node/10288
Pollution/pollution removal	Wastewater discharged (m^3), including concentrations of key pollutants in the wastewater discharged, by type of pollutant, referring to sector-specific guidance for types of pollutants; and temperature of water discharged, where relevant.	In reporting this core global disclosure metric, an organisation should also include: • Carrying capacity assessment score for the seabed in the area of discharge; • Score for water quality assessment from area where farming activity takes place; and • If independent, status of impact from nitrogen/ phosphorus on ecosystem exists, add their assessment conclusion.
Plastic pollution	Plastic footprint as measured by total weight (tonnes) of plastics (polymers, durable goods and packaging) used or sold broken down into the raw material content. For plastic packaging, percentage of plastics that is re-usable; compostable; technically recyclable; and recyclable in practice and at scale.	In reporting this core global disclosure metric, an organisation should consider plastic footprint for plastic materials used in their production. Examples of plastic components include floating collars, buoys, ropes, net enclosures, feeding systems and pond liners. An organisation should refer to ASC (2019) White Paper on Marine Litter and Aquaculture Gear.

Source: Table 6 of the TNFD Recommendations (TNFD 2023b, p. 83–86).

These global indicators are further specified by the TNFD through its sectoral guidance such as: Additional Guidance for the Fishing sector (TNFD, 2025a, p. 75–89) and Additional Guidance for the Aquaculture Sector (TNFD, 2024, pages 63–75).

III.B. Impact frameworks, guidance for setting indicators

The following sources offer a collection of impact frameworks **adopted by financiers**, which include **indicators commonly used in the interface between finance and ocean/coastal projects** (see Annex Table x).

Annex Table x. Impact frameworks (guidance for setting Indicators)

Organization	Links
The International Capital Markets Association (ICMA) Handbook - Harmonized Framework for Impact Reporting is widely used by green bond and sustainability bond issuers. Other relevant ICMA guidance includes guidance on sustainable bonds for nature and sovereign sustainability-linked bonds, as well as the Sustainable Bonds for Nature: A Practitioner's Guide The International Finance Corporation (IFC, 2025) refers to the ICMA Handbook for impact indicator selection. https://www.ifc.org/en/insights-reports/2025/guidelines-for-blue-finance	Relevant indicators can be found in the sector-specific guidance on water and waste-water management, biodiversity, climate change adaptation and living natural resources guidance. See Resources (section 2) for an overview of indicators presented in the biodiversity sector with relevance for ocean and climate projects. The harmonized impact reporting standard is not only applicable to green and sustainability bonds but also to loans in line with the ICMA green loan principles. https://www.icmagroup.org/sustainable-finance/impact-reporting/green-projects/ https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/sustainability-linked-bond-principles-slbp/ https://www.icmagroup.org/assets/documents/Sustainable-finance/2025-updates/Sustainable-Bonds-for-Nature-A-Practitioners-Guide-June-2025.pdf
ICMA, the United Nations Global Compact, the United Nations Environment Programme and the Asian Development Bank (ADB) have developed a global practitioner's guide for bonds to finance the sustainable blue economy (2023).	Bonds to Finance the Sustainable Blue Economy: A Practitioner's Guide (ICMA, 2023). The guide helps to evaluate the environmental impact of blue bond investments and suggests relevant project outputs and key performance indicators.
The **Climate Bond Initiative (CBI)** Standard offers eligibility criteria for bonds that finance climate objectives (mitigation, adaptation and resilience) and enables certification of the bonds. A large number of sectoral guidance documents provide further specifications of eligibility criteria.	The Standard (Climate Bonds Initiative, 2025a). Climate Bonds Taxonomy https://www.climatebonds.net/standard/taxonomy Relevant sectoral criteria can be found in water infrastructure criteria guidance, which also includes nature-based water infrastructure and hybrid green-grey infrastructure. CBI offers certification for ecosystem conservation and restoration for land use and marine resources. Climate Bonds | Water Infrastructure
Blue Natural Capital Financing Facility (BNCFF), hosted at IUCN. BNCFF provides a Blue Natural Capital Positive Framework and the Blue Natural Capital Positive Impact Management System for assessment, monitoring and reporting for blue natural capital projects.	The guidance considers indicators as proposed by IRIS+ impact measurement system of the Global Impact Investor Network (GIIN). 6748cf0b82b85d1cfe32c5cb_bnc-positive-impacts-management-system.pdf 6748cf668be380c41a8ea5bd_bnc-plus-framework.pdf https://www.bluenaturalcapital.org/downloads

Multilateral Development Banks' Joint Approach for measuring climate results (2024)	The common approach is not a new reporting mechanism but helps to deepen collaboration of multilateral development banks with the private sector and stakeholders. It includes an indicator list for Adaptation and Climate Resilience Results, especially for ecosystems and biodiversity, infrastructure, livelihoods, https://www.worldbank.org/en/topic/climatechange/publication/common-approach-to-measuring-climate-results https://documents1.worldbank.org/curated/en/099811511112496502/pdf/IDU-99acbc4c-fed3-4876-8e94-7829cf8efe5d.pdf
The World Bank Group has released a scorecard for impacts for their operations 2024–2030. It is a useful resource for AEs which are development banks.	New World Bank Group Scorecard FY24-FY30: Driving Action, Measuring Results. World Bank Document The new World Bank Scorecard strives to measure outcomes, rather than outputs, with a focus on results that improve people's well-being. It is designed to focus on a few indicators and list relevant indicators for the green and blue planet, resilient populations, sustainable food systems, more and better jobs and more private investments.
The Nature Positive Initiative	A recent guidance document worth exploring is the draft State of Nature Metrics Framework by the Nature Positive Initiative. It provides a common ground of priority metrics to measure the state of nature including ecosystem extent, ecosystem condition, species (species extinction risk, species population abundance with focus on priority species). The Nature Positive Initiative together with the Ocean Risk Resilience and Action Alliance (ORRAA) and the World Economic Forum (WEF) have published commonly agreed-upon ocean metrics (Nature Positive Initiative, 2025).

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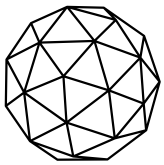

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