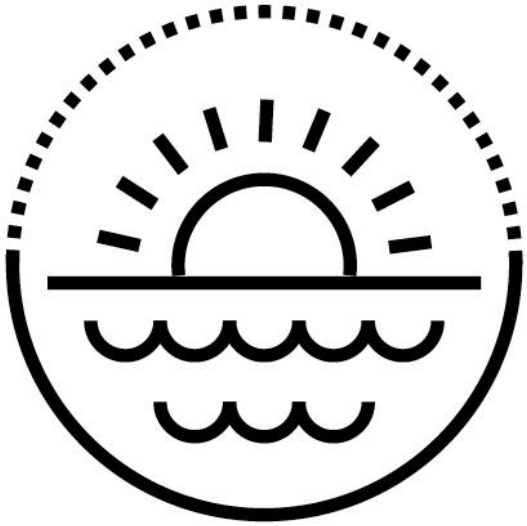

Sectoral Guide Consultation Version 1

Ecosystems & ecosystem services

GREEN CLIMATE FUND | Sectoral Guides

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CONTENTS

ABBREVIATIONS

AEs	Accredited Entities
AFOLU	Agriculture, forestry, and other land use
BAF	Blue Action Fund
CABEI	Central American Bank for Economic Integration
CFA	Conservation Finance Alliance
EA	Ecosystem Accounting
EBA	Ecosystem-based adaptation
EES	Ecosystems and Ecosystem Services
EU	European Union
FAO	Food and Agriculture Organization
FLU	Forest and Land Use
FONAFIFO	Fondo de Financiamiento Forestal de Costa Rica
FP	Funding Proposal
FPIC	Free Prior Informed Consent
FSC	Forest Stewardship Council
GFCR	Global Fund for Coral Reefs
GHG	Greenhouse Gas
GIZ	German Agency for International Cooperation
HCV	High Conservation Value
IDB	Inter-American Development Bank
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
iPMS	GCF's Information programme management system
IRMF	GCF's Integrated Results Management Framework
IRMF	International Union for Conservation of Nature
LCIPP	Local Communities and Indigenous Peoples Platform
LDCs	Least Developed Countries
MSMEs	Micro-, Small- and Medium enterpises
MSP	Multistakeholder platforms
NAPs	National Adaptation Plans
NCA	Natural Capital Accounting
NDA	National Designated Authorities
NDC	Nationally Determined Contributions
NGOs	Non-governmental Organizations
NOLs	No Objection Letters
OECD	Organization for Economic co-operation and development
PES	Payments for Ecosystem Services
PPP	Private-public partnerships
RRI	Rights and Resources Initiative
SDG	Sustainable Development Goals
SIDS	Small Island Developing States
SMEs	Small and medium-sized enterprises
SNA	System of National Accounts
SSCM	Sustainable Commodities Conservation Mechanism
TNC	The Nature Conservancy
UNCCD	United Nations Convention to Combat Desertification
WEF	World Economic Forum

EXECUTIVE SUMMARY

The Green Climate Fund (GCF) is dedicated to boosting climate finance for developing countries and has set an ambitious direction with its Strategic Plan for 2020-2023. In spite of the global pandemic, GCF is providing increased support to developing countries, helping them to build a low-emission, climate-resilient recovery. The GCF Sectoral Guide series supports the ambitious work programme approved for 2021[1], providing evidence-based information for impactful projects in priority investment areas, giving further momentum to making GCF operations more efficient and more effective.

There are eight mitigation and adaptation result areas in GCF. Of these, Ecosystem and Ecosystem Services (EES) and Forest and Land Use (FLU) are strongly complementary. Therefore, sectoral guides for both were developed jointly in order to avoid duplication and overlap, while clearly identifying synergistic opportunities for greater impact. Thematically, the EES Sectoral Guide focuses primarily on ecosystem-based management of terrestrial, freshwater, coastal, and marine ecosystems (including peatlands), while the FLU sectoral guide focuses on forests and related land use. Ecosystem based management can be defined as the approach that recognizes the full array of interactions within an ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation (Christensen et al. 1996). Operationally, the EES result area emphasises maintaining ecosystem services for both adaptation and mitigation results, while the FLU result area is focused mainly on mitigation through avoiding deforestation and enhancing carbon sequestration and storage. Other cross-sectoral issues are addressed through multiple result areas in a complementary manner, as shown in the table below:

Table ES-1: Cross-sectoral issues addressed throughout the series

Sectoral guide name	Cross-sectoral issues addressed
Ecosystem and ecosystem services (this guide)	Ecosystem-based management of terrestrial and freshwater ecosystems (incl. peatlands; wetlands; forests; grasslands; land restoration, conservation, and sustainable management for ecosystem services; watershed management). Ecosystem-based management of coastal and marine ecosystems (including marine habitats, mangroves; seagrass; fisheries and fishery supply chain management).
Agriculture and food security	Agroforestry; soils, grassland, and water management for food production; livestock and manure management; aquaculture; climate information for farmers; insurance; and staple and cash crops food systems
Forest and land use	Forest protection, restoration, and sustainable forest management; natural protected area systems, REDD-plus, timber and non-timber forest products, deforestation-free supply chains.
Energy	Biomass fuels from natural ecosystems; Hydro energy
Water	Water management for flood control, hydrological services in PES schemes.
Health	Ecosystems resilience for human health and populations relying on ecosystem integrity for their livelihoods.
Urban areas	Integrated urban development planning for green cities; ecosystem services provision to reduce heat island effects.

GCF Ecosystems and Ecosystem Services Sectoral Guide

GCF aims to increase climate resilience of Ecosystems and Ecosystem Services (EES) through support to developing countries and their National Designated Authorities (NDAs) in their transition towards low-emission and climate-resilient development pathways. The EES Sectoral Guide defines high-impact, transformative projects and programmes, linking them to the GCF Strategic Plan 2020-2023 and Investment

[1] Decision B.27/07

Framework. It provides context based on scientific evidence, experiences and lessons learned, and shares examples of good practices, and links to country ambitions and needs.

Two global emergencies, one of unprecedented ecosystem degradation and biodiversity loss on one hand, and another of climate change on the other, are recognised as central to the global agenda, (e.g., by IPCC 2018; 2019a 2019b, 2021, IPBES 2019). They are interlinked, and they amplify each other. Actions can be prioritised by looking at opportunities offered by various ecosystem types in terms of the degree of mitigation and adaptation potential, balanced with the level of threat and rate of loss of irrecoverable carbon. It follows that emphasis for mitigation can be placed on tropical forests (covered in the FLU Sectoral Guide), peatlands, and grasslands. On the other hand, and without diminishing their mitigation potential, coastal and marine ecosystems, including mangroves and coral reefs, provide better opportunities for adaptation (see Figure 2 and Figure 3 in the main document). Nevertheless, it is stressed that mitigation and adaptation actions are not necessarily mutually exclusive.

Ecosystems consist of plant, animal, and microorganism communities and their non-living surroundings interacting as a functional unit. They encompass 'natural' environments, and those managed by humans with varying degrees of intervention. The former includes, for example, pristine rainforests, alpine regions and coral reefs; the latter, agricultural land and managed forests. *Ecosystem services* are the benefits to nature and societies that arise from their existence and function, such as mitigating and adapting to climate change, maintaining water, carbon and nutrient cycles, regulating weather, protecting shorelines and marine life, and are a key part of socio-economic development and in enhancing human and environmental resilience. Maintaining biodiversity is central to ecosystem function, underpinning the integrity of ecosystem services provision.

The interlinked global challenges of climate change, combined with unprecedented losses of biodiversity, seriously threatens ecosystems and their functions. Ecosystems play key roles in our approaches to address climate change mitigation and adaptation.

Ecosystem degradation, loss, and the impacts of climate change, such as permafrost melting in artic climates, or increased forest fires release carbon stored in biomass and soils, inducing a vicious cycle that increases the risk of ecological collapse and reduces our ability to rely on the climate mitigating effects and adaptive potential of natural ecosystems. High carbon ecosystems, such as peatlands and tundra, or those that cover large areas, hence encompassing enormous carbon sinks are particularly important.

Coastal wetlands play a key role in achieving resilient low emission development, including mangroves, coral reefs, seagrass beds and inland waterways. Furthermore, human encroachment in natural ecosystems and unsustainable exploitation of wildlife not only degrades ecosystem services but may also increase the risk of emerging novel viruses harmful to humans, such as the recent Covid-19 (Dobson et al. 2020).

Paradigm shifting pathways

The *vision* for a paradigm shift in ecosystems is to secure their resilience, functionality, and the maintenance of ecosystem services under conditions of climate change. This can be achieved through large-scale protection, restoration, and adaptive management along two paradigm shifting investment pathways:

- Ecosystem-based management of terrestrial and freshwater ecosystems: *maintaining or enhancing ecosystem function at scales sufficiently large to be sustainable and facilitate adaptation to climate change*. Interventions are based on the principle of joint management of the human-environmental system aimed at maximising potential for ecosystem service provision and supporting livelihoods and socio-economic development. Sequestering carbon and protecting ecosystems requires diverse, resilient, and functional ecosystems that deliver a range of ecosystem services that support human activity and environmental function. Peatland ecosystems (whether in wetlands or forests) are of particular importance given their large carbon storage functions, as well as the close connection between their carbon and water cycles.
- Ecosystem-based coastal and marine zone management: *integrating ecosystem protection and restoration into planning and development to provide resilience to climate change and retain ecosystem*

services. This includes mitigation planning, adaptation planning, disaster risk reduction (DRR) and infrastructure development (entailing integration of both green and grey infrastructure).

There are many interdependencies and interlinkages between terrestrial, freshwater, coastal, and marine ecosystems, as well as synergies in the services they provide. However, as terrestrial and coastal ecosystems are differently positioned within existing policy, knowledge, and funding frameworks, GCF considers them separately within this Guide. In both pathways, however, global adaptation and mitigation opportunities require ecosystem protection, restoration, and management. *Protection* includes actions to maintain the integrity of natural ecosystems and the services they provide in the immediate term (near-scale). *Management* refers to the sustainable use, protection, and conservation of resources through work with communities and society. *Restoration* relates to actions that restore degraded ecosystems so that their effectiveness in providing services is enhanced in the long-term (decades). Ecosystem management involves actions that maintain the integrity of functioning ecosystems while allowing the use of its products and services by human society.

Although protection, management and restoration are essential for low-emission, climate-resilient ecosystems, on the scale of regional landscapes and seascapes, these should be integrated with sustainable management of forest, agricultural and urban pathways. There is a *continuum* of appropriate interventions, depending on location, and context-specific benefits and trade-offs. Understanding this continuum is important for developing cross-sectoral interventions, which have the greatest potential impact in terms of cost-effectiveness and social and environmental co-benefits.

Historically, conservation actions in coastal and marine ecosystem management typically have been second to terrestrial systems. However, they share many of the same causes of degradation and loss, barriers to paradigm shift, opportunities for transformation, and requirements for enabling factors. Hence, sharing of lessons, and replication of knowledge, tools and methods can be transformational to promote learning, innovation, and development of transformational solutions. Relevant to both terrestrial and coastal ecosystems, paradigm shifting pathways need to maintain the integrity of ecosystem provisioning, storage capacity and restore degraded ecosystems to regain their former functions to the extent possible, thus promoting long-term (decades) removal of greenhouse gases from the atmosphere. Pathways can be based on sustainable and transformational change in landscape-level policy and planning, with a greater emphasis on approaches that enable the participation of private sector actors in maintaining ecosystem services through tailored strategies such as creating and transforming markets. Due attention is given to environmental and social impact, gender equality and Indigenous Peoples issues to ensure inclusive, as well as sustainable outcomes. GCF recognizes the importance of the inclusion and recognition of local, traditional knowledge in decision-making, as well as recognition of customary land tenure and rights of Indigenous peoples and local communities in ecosystem management approaches. GCF advocates a rights-based approach, and this is supported by policies and operational guidelines on indigenous people and gender action.

Barriers and enablers to achieving paradigm shifting pathways

There are a number of barriers to a paradigm shift, many of which are economic in nature due to widespread externalities. Barriers range from – limited returns on high upfront investment costs, long-term payback or lack of financial resources including equity or collateral – to the more abstract – difficulty in quantifying economic benefits or uncertainty in valuing ecosystem services. A fundamental barrier is that ecosystem services or natural capital is not measured in terms of financial values in respect to government and private sector planning, and they are often considered as common goods, yet 49% of global economy is dependent upon ecosystem services (McKinsey, 2020). Adding to this, knowledge gaps of proven climate-friendly development models and a lack of institutional capacity, monitoring and assessment methods, result in a strong perception of investment risk. For details about barriers, see Section 3.2.

Specific to terrestrial and freshwater ecosystems are insufficient regulatory and legal protection, whereas coastal and marine ecosystems see limited availability of finance for marine protection and restoration in general, and for coastal adaptation projects in particular. Furthermore, there are strong incentives for coastal

development because of the desirability of these areas for urban expansion at the expense of coastal ecosystems (such as wetlands and mangroves), reducing ecosystem services such as the defence against shoreline erosion and storm protection.

Enabling actions across both pathways aim to protect, enhance, and ensure connectivity of the major ecosystem types and biomes. Prioritising vulnerable coastal areas, wetlands, and coral reefs with significant importance for carbon sinks, provision of coastal protection and disaster resilience, and adaptation functions is crucial.

All actions need to consider the social, cultural, and environmental context, as well as the rights, interests, needs and contribution of women, men, Indigenous Peoples, youth, and other vulnerable groups. This improves participation and engagement in decision making, thereby ensuring widespread community support and development of an enabling environment.

The Covid-19 pandemic demonstrates the importance of managing the interface between human communities and natural ecosystems and presents an opportunity for economic stimulus that can restore ecosystem function and generate sustainable jobs and improved livelihoods (Dobson et al., 2020). The pandemic has also disproportionately affected women and made vulnerable populations even more vulnerable.

Role of GCF in financing paradigm shifting pathways

GCF offers a four-pronged approach to drive implementation of the paradigm shifting pathways at scale through its range of financing instruments, including grants, loans, guarantees, and equity. Paradigm shifting pathways for EES in relation to the four pillars of the GCF Strategic Plan follow; detailed information on each can be found in Section 3.3.

(1) Transformational planning and programming: GCF supports developing countries create integrated climate and sustainable development strategies and policies. This fosters an environment conducive to green and blue, resilient investment, including climate compatible *processes* for planning and policy frameworks, ensuring transparency, access to information, participation and decision-making, and equity and sustainability, which guides and brings *legitimacy* to processes. In the EES result area, this pillar sets the foundation for long-term planning and programming that goes beyond business as usual. It incorporates managing ecosystems and maintaining ecosystem services into planning frameworks as legitimate goals in themselves. The approach internalises ecosystem services within the long-term vision of policies, institutions, communities, and other stakeholders.

(2) Catalysing climate innovation: GCF encourages innovation in policy, institutions, business, technology, and finance through enabling policy and institutional environments. This generates innovative policies, business models, and land and ecosystem management that harness multiple benefits for climate solutions.

    Key climate innovations include developing and piloting new approaches to properly value ecosystem services so that they can be recognised in decision-making processes. Closely linked to this is developing and transforming new markets that recognise and value ecosystem services as a natural capital asset.

    Removing subsidies that encourage ecosystem degradation is a complementary and long overdue action. There are also untapped opportunities to use technology (e.g., blockchain) to certify authenticity of value chains ensuring supply of quality traceable sustainable products, such as seafood and timber. Innovative approaches to reducing private sector financial risks can be validated in areas such as sustainable tourism management – this attracts investment in protecting natural areas and enhancing their effective management. Finally, a critical innovation is to test the cost-effectiveness of building with nature alternatives to grey engineering; and to work on green-grey approaches evidencing the right performance mix.

(3) Mobilisation of finance at scale: GCF fosters upscaling successful climate investments through mechanisms such as blended finance to de-risk investments, as well as through strengthening domestic capital markets and climate financing institutions. Using a range of financial instruments to reduce risks and barriers to investment in EES, countries can unlock national and local capital (*resources*) and deepen

access to commercial or "niche" markets relevant to sustainable use of ecosystems. Mobilisation of finance at scale requires innovation and demonstration.

Opportunities are sought with the private sector, emphasizing barrier removal for activities with high impact potential to conserve, restore and sustainably manage ecosystems and maintain ecosystem services. Areas of opportunity for investment include: nature-based funds aimed at leveraging conservation to drive performance; green and blue bonds aiming to raise capital to finance activities earmarked for the green economy; natural infrastructure through incentives from risk finance providers and insurers; carbon markets with new types of credit that can bundle climate adaptation benefits with carbon credits for corporate buyers; next-generation, innovative schemes for payments for ecosystem services (PES); and a portfolio of scalable financially viable ecosystem-based approaches possible by realigning private, corporate foundations and philanthropy. Opportunities that are consistent with Article 6 of the Paris Agreement through which the GCF can support the development of carbon markets as a means of mobilizing private finance are covered in the FLU Guide.

(4) Coalitions and knowledge to scale up success: GCF creates and shares knowledge to harmonise valuation methodologies and incorporate climate risks into every single financial decision to align finance with sustainable development. *Resources* needed to shift finance flows include strengthened institutional and individual capacity, and available and accessible information (data and best practices). By sharing lessons, traditional knowledge, scientific advances, and standards, global finance can flow into transformational projects and programmes that contribute to low emissions and climate resilient development.
Expanding and replicating knowledge for transformational change in the EES result area requires developing and enhancing specific platforms, methods, and approaches to generate, replicate, and share knowledge regarding ecosystems and ecosystems services for climate benefit. Ultimately, this fourth pillar will be the amalgam required to ensure paradigm shift in the sector.

By making investments through these pillars across the two investment pathways, GCF aims to support developing countries catalyse a paradigm shift in the EES result area. Results will be aggregated using the indicators in the Integrated Results Management Framework (IRMF) (GCF 2021[2]). Figure ES-1 shows potential investments in EES along the four pillars of the GCF Strategic Plan.

Section 5 features case studies of successful high impact EES activities that provide multiple ecosystem benefits. They demonstrate broad and inclusive "participation for engagement" by including local communities and authorities, Indigenous peoples, civil society, and the private sector. These cases include examples of flexibly including new forms of finance and good planning that acknowledges context, traditional knowledge, local norms, and values.

GCF investment criteria

Proposals to the GCF are assessed based on six GCF Board approved investment criteria:

(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.
(3) Sustainable development potential: How do the actions align with national SDG priorities? What are expected environmental, social, gender, and economic co-benefits? Wider benefits and priorities.
(4) Recipient needs: Vulnerability and financing needs of the beneficiary country and population
(5) Country ownership: Beneficiary country ownership of, and capacity to implement, a funded project or programme (policies, climate strategies and institutions.
(6) Efficiency and effectiveness: Economic and, if appropriate, financial soundness of the programme/project.

[2] GCF/B.29/12 (https://www.greenclimate.fund/sites/default/files/document/gcf-b29-12.pdf)

Section 6 provides examples of how these criteria could pertain to EES paradigm shifting pathways.

Figure ES-1: Possible actions for each EES pathway following the four pillars of the GCF Strategic Plan

Sector		Actions across the drivers of the GCF Strategic Plan			
	Ecosystems and ecosystem services	**Transformational planning & programming**	**Catalysing climate Innovation**	**Mobilising finance at scale**	**Coalitions & knowledge to scale up success**
Paradigm shifting pathway	**Ecosystem-based management of terrestrial and freshwater ecosystems**	• Participatory multi-stakeholder processes and effective FPIC • Public policies, regulatory frameworks to promote green infrastructure investments • Land use and ecological-economic zoning to enhance ecological connectivity • Ecosystem-based solutions improving NDCs or projects by ecosystem type and geography • Insurance premiums linked to wildfires reflecting risks of ecosystem loss • Building with nature planning • Securing land tenure	• Pilot, test, and evaluate new methods for valuing and incorporating ecosystem services in national accounts • Develop technology-based traceability systems for ecosystem services maintenance and provision (e.g., water regulation) in PES schemes • Test block-chain and other technologies for traceability of certification for commodities in ecosystem and climate-friendly crops • Pilot the development of bio-businesses based on non-timber forest products' sustainable management and harvesting	• Next-generation green bonds • Debt-for-climate and nature swaps • Low-interest lending and guarantees • Blended finance for nature-based solutions • Community-based financing methods • Cash transfer schemes • Bottom of the pyramid micro-financing • Standardised climate accounting • Public-private financing • Upscaled PES schemes with strong M&E systems linked to water fees • Infrastructure investments to protect and enhance ecosystems • High recreational value investment • Private incentives and partnerships in ecosystem management	• Participatory monitoring, evaluation and learning • Reconciliation GHG accounting and nested jurisdictional approaches • Harmonised monitoring and assessment • Involving companies in shared (hybrid) data governance (e.g. enhanced hydro-met services) • Data centres for ecosystems • Enhanced ES valuation and internalisation methodologies • Exchange platforms, in particular, south-south • Incubation and acceleration of start-ups and early-stage ventures
	Ecosystem-based management of coastal and marine environments	• Policies, regulation, and incentives for blue infrastructure • Policy recognition of mitigation co-benefits in climate resilience efforts • Social safeguards and FPIC • Enabling environment for EbA in coastal and marine areas • Improved coastal zone mapping (e.g. ridge to reef approach) • Insurance premiums linked to extreme events reflecting risks associated with mangrove / coral reef loss	• Develop and test new incentives for sustainable seaweed farming, especially in enhancing the market-share in traditionally highly carbon intensive products, such as food, feed, fertilizers, and biofuels • Pilot and test new schemes of ecosystem-based infrastructure and integration of green-grey approaches. Pilot schemes where coastal ecosystem approaches can replace or complement traditional infrastructure, particularly in erosion control and disaster prevention	• Enhanced national financing through blue bonds, debt swaps, and PES schemes in coastal areas • Private blue investment with both emerging and established markets • Increase domestic institutional capacity for large-scale funding • Securing finance to bring forward benefits and delay costs • Blended finance for blue carbon • Multi-stakeholder partnerships for innovative finance • Novel value chains in niche markets (e.g. fisheries, circular economy to reduce sea pollution) • Barrier removal for private sector • Enhanced certification / de-risking building with nature	• Diverse environmental and social impact monitoring • Quantification of ecosystem services per service type • Communities of practice for replication • Data centres for biodiversity accounting • Enhanced ES valuation methodologies • Platforms for information exchange • Large-scale incubation and acceleration programmes with ecosystems-based management approach

1 INTRODUCTION

1.1 GCF Sectoral Guides

The Green Climate Fund (GCF) is the world's largest dedicated fund helping developing countries respond to climate change. It was set up by the United Nations Framework Convention on Climate Change in 2010 and has a crucial role in upholding the Paris Agreement, supporting the goal of keeping the average global temperature rise well below 2°C. It does this by channelling climate finance to developing countries, which have joined other nations in committing to climate action.

The GCF Sectoral Guides are the result of an analysis to identify where targeted investment would have the most impact. They provide guidance to National Designated Authorities, Accredited Entities, and other stakeholders on potential areas for GCF investment in Mitigation and Adaptation result areas. Through its country-driven approach, the GCF helps countries design, finance and implement innovative climate initiatives that can be replicated, scaled up and sustained after project completion to achieve transformational change. The GCF offers a range of financing instruments and works with diverse groups of partners to share risk and catalyse larger financial flows towards climate investments.

There are eight mitigation and adaptation result areas in the Green Climate Fund. Of these, Ecosystem and Ecosystem Services (EES) and Forest and Land Use (FLU) are strongly complementary. Therefore, sectoral guides for both were developed jointly in order to avoid duplication and overlap, while clearly identifying synergistic opportunities for greater impact. Likewise, activities in agriculture, forestry, and other land use (AFOLU) can be addressed through up to three result areas (EES, FLU, and Agriculture and Food Security). Thematically, the EES Sectoral Guide focuses primarily on ecosystem-based management of terrestrial (including grasslands, peatlands, and mountain systems), freshwater, coastal, and marine ecosystems, while the FLU Sectoral Guide focuses on forests and related land use. Ecosystem based management is defined as the approach that recognizes the full array of interactions within an ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation (Christensen et al. 1996). Operationally, the EES result area emphasises maintaining ecosystem services for both adaptation and mitigation results, including ecosystem-based adaptation approaches in forest ecosystems which account for climate uncertainties, while the FLU result area is focused mainly on mitigation through avoiding deforestation and enhancing carbon sequestration and storage. Ecosystem protection and restoration are highly cost-effective climate change solutions, and affect other GCF result areas, in addition to FLU, as shown in Table 1.

Table 1: Cross-sectoral issues addressed in the EES and in other sectoral guides

Sectoral guide name	Cross-sectoral issues addressed
Ecosystem and ecosystem services (this guide)	Ecosystem-based management of terrestrial and freshwater ecosystems (incl. peatlands; wetlands; forests; grasslands; land restoration, conservation, and sustainable management for ecosystem services; watershed management). Ecosystem-based management of coastal and marine ecosystems (incl. marine habitats, mangroves; seagrass; fisheries and fishery supply chain management).
Agriculture and food security	Agroforestry; soils, grassland, and water management for food production; livestock and manure management; aquaculture; climate information for farmers; insurance; and staple and cash crops food systems.
Forest and land use	Forest protection, restoration, and sustainable forest management; natural protected areas systems, REDD-plus, timber and non-timber forest products, deforestation-free supply chains.
Energy	Biomass fuels from natural ecosystems; Hydro energy
Water	Water management for flood control, hydrological services in PES schemes
Health	Ecosystems resilience for human health and populations relying on ecosystem integrity for their livelihoods.
Urban areas	Integrated urban development planning for green cities; ecosystem services provision to reduce heat island effects.

1.2 Ecosystem and ecosystem services context

Ecosystem services are benefits to nature and societies that arise from functioning and biodiverse ecosystems. Many of these services support and contribute to the mitigation of, and adaptation to climate change globally. Ecosystem degradation erodes these benefits and amplifies climate change itself, creating a negative feedback loop that could contribute an additional 0.4°C warming across all scenarios by the year 2100 (Lade et al. 2019). Importantly, this loss also reduces the effectiveness of ecosystem-based approaches to climate change.

Human health and well-being are intrinsically linked to ecosystem services, as the 2020 Covid-19 pandemic has shown. Encroachment into natural ecosystems and indiscriminate consumption of wild animals can place humans in close contact with disease reservoirs (Dobson et al. 2020). Efforts to protect and enhance ecosystems have wide-ranging co-benefits, including contributions to food and economic security, health, and greater freedom of choice regarding development options. Ecosystem protection, restoration, and sustainable management are therefore needed to safeguard the extensive benefits that ecosystems provide, including climate related benefits. In all interventions, EES have different importance and values to women and men which are linked to their context, norms, roles, and responsibilities within communities.

The EES Sectoral Guide is a component of the GCF Strategic Plan 2020-2023,[3] focuses on paradigm shifting investment pathways through ecosystem-based management of high-impact, transformative projects, and programmes along two major ecosystem types:

- Terrestrial and freshwater ecosystems.
- Coastal zone and marine ecosystems.

There are many interdependencies and interlinkages between terrestrial, freshwater, coastal, and marine ecosystems, as well as synergies in the services they provide. However, as terrestrial and coastal ecosystems are differently positioned within existing policy, knowledge, and funding frameworks, GCF considers them separately within this Guide. Marine-related projects and programmes are expected to increase significantly in GCF-1 and beyond, and the increasing GCF focus on marine ecosystems is therefore reflected in this Guide. Sustainably managed, the planet's oceans have an important role to play in providing jobs and feeding the world (FAO 2020). The EES Sectoral Guide also covers peatlands, which are unique and carbon rich environments in forests and wetland ecosystems. Most studies on the role of tropical peatlands in the global carbon cycle have focused on Southeast Asian peatlands, which, during the last decades, have contributed considerable carbon to the atmosphere resulting from anthropogenic activities (e.g., land exploitation and fires).

A review of ecosystem services shows that some of these services primarily support mitigation (global carbon regulation through the maintenance of carbon cycles and enhancement of GHG sinks), while others provide increased adaptive capacity (regulation of water, soil erosion, flood prevention and other DRR functions, nutrient cycling, pollination, resource provision and cultural services). Many interventions in the EES result area support ecosystem services across multiple categories that can be achieved simultaneously and thus generate a higher impact. For example, wetlands restoration will not only promote carbon storage and reduce greenhouse gas (GHG) emissions, but also enhance livelihoods and regulate water supplies. Simultaneous promotion of multiple ecosystem services can be seen as the hallmark of high-impact activities.

1.3 Organisation of the document

This Guide has seven sections. After this introduction, Section 2 provides an overview of the state of ecosystems and their services globally and the potential they provide for climate change mitigation and adaptation; Section 3 highlights the barriers and opportunities to achieving a paradigm shift in the EES result area; Section 4 provides guidance on the most appropriate public and private finance for ecosystem-based

[3] Decision B.27/06

management, and their transformative potential; Section 5 explores case-studies that demonstrate paradigm shift potential; Section 6 provides specific guidance for the development of impactful projects and programmes in relation to the GCF investment criteria; finally, Section 7 presents the conclusion.

2 GLOBAL CONTEXT

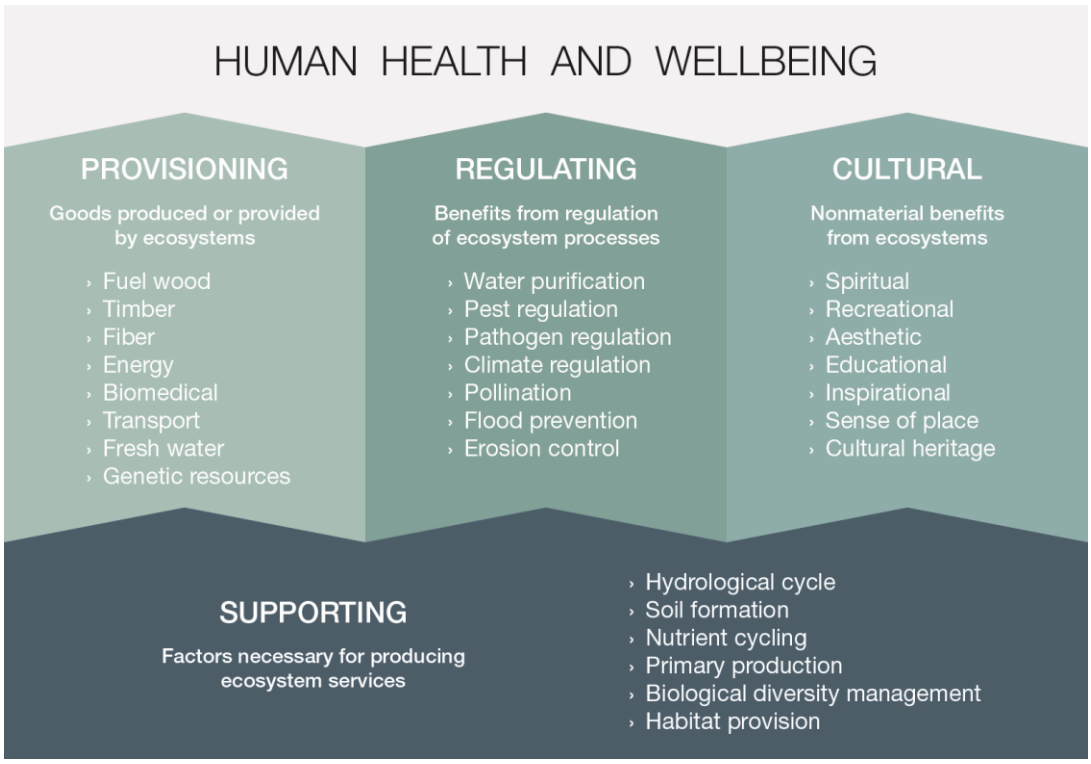
2.1 Scientific basis: why are ecosystems and ecosystem services relevant to climate action?

Two global emergencies, one of unprecedented ecosystem degradation and biodiversity loss on one hand, and another of climate change on the other, are recognised as central to the global agenda, (e.g., by IPCC 2018; 2019a 2019b, IPBES 2019). They are interlinked, and they amplify each other.

Biodiversity, the diversity of life at the genetic, species, and ecosystem levels, underpins all ecological functions and is key to maintaining and building ecosystem integrity and avoiding ecological collapse; yet the current loss of biodiversity is unprecedented in human history (IPCC 2019a). Ecosystems provide services that are integral to human health and well-being, including carbon sequestration over long periods of time (see Figure 1). Functional, biodiverse ecosystems are more resilient against external disturbance than degraded ones and support social resilience and adaptive capacity (Seddon et al. 2019); these issues have become particularly visible in the face of the Covid-19 pandemic. Without safeguarding the contribution of nature (i.e., ecosystems and their services) to climate mitigation, it will be difficult to keep global warming well below 2°C (IPCC 2019a).

A bold, scaled-up approach to the stewardship of natural ecosystems can help society meet the urgent goals of climate mitigation and adaptation (Dinerstein et al. 2019).

Figure 1: Four categories of ecosystem services



Source: GCF own elaboration.

Ecosystem-based approaches recognise the inherent connectivity within natural systems and the interdependence of human, ecological, economic, and institutional systems, with a focus not on single issues, species, or activities, but using an area-based, integrated view of socio-ecological systems. This integrated view targets multiple objectives through the "stacking" or "bundling" of ecosystem services (von Hase and

Cassin 2018). Climate change mitigation, adaptation, biodiversity conservation, natural resource management and economic development are often planned and implemented separately, leading to redundancies, and missed opportunities with often negative outcomes for biodiversity and ecosystems. Integrated ecosystem-based approaches, on the other hand, can bridge these sectoral divides, enhance synergies, and maximise benefits (see Table 2). For example, ecosystem-based adaptation (EbA)[4] can enable ecosystem protection and restoration and increase resilience, while alleviating poverty and protecting livelihoods and account for climate uncertainties (IPCC 2019a). Coupling EbA with community ownership of climate planning and implementation can deliver high-impact transformative projects based on the priorities, needs, knowledge, and capacities of resource-dependent communities (Reid et al. 2009).

Table 2: Examples of benefits provided by EbA practices

Examples of EbA practices	Examples of Benefits
Protect and restore riparian ecosystems	• Provide water storage. • Increase bank stability (erosion control). • Regulate floods. • Produce a physical barrier that restricts the flow of pollutants and sediments and prevents them from being washed into the aquatic ecosystem. • Improve water quality through lower suspended sediment loads. • Provide shade, temperature control, wildlife refugia, and secure water flows to protect sensitive populations of flora and fauna, especially in arid regions.
Restore and manage wetlands and coastal areas	• Sustain or improve water quality by trapping sediments, filtering pollutants, and absorbing nutrients. • Increase biodiversity and improve connectivity between habitats. • Lower flood peaks downstream • Protect coasts against storms and inundation.
Reconnect rivers to floodplains	• Increase natural storage capacity. • Reduce flood risk. • Restore wetlands. • Enhance habitats for migratory species.

Source : Ficke et al., 2008; Nelson et al., 2009; Shields et al., 2003

2.2 Global baseline: where is the sector today?

Degrading and disappearing terrestrial, freshwater, and marine ecosystems substantially contribute to GHG emissions (see Figure 2). IPBES (2019) reports that "Nature across most of the globe has now been significantly altered by multiple human drivers, with the great majority of indicators of ecosystems and biodiversity showing rapid decline." All future climate scenarios project impacts to land and the ocean, exacerbating risks to livelihoods, biodiversity, human and ecosystem health, infrastructure, and food systems (IPCC 2019a, b).

Terrestrial ecosystems are mainly lost or degraded to the expansion of agriculture; freshwater ecosystems are commonly degraded by agricultural runoff and pollution; and coastal ecosystems are lost to pollution, coastal development, mangrove clearance, overfishing, and unsustainable aquaculture. Climate change is increasingly a driver of ecosystem degradation in both the terrestrial and marine ecosystems (IPBES 2019). It is critical to halt the loss of ecosystems by addressing these drivers, and to restore already degraded ecosystems (Hoegh-Guldberg et al. 2019, IPCC 2019a).

Terrestrial and freshwater ecosystems. Land degradation has reduced the productivity of nearly one-quarter of the global land surface and impacted the wellbeing of about 3.2 billion people, costing 10% of annual global gross domestic product in lost ecosystem services (UNCCD 2019). Frequency, intensity and duration

[4] Ecosystem-based Adaptation (EbA) is formally defined by the CBD as the use of ecosystems and biodiversity to help human communities adapt to the effects of climate change.

of droughts, heat and extreme rainfall-related events are projected to increase in many regions as a result of climate change (IPCC 2019a).

Drylands are especially vulnerable. The World Bank estimates that 40 million people could be displaced due to climate change by 2050 across sub-Saharan Africa alone. Inland water bodies such as the Aral Sea, Lake Chad, or the Dead Sea are experiencing dramatic area reductions because of water diversions for agriculture, which uses up to 75% of all inland water. UNCCD and FAO (2019) state that one third of the world's population is currently living in water-scarce regions.

Climate change severely threatens all terrestrial ecosystems, but particularly damaging are threats to unique and endemic systems, that play a key role in the landscape. These include wetlands, mountain ecosystems including glaciers, and the Artic, and biodiversity hotspots such as rainforests, dry forests, and *páramos*. The destruction, fragmentation, and degradation of carbon-rich ecosystems (tropical forests, tundra, and inland wetlands) are pressing concerns for both climate and biodiversity goals[5]. Land use change, predominantly due to tropical deforestation and burning, contributes 13% of annual global emissions (IPCC 2019a), of which about 5% is irrecoverable carbon (see below). A long-term decline in the carbon sink capacity of Amazonian forests has been observed, suggesting the forest's function as a carbon sink is sensitive to changing environmental conditions, including increasing temperature and fragmentation (Hubau et al. 2020). The Amazon forests are being depleted at an alarming pace and may be approaching a tipping point, i.e., the point at which eastern, southern, and central Amazonia would transition to a savannah-like ecosystem (Lovejoy and Nobre 2018).

New research (Goldstein et al. 2020) has found that ecosystems such as peatlands, mangroves, and old-growth forests contain irrecoverable carbon, that is within human purview to manage and, if lost, could not be recovered by mid-century, the timeframe relevant to staving off the climate emergency. At least 4 billion tonnes of irrecoverable carbon have been lost to land conversion since 2010, equivalent to about 5% of annual emissions from burning fossil fuels. Irrecoverable carbon is also threatened by climate change impacts such as drought, fire, storms, and species shift. Ecosystems with high irrecoverable carbon must be protected and proactively managed for ecological and human resilience.

Peatlands. Peatlands are unique carbon rich environments. Tropical peatlands are mainly found in Southeast Asia (~247,778 km^2), South and Central America (107,486 km^2), and the relatively recently discovered peatlands in the central Congo Basin (145,500 km^2). Most studies on the role of tropical peatlands in the global carbon cycle have focused on Southeast Asian peatlands, which, during the last decades, have contributed greenhouse gases to the atmosphere resulting from anthropogenic activities (e.g., land exploitation and fires). Few studies have focused on the Amazon basin, where peatlands remain nearly intact, and have been a long-term carbon sink. Peatland restoration (including re-wetting of degraded peatlands) implies restoring a range of functions with different objectives, recognizing the full range of services that peatlands provide. Vast carbon stores remain undocumented, such as peatlands in Indonesia and the Democratic Republic of the Congo (Dargie et al. 2017; Harrison and Rieley 2018).

Coastal and marine ecosystems. Climate change, likewise, threatens marine ecosystems, with coral reefs negatively impacted by sea level rise, acidification, storm intensity, altered currents, and changing precipitation and runoff. Coastal ecosystems[6] are highly productive, biodiverse ecosystems, and mangroves are hotspots for carbon storage sequestering carbon at rates 10 times larger than those of terrestrial systems. Emissions resulting from the degradation and loss of these ecosystems are equivalent to approximately 8.4% of emissions from terrestrial deforestation, although they only represent 1.5% of the forest area (Hoegh-Guldberg et al. 2019). Vegetated coastal ecosystems such as marshes, mangroves, and peatlands are vulnerable to sea level rise and extreme weather events, placing important carbon sinks at risk and undermining coastal protection, habitats, and the goods they provide (IPCC 2019b). Sea levels have already increased by 0.16 meters between 1902 and 2015 (IPCC 2019b) and its rise continues to accelerate: sea

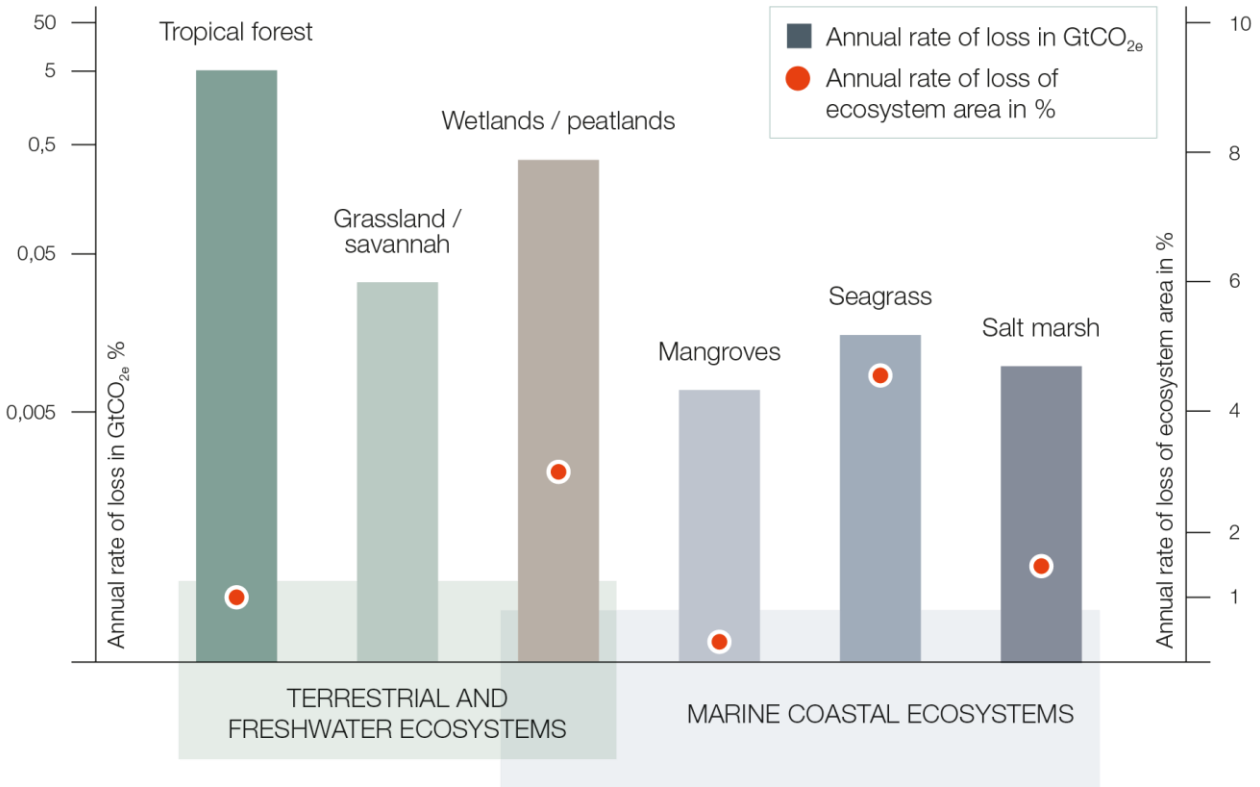
[5] cf. GCF Sectoral Guide on Forests and Land Use.

[6] Blue Carbon is a term used by some to refer to the carbon sequestered and stored in coastal and near-shore ecosystems, primarily mangroves, salt marshes and seagrasses. See https://www.iucn.org/resources/issues-briefs/blue-carbon

levels are projected to rise by 0.26-0.77 meters by 2100 with a global warming of 1.5°C, 0.1 meters more with 2°C warming - each additional 0.1 meters expose up to 10 million more people to risk (IPCC 2018).

Loss of vegetated coastal systems and coral reefs will lead to a substantial decline in the buffering of wave energy and in the protection against storm surges and other forms of coastal erosion. The global natural wetland area has declined by 31% since 1970, primarily in coastal and marine systems. Warming reduces seagrass meadows and kelp forest areas at low latitudes. Sustainable aquaculture holds tremendous promise in responding to surging demand for food, with global fishery product consumption having increased at almost twice the rate of population growth since the 1960's (FAO 2020). Yet human health, food security, tourism, and cultural identity and values are projected to be further impacted by climate-related ocean change due to more frequent harmful algal blooms, declining fish catch potential, and increasing exposure to, and bioaccumulation of contaminants (IPCC 2019b).

Figure 2: Baseline emissions from current degradation and loss of ecosystems



Source: Illustration based on data from IPCC 2019a, IPCC 2019b.

2.3 Global adaptation and mitigation potential: where does the sector need to be?

While the global adaptation goal set forth by the Paris Agreement links strongly to the needs of developing countries, adaptation efforts become much more difficult and expensive as climate change increases. Even if the mitigation goal of the Paris Agreement to limit global temperature increase to well below 2°C - 1.5°C can be achieved, the impact of global warming will still be felt across all ecosystems. Thus, climate mitigation remains important for both preventing future climate change impacts and for successful adaptation, although adaptation in the ecosystems and ecosystem services result area will remain important for decades to come, regardless of the climate scenario. Adaptation only, as well as integrated, multiple-objective climate mitigation and adaptation action can minimise pressure on natural ecosystems (IPCC 2019a).

EbA and incentives for ecosystem services play a critical role in helping people adapt to the adverse effects of climate change on land and reduce their vulnerability. Coastal and near-shore ecosystems, including salt

marshes, mangrove forests, seagrass meadows and seaweeds provide important services including coastal protection, habitat and food and resource provisioning. Mangroves provide diverse ecosystem services such as carbon storage, fisheries, timber and non-timber forest products, erosion protection, water purification, shore-line stabilisation, and regulate storm surge and flooding damages, thus enhancing resilience and reducing climate risk from extreme events such as cyclones (IPCC 2019a). Furthermore, mangroves provide a dual role in climate, mitigation, and adaptation. The GCF has already supported the innovative mangrove project "Mi Costa" in Cuba (FP157[7]) where the ecosystem-based management approach is implemented. Innovative approaches, such as sustainable seaweed aquaculture offers the potential to increase sustainably managed stocks for fuel, food, feed and chemicals, in the context of developing low-carbon alternatives and providing livelihoods to coastal communities (Buschmann et al. 2017; Hoegh-Guldberg et al. 2019; Rebours et al. 2014). Coral reefs are critical marine ecosystems that provide habitat to thousands of species and offer vital services through coastal protection and by provisioning food and resources that support coastal communities and form the basis for a number of industries and tourism.

Tropical peatlands provide significant ecosystem service functions, for instance, Amazonian peatlands store 3-6 Gt of organic carbon in their waterlogged soils with strong potential for conversion and release of GHG. These include variable levels of GHG emission, as well as variable microbial communities across rich to poor soil peatlands. The carbon-dense Amazonian peatland may switch from a current carbon sink into a source in the 21st century. Peatlands in Southeast Asia are to some extent degraded and many no longer function as carbon accumulating systems. The region now faces loss of productive land and flooding because many peatlands are near sea level. Regional CO_2 emissions from peat oxidation reached 155±30 MtC per year in 2015, similar in magnitude to regional fossil-fuel emissions and peat fires. Peatlands are also common in many mountain ranges, including the Andes and above 3500 meters in several climate zones. Many tropical mountain peatlands in the Andes are formed by cushion plants, locally known as *Bofedales*. In the Northern Andes, the *Páramo* is a high-altitudinal neotropical ecosystem containing peatlands. Many of the largest tributaries of the Amazon basin have their headwaters in the *Páramo*. The Cuvette Centrale in the central Congo Basin harbours an estimated 30.6 Pg of carbon stored in an extensive tropical peatland complex. While much of the peatland area is protected by some form of conservation, there is risk from hydrocarbon exploration, logging, plantations, and other forms of disturbance to significantly damage these tropical peatland ecosystems.

Grassland ecosystems cover 31–43% of all terrestrial habitats and provide carbon storage, food, forage, biofuels, tourism, and recreation. Up to 90% of grassland biomass is belowground and thus soil carbon levels are high in proportion to total biomass compared with other ecosystems. In addition to these ecosystem services, grasslands contribute to food security through ruminant milk and meat production (Gibson and Newman 2019).

Conservation planning supports maintaining and restoring ecosystems, ecological connectivity, and sustainably managed production systems. There is an opportunity to simultaneously reduce socio-economic vulnerability and consider equitable distribution of adaptation benefits and prioritising beneficial outcomes for disadvantaged and vulnerable groups (IPCC 2019a).

The above analysis shows that global adaptation and mitigation opportunities in the EES result area can be achieved through the protection, restoration, and sustainable management of natural ecosystems. *Protection* includes actions to maintain the integrity of natural ecosystems and the services they provide. *Restoration* relates to actions that restore degraded ecosystems so that their effectiveness in providing services is enhanced in the long-term (decades). *Management* involves actions that maintain the integrity of functioning ecosystems while allowing the use of its products and services by human society.

Although protection and restoration are essential for low emission climate resilient approaches, on the scale of regional landscapes and seascapes, these should be integrated with sustainable management of forest,

[7] https://www.greenclimate.fund/project/fp157

agricultural and urban pathways. There is a continuum of appropriate interventions depending on location and context-specific benefits and trade-offs. Understanding this continuum is important for developing cross-sectoral interventions, which have the greatest potential impact in terms of cost-effectiveness for social and environmental co-benefits.

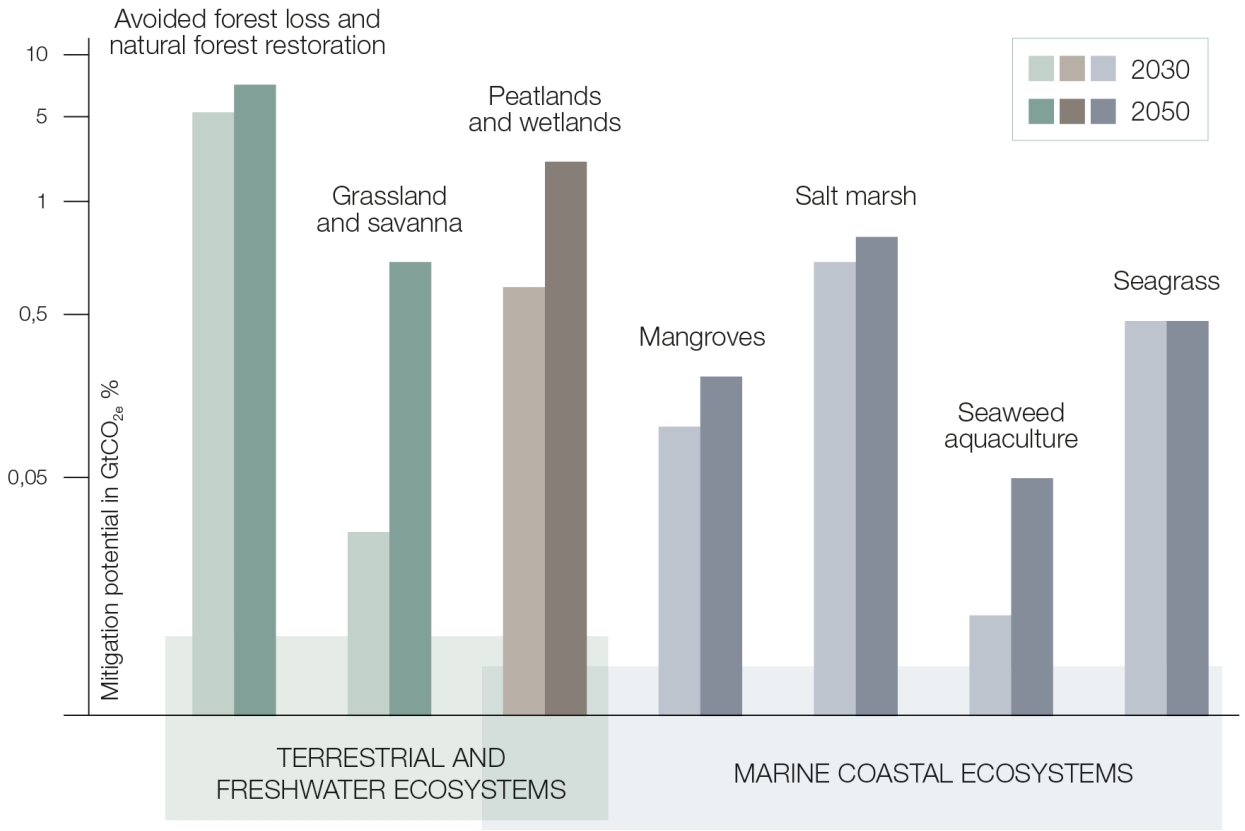
The greatest mitigation potential for intact natural ecosystems lies in their **protection**. Protecting ecosystems is a priority to maximise the future ability to harness ecosystem-based solutions. The sooner emissions from the degradation and destruction of natural ecosystems are phased out, the greater the mitigation benefit over the century by avoiding further loss of carbon sequestration and storage potential. Some ecosystems contain 'irrecoverable carbon', carbon vulnerable to release upon ecosystem degradation that is not recoverable on timescales relevant to humanity´s ability to address climate change. Many of the most effective opportunities to protect this irrecoverable carbon will not last, and so the protection of all remaining intact high-carbon ecosystems must be prioritised (Goldstein et al. 2020; Anderson et al. 2019). The conservation of irrecoverable carbon in high-carbon ecosystems such as peatlands, coastal wetlands, grasslands mangroves, and forests, delivers immediate benefits to mitigation and adaptation of ecosystems and people (IPCC 2019a), as well as the long-term benefits of protecting stored carbon.

The natural carbon uptake of degraded terrestrial and coastal ecosystems can be enhanced through **restoration** interventions. Restoration actions, such as reforestation, agroforestry, and the reclamation of degraded soils, and coastal areas, take more time to deliver and are much costlier than protection (IPCC 2019a). Restoration involves removing external impacts such as unsustainable grazing, illegal logging, pollution, over-harvesting and weed invasion, establishing buffer zones, fishery recovery areas and connectivity corridors, securing tenure and rights, and improved governance mechanisms. In terrestrial ecosystems, restoration is possible through ecosystem conservation and land regeneration, and soil organic carbon management (IPCC 2019a). In coastal ecosystems, restoration can be achieved by reducing anthropogenic nutrient and pollutant inputs restoring hydrology (re-wetting peatlands) and intervening in ecosystem function by reinstating predators (Macreadie et al. 2017). As stated in the UN Decade on Ecosystem Restoration, ecosystem restoration encompasses a wide continuum of activities that contribute to protecting intact ecosystems and repairing degraded ecosystems (UN Environmental Programme 2020).

Finally, **ecosystems management** is an appropriate strategy when there is strong synergy between maintaining ecosystem services, and tangible economic use. Sustainable ecosystem management needs to be seen in the context of the broader landscape by integrating it with ecosystem protection and restoration approaches. Traditional knowledge can play an important role in uncovering sustainable ways to use ecosystems. The UN Convention on Biological Diversity recognises that sustainable land use practices that maintain carbon stocks or enhance sequestration can provide a range of additional benefits that are crucial for sustainable development (Epple et al. 2016). Likewise, the Conference of the Parties to the UNFCCC recognized the need to strengthen knowledge, technologies, practices and efforts of local communities and indigenous peoples related to addressing and responding to climate change and established the Local Communities and Indigenous Peoples Platform (LCIPP). LCIPP brings together people and diverse knowledge systems to address climate change in a holistic and integrated way.

Through protection, restoration, and management, the EES result area offers among the best opportunities for achieving meaningful adaptation outcomes, given the crucial services that ecosystems provide. GCF encourages exploring the EES result area as an important avenue to achieve adaptation results.

Figure 3: Strategic targets for mitigation in terrestrial and marine ecosystems



Source: Own illustration based on Hoegh-Guldberg, et al., 2019, Griscom et al. 2017, Dooley et al. 2018, Dinerstein et al. 2019.

Figure 3 summarises global strategic mitigation targets for a range of ecosystems. The highest mitigation opportunities are in carbon-rich ecosystems (tropical forests, peatlands, coastal and marine ecosystems). Protection and restoration of degraded forests, grasslands and peatlands offers a mitigation potential of 6-7 Gt CO_2e per year in 2030 and 11-14 Gt CO_2e per year in 2050. Coastal and marine ecosystems offer a mitigation potential of 0.3-0.9 Gt CO_2e per year by 2030 and 0.5-1.4 Gt CO_2e per year by 2050, over much smaller areas (Hoegh-Guldberg et al. 2019). Nevertheless, properly functioning ecosystems, even those with low mitigation potential, also underpin the adaptation potential of the coupled socio-ecological system, particularly in coastal areas.

Undertaking actions and interventions that respond to this crisis and maximise opportunities for impact is urgent. Actions can be prioritised by looking at opportunities offered by various ecosystem types in terms of the degree of mitigation and adaptation potential balanced with the level of threat and rate of loss irrecoverable carbon. It follows that emphasis for mitigation can be placed on tropical forests (covered in the FLU Sectoral Guide), peatlands, and grasslands. On the other hand, coastal and marine ecosystems, including mangroves and coral reefs, provide the best opportunities for adaptation (see Figures 2 and 3).

2.4 Financing adaptation and mitigation: how much will it cost to meet these targets?

Many economic activities are either directly or indirectly dependent on ecosystems and their services on nature. More than half the world's GDP – USD 44 trillion – is highly or moderately dependent on nature and its services (WEF 2020). During 2019 and 2020, multiple natural disasters (e.g., wildfires) have cost billions of dollars globally each year, and it is now widely accepted that physical climate risks are not priced properly in today's global economic system (Johnson et al. 2020). Coral reefs, mangroves, and seagrasses provide ecosystem services vital for more than a billion people who depend on them. While it is difficult to incorporate estimates of the financial costs of biodiversity loss and ecosystems degradation into the financial plans of other sectors (OECD 2019), it has been estimated that the loss of ecosystem services resulting from a business-as-

usual scenario would represent a cost of nearly USD 10 trillion to the global economy by 2050 (Johnson et al. 2020).

Delivering maximum climate impact and achieving sustainable development through EES will require addressing a broad range of governance, institutional and economic drivers of ecosystem degradation and loss. Key to ensuring successful projects and programmes is to address the risk of trade-offs between environmental and social goals, with particular attention to gender issues, through project design that maximises socio-ecological synergies. This may include carefully considering a focus on areas with high population density and/or high opportunity costs for agricultural and coastal lands (Schleicher et al. 2017).

Currently 50 projects[8] in the GCF portfolio contribute to the EES result area, with a noted emphasis on adaptation opportunities, including increasing the resiliency of the most vulnerable people and communities, health and well-being, and food and water security. Among these 50 projects, 20 projects cover both EES and FLU outcomes. As of February 2021, GCF contributions to these projects totalled USD 1.48 billion, with EES activities within those projects totalling USD 420 million. Individual contributions to EES activities in projects and programmes ranged from USD 0.59 million to USD 21.9 million; the average budgetary contribution to EES is USD 8.37 million (GCF iPMS data). These figures are modest compared to an estimated "biodiversity financing gap" of USD 598 to 824 billion per year (Deutz et al. 2020).

Projects and programmes that take an integrated view of mitigation, adaptation, biodiversity, and the needs of the most vulnerable, can better realise potential synergies and avoid conflict between different objectives. Pursuing mitigation objectives alone can risk generating perverse outcomes that may increase rather than reduce vulnerability (Morecroft et al. 2019). Quantification of the climate mitigation benefits of restoration projects is not straightforward (IPCC 2019c). There are inherent uncertainties in quantifying carbon release resulting from ecosystem loss and degradation, and therefore in determining associated emission reduction from the prevention of loss (IPCC 2019c).

To determine the most appropriate management approach for ecosystem protection and restoration, which is key for determining the financial requirement, it is important to understand the baseline condition of the ecosystem in question. Ecosystem condition is defined as "the quality of an ecosystem that may reflect multiple values, measured in terms of its abiotic and biotic characteristics across a range of temporal and spatial scales" (Keith et al. 2020). It determines ecosystem stability and describes how far ecosystem condition is at or below maximum ecological stability. Ecosystem stability depends on structure, composition and function and builds on natural ecological and evolutionary processes, incorporates self-regeneration, and involves dynamic equilibria in response to natural disturbance regimes (Keith et al. 2019).

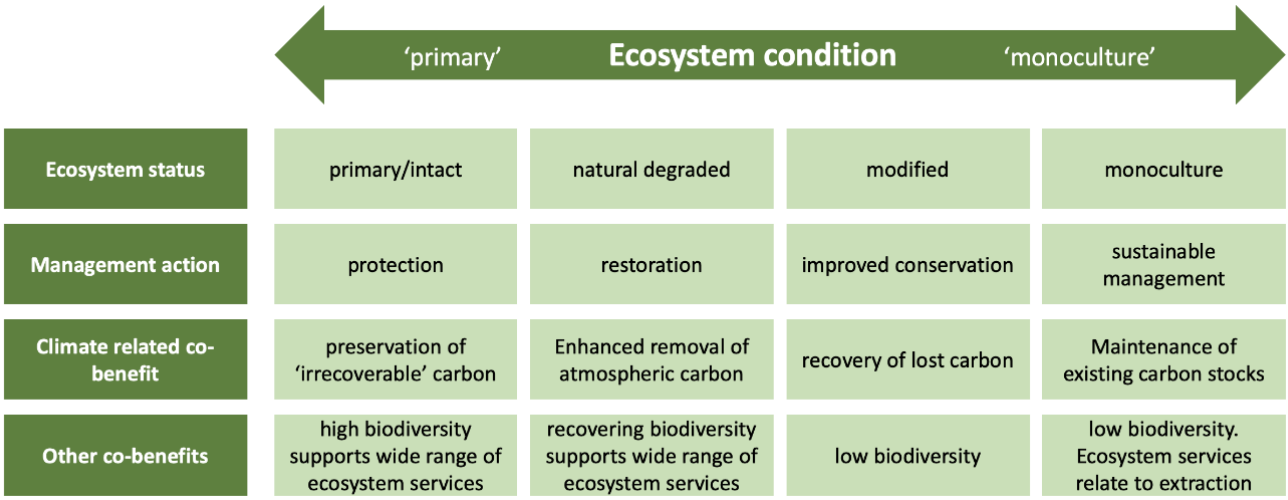
Ecosystem condition can be assessed along a continuum, from primary to modified to monoculture systems, for example by assessing biodiversity or above- and below-ground carbon (see Successful ecosystem landscape restoration is forward-looking and dynamic, focussing on strengthening the resilience of landscapes and creating future options to adjust and further optimise ecosystem goods and services as societal needs change or new challenges arise (GIZ 2012, IUCN 2020).

Figure 4 for a simplified scheme). Where an ecosystem is positioned along this continuum can inform priorities and development pathways for each type of intervention. Diverse, intact natural ecosystems are in principle more resilient than monocultures of non-native species (Seddon et al. 2019), because ecosystems that are as close as possible to their natural state (biodiversity, area, connectivity) are more resilient to external impacts. A basic principle of ecosystem function is its "non-stationarity" status, the shifting between states of the system, which offers the very basis for resilience and evolutionary potential. Flexibility to change course if needed is also a principle of sound ecosystem management (Schindler and Hilborn 2015). Crucially, restoring ecosystems increases the supply and quality of ecosystem services over time towards desired outcomes supporting national sustainable development priorities (UN Environmental Programme 2020).

[8] As of February 2021 (post B.27). Indicates the number of projects with greater than 5% in the EES result area.

Successful ecosystem landscape restoration is forward-looking and dynamic, focussing on strengthening the resilience of landscapes and creating future options to adjust and further optimise ecosystem goods and services as societal needs change or new challenges arise (GIZ 2012, IUCN 2020).

Figure 4: Actions and benefits and co-benefits under an ecosystem continuum approach



Aside from the loss of ecosystem services and the associated economic value when ecosystems are degraded or destroyed, the irreversibility of loss of carbon-rich and biodiverse ecosystems is much more severe than previously thought, and increasingly easier to quantify (Goldstein et al. 2020). High impact areas for new projects or programmes are those where biodiversity is imminently threatened (e.g., loss of unique and rare species in unique ecosystems, environments, and habitats), those with high carbon density (tropical forests, wetlands, peatlands, and mangroves), those with high levels of provisioning services, and those with strong potential for benefits to communities dependent on ecosystems for livelihoods and security. The coastal zone is notable for the high level of provisioning services, including significant carbon storage capacity, storm and erosion protection, fisheries, timber, and other provisions.

At least one-quarter of the known carbon stored in the world's tropical and sub-tropical forests (1000 Gt CO_2e) is in collectively managed territories (RRI 2018). Without secure tenure rights, this carbon is under threat (FAO and FILAC 2021). Supporting the rights and livelihoods of Indigenous Peoples and local communities ensure that local communities have an active role in making land use decisions and ensure benefit flows-- thereby reducing conflict, ensuring equity, and boosting investor´s ability to benefit from these investments. Given the significant overlap between natural lands, conservation areas and lands managed by Indigenous Peoples and local communities (Garnett et al. 2018), clarifying and securing land rights makes sound economic sense as well as enhancing women´s roles and rights. Furthermore, indigenous and traditional knowledge systems related to ecosystems and ecosystem services can play a key role in designing for engagement (Larson and Sarmiento Barletti 2019). Most of these opportunities are covered in the FLU Sectoral Guide and are mentioned here as they can also apply to the other ecosystems covered in this guide.

3 PARADIGM SHIFTING PATHWAYS

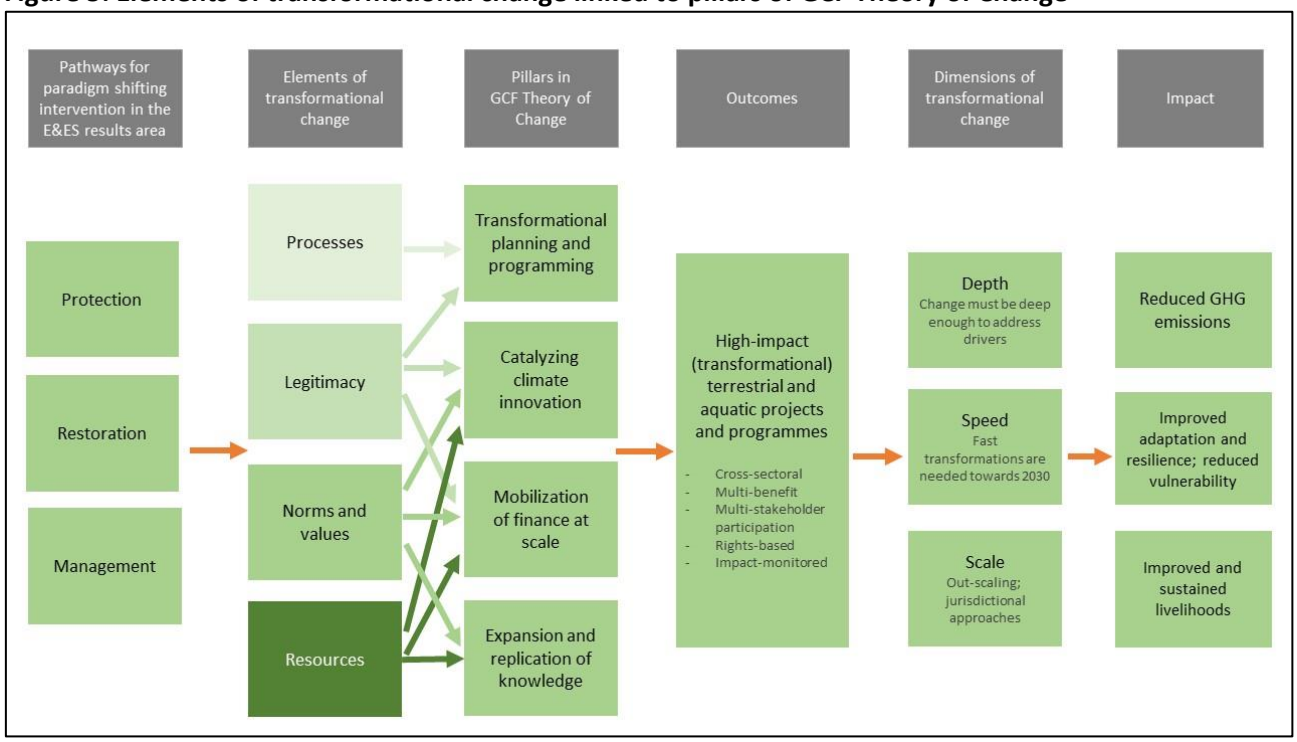
3.1 Drivers of change across paradigm shifting pathways

To achieve a paradigm shift to build back, maximise and sustainably harness ecosystem benefits, high-impact projects and programmes are required to achieve multiple objectives based on ecosystems and their services. The GCF, multilateral policy agreements, international aid agencies, and some countries recognise the need for broader-scale, synergistic policy interventions to protect ecosystems (Morrison et al. 2019). These multiple objectives include:

(1) Following the principles of ecosystem-based management for increased biodiversity and maximum ecosystem "assets" for maximum function and benefits.
(2) Increasing resilience of ecosystems to climate change.
(3) Increasing resilience of people, in particular vulnerable people, to the effects of climate change.
(4) Enabling the respect and participation of Indigenous Peoples and local communities to be stewards of their lands and ecosystems.
(5) Addressing development objectives (i.e., livelihoods, equitable jobs and income, access to water, education, sanitation, and health).
(6) Reducing emissions from loss and degradation of natural ecosystems.

The concept of paradigm shift in the GCF context is the degree to which a funded activity (project or programme) can catalyse impact beyond a one-off project or programme investment (GCF 2020). The Updated Strategic Plan for the Green Climate Fund 2020-2023[9] seeks to promote paradigm shifts across high-impact areas encompassing mitigation potential and countries' adaptation and resilience needs. Through this Strategic Plan, GCF seeks to provide guidance for designing projects and programmes that result in significant transformation.

Figure 5: Elements of transformational change linked to pillars of GCF Theory of Change



Source: GCF own elaboration.

Three dimensions commonly define transformational change: depth, scale, and speed: *Depth* is the essence of a transformational shift; without depth there is little transformation. Deep transformations cut across sectors, levels and generations, and are needed to change cultures, power dynamics, and structures (markets, laws, institutions). *Scale* refers to defining what is scalable, and the numbers of people affected, or the geographical extent of change achieved with the scaling. *Speed* indicates how quickly transformations can be achieved; the urgency of the climate crisis prioritises early outcomes achievable in 5-10 years (the 2030 goal) over those achievable in 30 years (the 2050 goal), because each 'missed year' increases the size of the task ahead.

[9] https://www.greenclimate.fund/document/updated-strategic-plan-green-climate-fund-2020-2023

A paradigm shift in the EES result area must focus on depth rather than scale or speed, because EES activities need to address the underlying, complex causes of ecosystem degradation - causes found in the economic and policy forces, incentives, norms, and pressures in other sectors that shape how sustainably ecosystems are being managed.

The GCF Theory of Change is based on four pillars: transformational planning and programming, catalysing climate innovation, mobilisation of finance at scale, and expansion and replication of knowledge (GCF 2020). Key actions for each of the paradigm shifting pathways, across the four pillars of the GCF Strategic Plan are outlined in Tables 4 and 6, as well as on Figure 6, followed by a detailed description of each driver.

3.2 Two paradigm shifting pathways in the EES Sector

The *vision* for a paradigm shift in ecosystems is to secure the resilience, functionality, and maintenance of ecosystem services under conditions of climate change through large-scale ecosystems protection, restoration, and management. This can be achieved through pathways along two major ecosystem types: (i) terrestrial and freshwater ecosystems, and (ii) coastal zone and marine ecosystems. As mentioned earlier, there are many interdependencies and interlinkages between terrestrial, freshwater, coastal, and marine ecosystems, as well as synergies in the services they provide. However, as terrestrial and coastal ecosystems are differently positioned within existing policy, knowledge, and funding frameworks, GCF considers them separately within this Guide.

3.2.1 Pathway 1: ecosystem-based management of terrestrial and freshwater ecosystems

Vision. A paradigm shift in how terrestrial and freshwater ecosystems are managed lies in landscape protection (including through protected areas), restoration, and management interventions based on the principle of joint management of the coupled human-ecological system. These interventions maintain or enhance ecosystem function at a scale sufficiently large to be ecologically sustainable. Key aspects of ecological sustainability related to climate benefits is the ability of the landscape to store and/or sequester carbon and provide ecosystem services for adaptation.

However, carbon and adaptation gains should not be achieved at the expense of other ecosystem functions, thus avoiding emissions requires resilient and ecosystem integrity. These ecosystems will deliver a range of ecosystem services that contribute to adaptation, sustainable livelihoods, and other benefits for climate, biodiversity, local communities, and societies at large, including the differentiated roles of women and youth.

GCF recognizes the importance of the inclusion and recognition of local, traditional knowledge in decision-making, as well as recognition of customary land tenure and rights of Indigenous peoples and local communities in ecosystem management approaches. GCF advocates a rights-based approach, and this is supported by policies and operational guidelines on indigenous people and gender action. The GCF Indigenous Peoples Policy recognizes that indigenous peoples often have identities and aspirations that are distinct from mainstream groups in national societies and are disadvantaged by traditional models of mitigation, adaptation, and development.[10]

The GCF IP Operational Guidelines provide guidance on the application of the Indigenous Peoples Policy that forms part of the Green Climate Fund's environmental and social management system.[11]

The impacts of climate change affect women and men differently. Women are the hardest hit by dramatic shifts in climatic conditions. Women tend to rely more on natural resources for their livelihood. The Governing Instrument for the GCF vests GCF with a clear mandate to enhance a gender-sensitive approach in its processes and operations. The Governing Instrument recognizes the importance of gender considerations in terms of impact and access to climate funding. The Gender Policy of the GCF (hereinafter "Gender Policy") expresses

[10] https://www.greenclimate.fund/document/indigenous-peoples-policy
[11] https://www.greenclimate.fund/document/operational-guidelines-indigenous-peoples-policy

the commitment of GCF to promote gender equality within the Secretariat, across its investment criteria, and as an integrated measure of the social dividends of the overall portfolio.[12]

Barriers and enablers to paradigm shift in terrestrial and freshwater ecosystem management can be found in Table 3 and Table 4.

Table 3: Selected barriers to paradigm shift in terrestrial and freshwater ecosystems management

Barrier	Description
Status quo prevents innovation	Status quo can prevent the identification of long-term benefits by perceiving short term benefits as more valuable. This situation creates risk aversion and thus becomes a barrier to change. Absence of markets and financial mechanisms to properly value nature, ecosystem services, cultural values, and other externalities.
High upfront costs and elevated investment risk	High upfront costs of maintenance and restoration of ecosystem services versus lower costs of 'business-as-usual' activities, because valuation is based on short-term costs and benefits, ignoring the true cost of all externalities (e.g., emissions, loss of ecosystem services). Protection and restoration actions are subject to environmental, social, gender, political, technical, and economic risks and uncertainties, which may be perceived as higher than for other types of investments. Uncertainty over implementation of new or untested financing mechanisms. Particularly should market and environmental interests fail to align, or when private sector funding diminishes or becomes unavailable, as could have happened with the Covid-19 pandemic.
Overuse of expert-driven processes	Overuse of expert-driven processes can result in the imposition of pre-conceived ideas, instead of relying on genuine participation in stakeholder processes with due consideration to gender issues, and the use of traditional knowledge, thus undermining the legitimacy and applicability of outcomes.
Perceived conflicts	Competing interests of different stakeholders (e.g., socio-environmental conflicts at inter-community level and disagreements at the intergovernmental level).
Weak or non-existent land tenure	Local communities, including Indigenous Peoples, will have greater capacity to receive benefits from investments if land rights are recognized, and enforceable by legal means. There are an increasing number of countries putting legal frameworks in place for Indigenous Peoples lands, but legal recognition of collective land and access rights allowing communities to attract investment is still mostly absent.
Gender inequality	Laws, governance structures and traditional decision-making structures often either exclude or discriminate against women. In many regions discriminatory customary laws and norms reduce women's capacity in supporting the sustainable use of land resources (IPCC 2019a).
Lack or incomplete knowledge and learning	Lack or incomplete knowledge regarding the state of degraded ecosystems and inventories present a barrier to implementation and investment and creates lack of confidence that ecosystem-based solutions will achieve desired outcomes. Lack of flexibility and progress evaluation hinders learning and feedback loops and results in lack of knowledge sharing.
Generic indicators and accounting methods	Lack of common indicators for monitoring progress across different ecosystem types, including lack of robust carbon accounting methods for different ecosystem types.

[12] https://www.greenclimate.fund/document/gender-policy

Barrier	Description
	Lack of common monitoring/evaluation frameworks for a wide variety of ecosystems across the world. Generic and imprecise methods to properly value ecosystem services.

Table 4: Paradigm shift for ecosystem-based management of terrestrial and freshwater ecosystems

Outcome	Possible actions and transformational potential
Transformational planning and programming	• Securing land tenure and strengthening land registry systems for Indigenous Peoples and local communities, and other land ecosystems with uncertain ownership. • Multi-level and multi-sectoral governance and coordination (e.g. through multistakeholder platforms (MSP) to bring together diverse stakeholders. MSPs may produce more effective and sustainable outcomes by coordinating and aligning divergent views through discussion, negotiation, and planning (Sarmiento Barletti and Larson 2019). • Gender- and youth-inclusive approaches increase gender equality, and support diversified and more sustainable ecosystem management, and make better use of traditional knowledge (IPCC 2019a). • Ecosystem-based solutions improve NDCs or projects by ecosystem type and geography using conditionality to increase support and ambition (Beasley et al. 2019). • Support land use planning, economic-ecological zoning, and other planning tools to enhance connectivity in landscapes (see Case Studies, Section 0). • Enhance information for insurance premiums to reflect risks associated with ecosystem loss (e.g., agriculture in flood plains, loss of riparian ecosystems) • Promote "building with nature" planning.
Catalysing climate innovation	• Pilot, test, and evaluate new methods for valuing and incorporating ecosystem services in national accounts. • Developing new markets and transforming existing ones for protecting carbon stocks in ecosystems under threat. • Piloting the use of culturally appropriate and country-/site-specific indicators (Spangenberg 2009) to increase ownership and commitment. • Piloting ecosystem-based adaptation practices that identify synergies with mitigation to foster higher carbon and non-carbon benefits. • Piloting untested new schemes where ecosystem approaches can replace or complement traditional infrastructure, particularly in flood control (wetlands), and disaster prevention (protection of soil-retention ecosystems). • Developing technology-based traceability systems for ecosystem services maintenance and provision (e.g., water regulation) in PES schemes. • Testing block-chain and other technologies for traceability of certification for commodities in ecosystem and climate-friendly crops. • Pilot the development of bio-businesses based on non-timber forest products' sustainable management and harvesting.
Mobilisation of finance at scale	• Piloting green bond issuance that uses new certification standards for land conservation and restoration, and water infrastructure (e.g., wetlands and watersheds) to attract institutional investors. • Debt-for-climate swaps and debt-for-nature swaps can overcome fiscal constraints and contribute to debt sustainability, especially in Small Island Developing States (SIDS). • Low-interest lending and risk guarantees for climate change adaptation and mitigation activities provide proof of concept funding opportunities that can be replicated with fewer concessional loans as new markets develop. • Blended finance to help de-risking project investments. • Community-based financing methods such as beneficiary in-cash and in-kind contributions, small grant funds, and revolving concessional loan funds can expand access to climate finance for vulnerable and rural populations and help to ensure tenure rights and sustainable use of ecosystems.

Outcome	Possible actions and transformational potential

	• Cash transfer schemes to reduce pressure on natural ecosystems (Ferraro and Simorangkir, 2020).
	• Support for "bottom of the pyramid" micro, small and medium enterprises, including start-ups, business incubators and accelerators, technical assistance, and concessional lending for investments with adaptation benefits can enable EbA.
	• Standardised climate finance accounting for ecosystem-based approaches, such as climate budget tagging, increases visibility of domestic/private finance.
	• Public-private partnerships can develop and pilot new scalable ecosystem-based financing concepts.
	• Upscaled PES schemes that incorporate lessons from earlier experiences (strengthened governance, better benefit sharing, adapting payment levels to local conditions, addressing trade-offs, results-oriented monitoring, local data availability). PES schemes can also emphasise "stacking" of ecosystem services (e.g., water, biodiversity, carbon) to ensures a multiplicity of benefits are recognised, valued, and monitored).
	• Infrastructure investments that protect and enhance natural ecosystems (Thiele et al. 2020).
	• Financing watershed conservation through fees in water utility bills.
	• Financing ecosystem conservation, restoration, and management, with high recreational value.
	• In particular, investments from ***private sector*** in sustainable ecosystem management could be incentivised through:
	  o Incentives for landscape-level land uses that enhance ecosystem services. Providing concessional financing for compatible land uses (e.g., ecotourism concessions where its business case relies on ecosystem protection).
	  o Using market-pull forces through certification schemes for ecosystem-friendly activities (ecosystem-friendly agricultural production, certified tourism operations).
	  o Financing the establishment and protection of ecological corridors that connect compatible land uses with landscape-level ecosystem maintenance.
	  o Partnerships with private business that rely or benefit from ecosystem conservation, including extractive industries aligned with ecosystem conservation.
	• Pilot hybrid financial products such as repayable grants, forgivable loans, convertible grants, revenue sharing agreements.

Expansion and replication of knowledge	• Participatory monitoring, evaluation and learning, based on a context-specific theory of change can ensure that a desired shift is taking place in complex change dimensions such as governance, participation, voice, and empowerment (Hallegatte and Engle 2019). • Capacity building in technical skills and approaches in natural resource management, ecosystem-based adaptation, traditional knowledge, green infrastructure maintenance, financial and project management, and participatory monitoring and evaluation. This is of particular relevance given the high rotation seen in many organisations and the need to ensure vertical integration and knowledge flow. • Efforts to reconcile national GHG accounting with nested jurisdictional approaches with potential to generate greater synergies between private sector supply chain incentives and regional policy drivers of change. • Harmonised monitoring and assessment approaches to reduce error and misalignment of different assessments (IPCC 2019a). • Involving companies in shared (hybrid) data governance facilitates for implementation of ambitious commitments. • Establishment of data centres for ecosystem services identification, valuation, disaggregation by gender and social groups, and accounting. • Support for enhanced valuation and internalisation methodologies for ecosystem services. • Support for platforms for exchange of information and experiences related to EES, in particular for fostering south-south exchange and collaboration. • Supporting incubation and acceleration of start-ups, early-stage ventures and SMEs relying on natural capital for their business models.

3.2.2 Pathway 2: ecosystem-based management of coastal and marine ecosystems.

Vision. In ecosystem-based management in coastal and marine ecosystems, the paradigm shift integrates protection (including through protected areas), restoration, and management of coastal and marine ecosystems into mitigation planning, adaptation planning, and infrastructure development. Planning and policy making about coastal and marine ecosystem management historically has been second to terrestrial systems. In addition to some of the same barriers to sustainable terrestrial systems management listed above, there are also additional barriers specific to coastal and marine ecosystems.

Barriers and enablers to paradigm shift in coastal zone management can be found in Table 5 and Table 6.

Table 5: Selected barriers to paradigm shift in ecosystem-based management in coastal and marine ecosystems

Barrier	Description
Targets and valuation	Lack of quantified targets for marine restoration or the capturing of the benefits of these ecosystems in terms of carbon sequestration and storage.
Relative high opportunity costs in relation to value of perceived benefits of ecosystem conversion	Coastal areas have very high development values because of the desirability of coastal locations for urban expansion and recreational sites.
Insufficient data and evidence of synergistic outcomes	Lack of site-specific understanding of the pressure on coastal ecosystems. Lack of evidence to demonstrate how ecology and infrastructure interact or can interact (flooding and walls, wetland and roads, and so on) to achieve synergistic outcomes.
Lack of experience, standards, and examples	These gaps lead to an institutional emphasis in favour of conventional 'grey' infrastructure. Failure to recognise or underestimate the long-term maintenance of grey infrastructure, in comparison to building with nature.
Social acceptance	Lack of confidence within the public at large and the finance community that ecosystem-based solutions will provide predicted protection and ecosystem benefits. Established confidence that 'grey infrastructure' will deliver required benefits. Many coastal ecosystems such as mangroves, have traditionally been considered unsanitary and undesirable, and perceived as mosquito breeding grounds.
Inadequate marine conservation finance and implementation	The size, duration and diversity of revenue streams is insufficient for marine conservation initiatives, which remain chronically underfunded. This is prevalent across climate-related finance where coastal and marine finance is less well developed when compared with terrestrial projects. Coverage of marine protected areas is significantly lower when compared with terrestrial ecosystems.
Lack of institutional models	Lack of institutional models and arrangements capable of channelling finance to stakeholders and a lack of partnership models for delivering multistakeholder projects and programmes.
Lack of accurate globally accepted accounting methods	Without accurate accounting methods for coastal carbon stocks accepted by all stakeholders, it is difficult to effectively incorporate carbon into policy, regulatory, and finance mechanisms. Generic and imprecise methods to properly value coastal and marine ecosystem services.
Incomplete knowledge	Knowledge regarding the state of coastal and marine ecosystems and inventories is incomplete in many countries. Lack of agreed scientific approaches may have deviated investment opportunities (e.g., conservation of coral reefs).

Table 6: Possible actions to support paradigm shift for ecosystem-based management in coastal and marine ecosystems

Outcomes	Possible actions and transformational potential

Transformational planning and programming	• Public policies, regulatory frameworks, and incentive mechanisms to promote ecologically appropriate infrastructure investments. These can benefit from proper valuation of ecosystem services.
	• Policy recognition and science-policy bridge of:
	  o mitigation benefits of coastal and marine ecosystems.
	  o carbon from coastal and marine ecosystems better recognized in carbon markets and integration of coastal and marine ecosystems into national GHG inventories and NDCs.
	  o social benefits arising from the protection of coastal and marine ecosystems and link to UN Sustainable Development Goals, including expanded recognition of local stewardship and designation of collectively managed marine protected areas.
	• Provide social safeguards that protect local communities through free prior informed consent (FPIC) when appropriate.
	• Integrating seagrass management into coastal and estuary management and protection to provide multiple benefits (biodiversity conservation and biomass harvesting) (see Section 0, review study seagrass management).
	• Creating an enabling environment for EbA approaches in coastal and marine ecosystems through contribution of results and lessons learned from projects into national planning for adaptation (see Section 5.1 BAF case study).
	• Coastal zone mapping and management to better direct conservation efforts.
	• Enhance information for insurance premiums to reflect risks associated with ecosystem loss (e.g., mangrove transformation for coastal development).
	• Promote “building with nature” planning.

Catalysing climate innovation	• Piloting innovative schemes to remove harmful subsidies to disincentivise ‘grey infrastructure’ (human-engineered hydrological infrastructure) or ecosystem degradation and involving the insurance industry when appropriate. • Pilot and test new schemes of ecosystem-based infrastructure and integration of green-grey approaches. Piloting schemes where coastal ecosystem approaches can replace or complement traditional infrastructure, particularly in erosion control (mangrove protection), and disaster prevention (coastal wetland conservation). • Develop and test new incentives for sustainable seaweed farming, especially in enhancing the market-share in traditionally highly carbon intensive products, such as food, feed, fertilisers, and biofuels. • Develop and pilot co-management leases for marine protected areas with revenue models, leveraged by blended finance and empowered local communities. • Deployment of technological solutions to develop ecological adaptation interventions to rehabilitate degraded ecosystems, particularly coral reefs.
Mobilisation of finance at scale	• Catalyse increases in national financial resources through blue bond issuance, debt swaps, and payments for ecosystem services. • Design blue investment models that involve the private sector and combine revenues from ecosystem services using both emerging and established markets. • Develop domestic institutional capacity to request and manage large-scale funding, including through dedicated trust funds. • Securing patient capital and/or concessional finance to bring forward benefits and delay costs for projects with a long lifespan. • Develop blended finance and other investment models not traditionally utilised in the financing of blue carbon projects, including insurance and debt swaps. • Encourage multistakeholder partnerships to develop and pilot scalable funding models that deploy innovative finance. • Revenue generating activities linked to novel value chains including product and service entry to niche and specialised markets. • Deployment of blue natural capital accounting to measure and value the natural assets and flow of ecosystem services within the coastal zone. • Incentives to private sector intervention and barrier removal. • Enhanced use of market-pull forces through certification schemes that reward coastal and marine ecosystem conservation, restoration, and sustainable management of fisheries.

Outcomes	Possible actions and transformational potential
	• De-risking cold chain investments for the supply of quality traceable sustainable seafood to markets (e.g., FP001). • De-risking building with nature coastal development schemes through insurance, equity investments, or co-financing.
Expansion and replication of knowledge	• Development of methods and tools for diverse environmental and social impact monitoring (trace impact; synergies between resilience and infrastructure, livelihoods, habitat protection) and early warning systems. • Quantifying actual/potential uptake and storage of carbon in coastal and marine ecosystems. • Strong global, regional, and local communities of practice for replication of experiences and best practices across government, NGOs, regional platforms and research bodies (see Section 5.1, BAF case study). • Establishment of data centres for coastal and marine ecosystem services identification, valuation, and accounting. • Support for enhanced valuation methodologies for coastal and marine ecosystem services. • Support for platforms for exchange of information and experiences in coastal and marine EES. • Large-scale fisheries supporting incubation and acceleration programmes for start-ups, early-stage ventures and SMEs relying on marine and coastal-based natural capital for their business models (e.g., through circular and regenerative models).

3.3 Role of GCF in financing the paradigm shifting pathways

These key actions for each of the paradigm shifting pathways, across the four pillars of the GCF Strategic Plan 2020-2023 are summarised in Figure 6, followed by a detailed description of each driver. Results will be aggregated at the program level through the use of the indicators in the IRMF (GCF 2021).

Figure 6: Possible actions for each EES pathway following the four pillars of the GCF Strategic Plan

Sector		Actions across the drivers of the GCF Strategic Plan			
	Ecosystems and ecosystem services	**Transformational planning & programming**	**Catalysing climate Innovation**	**Mobilising finance at scale**	**Coalitions & knowledge to scale up success**
Paradigm shifting pathway	**Ecosystem-based management of terrestrial and freshwater ecosystems**	• Participatory multi-stakeholder processes and effective FPIC • Public policies, regulatory frameworks to promote green infrastructure investments • Land use and ecological-economic zoning to enhance ecological connectivity • Ecosystem-based solutions improving NDCs or projects by ecosystem type and geography • Insurance premiums linked to wildfires reflecting risks of ecosystem loss • Building with nature planning • Securing land tenure	• Pilot, test, and evaluate new methods for valuing and incorporating ecosystem services in national accounts • Develop technology-based traceability systems for ecosystem services maintenance and provision (e.g., water regulation) in PES schemes • Test block-chain and other technologies for traceability of certification for commodities in ecosystem and climate-friendly crops • Pilot the development of bio-businesses based on non-timber forest products' sustainable management and harvesting	• Next-generation green bonds • Debt-for-climate and nature swaps • Low-interest lending and guarantees • Blended finance for nature-based solutions • Community-based financing methods • Cash transfer schemes • Bottom of the pyramid micro-financing • Standardised climate accounting • Public-private financing • Upscaled PES schemes with strong M&E systems linked to water fees • Infrastructure investments to protect and enhance ecosystems • High recreational value investment • Private incentives and partnerships in ecosystem management	• Participatory monitoring, evaluation and learning • Reconciliation GHG accounting and nested jurisdictional approaches • Harmonised monitoring and assessment • Involving companies in shared (hybrid) data governance (e.g. enhanced hydro-met services) • Data centres for ecosystems • Enhanced ES valuation and internalisation methodologies • Exchange platforms, in particular, south-south • Incubation and acceleration of start-ups and early-stage ventures
	Ecosystem-based management of coastal and marine environments	• Policies, regulation, and incentives for blue infrastructure • Policy recognition of mitigation co-benefits in climate resilience efforts • Social safeguards and FPIC • Enabling environment for EbA in coastal and marine areas • Improved coastal zone mapping (e.g. ridge to reef approach) • Insurance premiums linked to extreme events reflecting risks associated with mangrove / coral reef loss	• Develop and test new incentives for sustainable seaweed farming, especially in enhancing the market-share in traditionally highly carbon intensive products, such as food, feed, fertilizers, and biofuels • Pilot and test new schemes of ecosystem-based infrastructure and integration of green-grey approaches. Pilot schemes where coastal ecosystem approaches can replace or complement traditional infrastructure, particularly in erosion control and disaster prevention	• Enhanced national financing through blue bonds, debt swaps, and PES schemes in coastal areas • Private blue investment with both emerging and established markets • Increase domestic institutional capacity for large-scale funding • Securing finance to bring forward benefits and delay costs • Blended finance for blue carbon • Multi-stakeholder partnerships for innovative finance • Novel value chains in niche markets (e.g. fisheries, circular economy to reduce sea pollution) • Barrier removal for private sector • Enhanced certification / de-risking building with nature	• Diverse environmental and social impact monitoring • Quantification of ecosystem services per service type • Communities of practice for replication • Data centres for biodiversity accounting • Enhanced ES valuation methodologies • Platforms for information exchange • Large-scale incubation and acceleration programmes with ecosystems-based management approach

Transformational planning and programming: GCF supports developing countries to create integrated climate and sustainable development strategies and policies. This fosters an environment conducive to green and blue, resilient investment, including climate compatible *processes* for planning and policy frameworks, ensuring transparency, access to information, participation, equity, and sustainability, which guides and brings *legitimacy* to processes and decision-making.

In the EES result area, this pillar sets the foundation for long-term planning and programming that goes beyond business as usual. It incorporates managing ecosystems and maintaining ecosystem services into planning frameworks as legitimate goals in themselves and internalises them within the long-term vision of policies, institutions, communities, and other stakeholders. A key action to achieve this is securing land tenure and protecting the rights of local stakeholders that have weak capacity to enforce land tenure, with emphasis on Indigenous Peoples and women, and local communities. Similarly, strengthening collective land governance through, and include the right to free, prior, and informed consent when applicable or appropriate. Another key aspect is implementing participatory multistakeholder processes for dialogue and decision making. Multistakeholder platforms (MSP) adopting gender- and youth-inclusive approaches achieve this most effectively by coordinating and aligning divergent views through discussion, negotiation, and planning. Gender responsive approaches that ensure the participation of women as well as an increase in their capacity, skill and empowerment levels are critical for enhanced and more sustainable ecosystem management. Changes in norms and practices that hinder the full engagement and benefit of women from EES should be addressed. Inter-institutional coordination of land and sea use, spatial planning and NDCs can contextualise projects to ecosystem type and geography for multiple objectives, such as the promotion of area-based fishery rights management, controlling illegal fisheries, and managing coastal estuaries for biodiversity and carbon values.

Other approaches include incorporating ecosystem services into land use planning and marine spatial planning and supporting an insurance industry that disincentivises occupying ecosystems and the loss of ecosystem services (e.g., higher premiums for settlements or agricultural areas in flood plains). Finally, "building with nature" approaches in terrestrial and coastal ecosystems can take advantage of ecosystem services while conserving ecosystems.

Catalyzing climate innovation: GCF encourages innovation in policy, institutions, business, technology, and finance through enabling policy and institutional environments. This generates innovative policies, business models, and land and ecosystem management that harness multiple benefits for climate solutions.

A key climate innovative approach is to develop and pilot new approaches to properly value ecosystem services so they can be recognised in decision-making processes, including in national accounts. Currently, most services are considered free and therefore their contribution to society is not properly assessed, and their loss is not recognised. Closely linked to this is developing and transforming new markets that recognise and value ecosystem services. Removing subsidies that encourage ecosystem degradation is a complementary and long overdue action. Although some progress has been achieved through certification schemes, there are opportunities for further innovation, piloting, and testing.

There are untapped opportunities for innovation to use technology (e.g., blockchain) to de-risk value chains ensuring supply of quality traceable sustainable products such as seafood and timber. Complementary measures include understanding the "quality" of ecosystem condition (ecosystem health) to increase stability and resilience, significantly reduce investment risk in climate mitigation activities, and enhance adaptation. Innovative approaches to reducing private sector financial risks can be validated in areas such as sustainable tourism management – this attracts investment in protecting natural areas and enhancing their effective management. Finally, a critical innovation is to test the effectiveness and financial costs of ecologically appropriate infrastructure as emerging alternatives to grey engineering; and to work on green-grey approaches evidencing the right performance mix.

Mobilisation of finance at scale: GCF fosters upscaling successful climate investments through mechanisms such as blended finance to de-risk investments, as well as through strengthening domestic capital markets and climate financing institutions. Using a range of financial instruments to reduce risks and barriers to investment in EES, countries can unlock national and local capital (*resources*) and deepen access to commercial or "niche"

markets relevant to sustainable use of ecosystems. Mobilisation of finance at scale requires innovation and demonstration.

Opportunities are sought with the private sector, emphasizing barrier removal for activities with high impact potential to conserve, restore and sustainably manage ecosystems and maintain ecosystem services. Areas of opportunity for investment include: nature-based funds aimed at leveraging conservation to drive performance; green and blue bonds aiming to raise capital to finance activities earmarked for the green economy; natural infrastructure through incentives from risk finance providers and insurers; carbon markets with new types of credit that can bundle climate adaptation benefits with carbon credits for corporate buyers; next-generation, innovative schemes for payments for ecosystem services (PES); and a portfolio of scalable financially viable ecosystem-based approaches possible by realigning private, corporate foundations and philanthropy.

Currently, public international funding flowing to NBS is still relatively small, accounting for only USD 3.8-8.7 billion, or approximately 0.6-1.4%, of total climate finance flows and 1.5-3.4% of public climate finance flows, in 2018 (Swann et al. 2021).

Payments for Ecosystem Services (PES) approaches, debt-for-climate and nature swaps, revolving funds and incubators for conservation finance, green and blue bond issuance using best practice certification standards, parametric insurance, trust funds, patient capital, blended finance to de-risk private finance, financial services for nature-based SMEs, and community-based financing, all have a role to play. New opportunities through REDD+ are covered in the FLU Guide, including those emerging from recent discussions under the UNFCCC and beyond suggesting that many stakeholders envision the longer-term future of Results-based Payments (RBPs) including the role of carbon credits. This was also illustrated at COP26 in Glasgow where parties further defined the terms of Article 6 of the Paris Agreement.

Careful design can incorporate lessons from earlier PES projects by adapting payment levels to local conditions, addressing trade-offs, result-oriented monitoring, and considering local data availability. Efforts towards “stacking” ecosystem services (e.g., water, biodiversity, carbon) can ensure that multiple benefits are recognised, valued, realised, and monitored. Finally, private sector investment in sustainable ecosystem management could be encouraged through: incentives for land use that enhances ecosystem services at the landscape level (concessional financing); certification schemes for ecosystem-friendly activities (market-pull); financing landscape-level ecosystem maintenance by establishing and protecting ecological corridors; revenue generating activities linked to novel value chains including product and service entry to niche and specialised markets.

Coalitions and knowledge to scale up success: GCF creates and shares knowledge to harmonise valuation methodologies and incorporate climate risks into every single financial decision to align finance with sustainable development. Resources needed to shift finance flows include strengthened institutional and individual capacity, and available and accessible information (data and best practices). By sharing lessons, traditional knowledge, scientific advances, and standards, global finance can flow into transformational projects and programmes that contribute to low emissions and climate resilient development

Expanding and replicating knowledge for transformational change in the EES result area requires developing and enhancing specific platforms, methods, and approaches to generate, replicate, and share knowledge regarding ecosystems and ecosystems services for climate benefit. Ultimately, this fourth pillar will be the amalgam required to ensure paradigm shift in the sector.

Evidence-based decision-making and traditional knowledge systems are the basis for successful knowledge exchange platforms (including South-South exchange). Capacity building in technical skills and approaches in natural resource management, ecosystem-based adaptation, traditional knowledge, infrastructure maintenance, financial and project management, and participatory monitoring and evaluation can ensure project sustainability and replicability. When possible, these approaches can benefit from participatory monitoring, evaluation, and learning. Shared (hybrid private public) data governance is important to facilitate cross-sectoral commitments of all actors. Harmonised monitoring and assessment of national GHG accounting and jurisdictional approaches can reduce error and misalignment of different assessments and generate

greater synergies between private sector supply chain incentives and regional policy drivers of change. Monitoring carbon uptake and storage across all ecosystem types for both quantity and quality of carbon stocks can increase resilience of mitigation outcomes.

4 FINANCING PARADIGM SHIFTING PATHWAYS

What financing instruments and mechanisms are involved in EES paradigm shifts?

The role of the GCF in the EES result area can be sharpened through a combination of two important dimensions: country priorities, and GCF comparative advantage. Until now, ecosystem loss and the resulting ecosystem services loss has been the result of incomplete knowledge regarding the true value of ecosystem services coupled with a lack of sufficient resources to bridge the funding for nature gap. Therefore, GCF will finance paradigm shifting projects and programmes that unlock knowledge and awareness, fosters innovation, and leverages resources for sustainable results.

Therefore, GCF funding in project and programme proposals in the EES result area play a dual role: first, to provide financing unavailable from other sources that allows risk-taking, making such proposed interventions feasible; second, to allow for an expansion in the scope and scale of interventions to enable ecosystem-scale transformations, reaching a greater number of beneficiaries and facilitating an integrated, cross-sectoral approach. The approach should comprehensively address the diverse facets of climate change adaptation and resilience. GCF finance allows the adoption of cross-sectoral transformative pathways that address urgent climate hazards and mitigation opportunities at scale.

It is crucial to keep a mix of financial solutions for mechanisms in the EES result area. The different mechanisms can be combined to achieve improved ecosystems management, restoration, and conservation outcomes. There are different approaches that can be used to organise the available financial mechanisms for the EES result area. An integral approach is presented in the BIOFIN[13] framework, which uses the following categories of mechanisms: (i) revenue generating (e.g., biodiversity-related fees and charges); (ii) better delivery through improved efficiency (e.g., private protected areas and performance-based incentives); (iii) realigned expenditures towards nature positive flows (e.g., reform of harmful subsidies); and (iv) avoided future expenditures (e.g. reef insurance). Many geographies and industries, countries and companies have a wide range of experience designing and implementing nature conservation and ecosystems management-related financial mechanisms and instruments. The menu of options needs to remain open and care should be taken in selecting a solution based on extensive assessment to understand the needs of climate finance for ecosystems-based approaches.

Domestic public budgets are increasingly made available for ecosystems and ecosystem services under climate change objectives. GCF funding can help to leverage these funds, together with Accredited Entities (AEs) and National Designated Authorities (NDAs), in ways that are sensitive to the capacity, needs and existing financial structures at the national level. Countries can use a number of fiscal policies such as taxes, fees, tariffs, royalties, charges, and subsidies to generate revenue to support biodiversity conservation and/or to disincentivise behaviour that may negatively impact biodiversity and ecosystems.

Private sector engagement: This is key to scaling-up investment, with corporate social responsibility initiatives and Payment for Environmental Services schemes (PES; see also Table 8) being significant opportunities to engage the private sector in mitigation activities in developing countries. Whether used as a revenue generation or delivery mechanism, the value of PES schemes derives from the fact that they can be used to channel much needed funding to high-priority ecosystems and ecosystem services. Arrangements between private sector investors and developing countries could leverage investments or de-risk the investment of

[13] The Biodiversity Finance Initiative (BIOFIN) was created to direct countries on how they could finance their biodiversity goals using evidence-based frameworks.

private sector parties. One example is the collaboration of the Global Peatlands Initiative's members while aiming to reduce the carbon footprint of peat extracting industries. Barrier removal is critical for activities with high potential to conserve, restore and manage ecosystems and maintain or enhance ecosystem services.

Private sector finance for biodiversity is an area of very rapid growth. To facilitate the harmonization and understanding of many of these initiatives, the Finance for Biodiversity Pledge[14] presents a guide of such efforts involving investors, banks, insurers, and corporations. These efforts cover environment, social and governance (ESG), measurement and data, target setting, reporting and disclosure, positive impact, and public policy and advocacy.

GCF projects and programmes seek to incorporate co-financing where possible, although there is no minimum amount of co-financing required. In the EES result area, nearly all projects have sources of co-financing, and GCF contributions commonly comprise an average of 65% of total project budgets.

Blended finance, which is the strategic use of public or philanthropic funds to mobilise additional private commercial finance for development-related investment; can attract co-finance. Blended finance can create opportunities to scale up finance for ecosystems and ecosystem services, because it can help lift the apprehension that many impact investors still have for investments in the sector. The development of blended finance structures, through de-risking and aggregation, could stimulate the emergence of opportunities to finance landscape initiatives, within the context of achieving the climate goals.

The different co-financing tools can apply equally effectively to ecosystem protection and restoration, and to different types of ecosystems. In the EES result area, co-financing may be characterised as follows:

- Development funds, using loans, guarantees, equity, and other tools, can help share risks and be used to cover first losses. Using development funds for co-finance can make investors feel more at ease with new investment types such as EES, given development funds' better understanding of landscape issues. Development funds come from public and philanthropic investors, who expect to receive a "lower financial return commensurate with impact value delivered instead." Among these investors are the Danish Investment Fund for Developing Countries (IFU), the Dutch Development Bank (FMO) and FinnFund, which contribute through equity investments or provide technical support to the investees.
- Impact funds can bring together public and private finance in a way that facilitates investment, generating positive social and environmental impact along with financial returns. For example, the Sustainable Commodities Conservation Mechanism (SCCM[7]) of Lestari Capital addresses the need for long-term approaches to conservation finance through collaboration with the financial, commodity, and climate economy sectors. The SCCM channels finance to a growing community of ecosystem restoration and conservation projects that deliver impact for a minimum of 25 years.
- In the context of marine ecosystems, new blended finance solutions integrating Blue Natural Capital can play a critical role in the transition from infrastructure investments in sectors with unclear or negative impacts on nature ('grey finance') towards infrastructure investments that protect and enhance natural ecosystems in coastal and marine areas ('blue finance') (Thiele et al. 2020). This can be achieved through the provision of transport, clean water and energy and flood and erosion control. Such solutions can help de-risk ecologically appropriate infrastructure investments, while specifically attracting a suite of private actors, including impact investors.

4.1 Complementarity and coherence

The GCF seeks to drive cooperation between financing mechanisms to help countries navigate the climate finance landscape (GCF 2020). To enhance complementarity, non-monetised benefits, and costs of investments in actions related to ecosystems and ecosystem services need to be better accounted for, so that the full net benefits can be evaluated. Natural Capital Accounting (NCA) and Ecosystem Accounting (EA) can provide a systematic way to measure and report on stocks and flows of natural capital, so that ecosystems and

[14] https://www.financeforbiodiversity.org/

ecosystem services can be better integrated into project and programme proposals and valuations. NCA covers accounting for individual environmental assets or resources (e.g., such as water, minerals, energy, timber, fish), and ecosystem assets (e.g. forests; wetlands), biodiversity and ecosystem services. There are three common approaches to NCA:

- Extend commonly used frameworks, such as the System of National Accounts (SNA), to include more environmental impacts, but still follow SNA conventions
- Develop a separate set of NCA that complements the current SNA
- Develop a full range of social welfare accounts, which includes environmental services (Badura et al. 2017). For example, guidelines are available for implementing NCA at the project level in the context of forest certification (e.g., FSC Ecosystem Services Procedure) that help projects claim the generation of ecosystem services.

'Financing coherence' considers the relationship between national and subnational level actors in each country. GCF and other key players could further engage at domestic and regional levels, particularly to promote the increasing attention towards jurisdictional approaches in the EES area. Some countries have created impact investment vehicles to enhance the nation/region's ability to synergise across funds and build confidence for donors that funds are going to be internally managed in a consistent and coordinated way. These vehicles have varying degrees of capacity, maturity, and legitimacy within the domestic legal and institutional context. An example is the Environment Fund Management Body Indonesia (EFMBI) initiated by the Indonesian Government to manage domestic and foreign funds to assure effectiveness of activities to protect the environment and EES and share benefits equitably. To leverage these funds, GCF, NDAs, AEs and project and programme proponents at large, need to be sensitive to the capacity, needs and existing financial structures in partner countries. Complex and varied funding procedures are causing underspending. As an example, GCF, NDAs and AEs could contribute by helping reconcile global development goals with local development goals. This can be done through the strengthening of local development institutions and local organisations, increased participation to local forums by global players, and the development of guidance rather than microlevel objectives.

Of special importance is the complementarity with other international financing sources, in particular the GEF and other climate funds. Some of these opportunities are explored in the recent document "Long-Term Vision on Complementarity and Coherence collaboration between the Green Climate Fund (GCF) and the Global Environment Facility (GEF)"[15] issued jointly. In this document, the new vision aims to build on the Pilot Coordinated Engagement exercise the GCF and GEF have been carrying out since 2018, and further define specific areas of cooperation, where complementarity of action might be most efficient and effective, and possible modalities to generate long-lasting outcomes and outputs in climate change adaptation and mitigation. There has also been a joint statement of collaboration by the Secretariats of the AF, CIF, GEF, GCF on Enhanced Complementarity and Collaboration, issued in November 2021[16], and a GCF publication on complementarity and coherence with other climate funds also published in 2021.

4.2 Financial barriers

In section 2 we discussed barriers to paradigm shift in ecosystem-based management of terrestrial, freshwater, and marine ecosystems. These include, among others, perceptions on costs and investment risk, large uncertainties in ecosystem valuation and target setting, and a lack of development models, capacities, and assessment methods. The most common barrier in GCF projects submitted to the EES result area, however, are financial barriers, cited by over 80% of approved projects. These are listed in Table 7. To achieve a paradigm shift in the EES area the financial resources provided by the GCF should be targeted at addressing these barriers.

[15] https://www.greenclimate.fund/document/towards-long-term-vision-complementarity-gef-and-gcf-collaboration
[16] https://www.climateinvestmentfunds.org/news/joint-statement-secretariats-af-cif-gef-gcf-enhanced-complementarity-and-collaboration

These financial barriers may relate to limitations in the use of fiscal policies such as taxes, fees, tariffs, royalties, charges, and subsidies to generate revenue to support NBS; the insufficiency of validated financial models and structures for NBS deriving in adaptation and mitigation impact; or the inability to evidence and capture positive impacts of restoring, sustainably managing and conserving ecosystems in financial systems.

If these barriers are overcome, there is considerable untapped potential to reach "bottom-of-the-pyramid" micro-, small- and medium enterprises (MSMEs) and communities through small grant funds, grant-supported business incubation and early-stage project development, and the greater deployment of revolving loan funds. The rapidly expanding market in green and blue bonds can offer investment at scale and includes new certification standards for land conservation and restoration, and water related infrastructure (e.g., wetlands and watersheds). Debt-for-climate swaps (especially in SIDS) could achieve significant co-benefits in terms of debt sustainability. For attracting private sector finance, natural capital disclosure can improve the investment profile of companies, while GCF funding can address the risks from riskier new markets such as PES, should market and environmental interests fail to align.

Table 7: Key financial barriers for EES

Barriers Identified	Description
Limited financial returns	Further exacerbated by high upfront costs and the long holding period required for many projects (25% of GCF EES projects discussed this as a barrier)
Increased costs when considering future adaptation needs and climate risks	May result in reliance on solutions that are not sustainable over the long-term. Financing adaptation components of a project can be difficult as the economic benefits can be hard to quantify (28%)
Lack of national financial resources to address problems that require heavy investment over long periods of time	May result in projects not meeting best practices, not being tailored to specific sites appropriately or not able to be completed, resulting in loss of faith from donors. Accreditation scope of AEs, existing debt, or the disconnect between private and national budgetary cycles may limit the ability to borrow (43%)
Insufficient financial capacity to manage loans or reimbursable grant finance	Additional finance may also be required to cover legal costs. Lack of institutional capacity to access international financing (28%)
Limited incentives	Including limited understanding of the economic value of functional ecosystems; small evidence base to motivate increased investment. This applies across government, private sector, and local communities (45%)
Lack of equity/development capital	Including few assets or collateral in local communities to engage in projects and therefore derive benefits Low purchasing power of rural communities and lack of access to markets; unaffordable insurance; lack of investment resources within communities to implement adaptation measures (53%)

4.3 GCF portfolio and financing structures

A key role for the GCF in financing projects and programmes in the EES result area is de-risking, given the current lack of investor confidence in natural climate solutions. Stacking of ecosystem services is one form of de-risking, by increasing the resiliency of projects and programmes and the people and communities that depend on them, and diversifying income streams. De-risking future investments will require to clarify and secure land tenure in many instances.

Grants are the principal form of GCF financing in the EES result area; most project proponents to date (85%, or 35 projects, as of June 2020) requested grants as their only source of GCF funding. However, a range of other promising financing options exist for the EES result area, including through the expanded use of the GCF financial instruments.

Financial instruments in the EES result area may be characterised according to their transformational potential aiming at sustainability beyond project-based grants and concessional loans. The taxonomy of financial instruments is overlapping and non-exclusive, with programmes often using a variety of different instruments to achieve their goal.

Table 8: Taxonomy of financial instruments in the EES result area

Instrument	Definition	GCF role[17]	Transformational (paradigm shifting) Potential	Examples
Grants	Non-reimbursable financial award offered in "major convertible currencies" to support projects and programmes, including sub-grant facilities. Grants with repayment contingency (output-based grants) can also be provided to the private sector (Decision B.09/04).	Grants can be supplied for projects and/or (policy-based) programmes, including for: conservation trust funds, tenure resolution, community level sub-grants, and incubators for conservation finance. Funded activities include technical assistance, studies, capacity building, participatory planning, and support for policy development. Micro to medium scale.	Significant potential to meet various transformational objectives, including improved governance (e.g., funding establishment of multistakeholder platforms, securing land tenure) and capacity building (e.g., creation of knowledge hubs, training community associations in financial and project management). GCF could reach community organisations, MSMEs and "bottom of the pyramid" organisations (GCF 2019) through dedicated facilities for small grants, plus grant (alongside equity) support for business incubation facilities. Grants provide essential financing for preservation or restoration of underlying ecosystems or securing of rights pertaining to their use (land tenure, conservation easements) in cases where little potential exists for investment returns, or investment risks are perceived as very high.	Funbio, Tenure Facility, GEF Small Grants Program, CFA Incubator for Conservation Finance, Indigenous Peoples' Assistance Facility (IFAD), NESsT providing grants and patient capital to MSMEs Results and performance-based finance
Loans	Concessional (below market rate) lending to support projects and programmes, including credit facilities, covering activities for which finance on market terms is unavailable or would not be financially sustainable.	High and low concessional project and/or (policy-based) loans are already offered with a long tenure. GCF could further emphasise loan facilities over project-based lending. It can also take on subordinated (junior) debt, (the riskiest loan tranches), in order to catalyse private investors by reducing their risk exposure. Micro to large scale.	A core instrument for EES infrastructure investments and blended finance. Can mobilise finance at scale, although more can be done to move beyond project-based finance. Credit facilities (raising money through bond issues to provide loans for EES) could unlock significant private capital. At smaller and micro scale, loans providing working capital to MSMEs could enhance supply chain sustainability. As part of enhanced direct access, revolving loan funds can be efficient means to achieve financial inclusion of community enterprises. Relevant to financing all types of ecosystem-based management of terrestrial and freshwater. ecosystems, and ecosystem-based management in coastal ecosystems.	CABEI Support Programme for Biodiversity Friendly MSMEs Tropical Landscape Finance Facility Sustainable India Finance Facility Conservation International Ventures

[17] The scale of supported projects uses GCF project size categories: Micro: <USD 10m; Small: USD 10-50m; Medium: USD 50-250m; Large: >USD 250m. See Annex I to decision B.08/02

Instrument	Definition	GCF role[17]	Transformational (paradigm shifting) Potential	Examples
Guarantees	Guarantees promise that if assets lose value and/or a borrower defaults on payments, the guarantor repays some or all of the losses – a form of credit enhancement that lowers the risk of investment.	Issue partial (first loss) risk guarantees backing loans and bond issuance, including debt-for-climate swaps. Small to large scale.[18]	Guarantees catalyse finance by reducing the level of risk taken on by public or private investors. MDBs have overwhelmingly targeted guarantees towards "middle income" economies since they work to de-risk investments in otherwise fairly well-established capital markets. Can be used across whole range of EES, but greatest potential in relation to tropical forest and ocean conservation, and activities that overlap with sustainable agriculture and water infrastructure.	Althelia/Mirova Sustainable Ocean Fund
Equity	Equity investments involve taking a partial ownership stake in projects or companies and are particularly relevant as a means of supporting higher risk investments. Equity can be directly invested in individual companies or via investment funds that take a stake in various companies, helping to pool risks.	Anchor investor in equity funds, often in combination with other instruments (grants for technical assistance/market development, or and first loss guarantees). Micro to large scale.	Equity funds can catalyse investment by supporting social entrepreneurs and incubating early-stage businesses. Criteria for exclusions (related to safeguards) and transparency in sub-project approval processes helps to ensure stakeholder consultation and FPIC for Indigenous Peoples and local communities.	Ecosystem Investment Partners Althelia/Mirova Sustainable Ocean Fund Meloy Fund for Sustainable Community Fisheries
Payments for Ecosystem Services	PES schemes generate payments and fees for the implementation of land and coastal management practices intended to preserve ecosystems or provide ecosystem services.	Technical assistance to governments (and private sector) to implement and scale up PES. Micro to large scale.	Well-implemented Payment for watershed services schemes have been shown to improve water quality and contribute to rural development as well as increase climate resilience. Caution needed with top-down approaches that sometimes fail to channel resources to target communities. Difficulties include poor governance and a lack of institutional capacity (or local distrust of institutions). PES schemes focused on biodiversity protection pose additional challenges in accounting for benefits that are often indirect, while carbon sequestration accounting challenges are posed by the potential for leakage (displacement of harmful activities to adjacent areas) and permanence. Payments for watershed services are the most widely adopted schemes, although many marine and ecosystem PES schemes have also been undertaken. There are growing opportunities to design PES schemes considering the role of soil erosion, sedimentation, and control of contamination for private sector water users, water utilities and hydro energy company operations.	Cloud Forest Blue Energy Mechanism FONAFIFO, Costa Rica FP111 IDB Honduras: Promoting climate-resilient forest restoration and silviculture for the sustainability of water-related ecosystem services

[18] Guarantees are unlikely to be large-scale in their own right but are often used in conjunction with debt financing (loans or bonds) for large-scale projects and programmes.

Instrument	Definition	GCF role[17]	Transformational (paradigm shifting) Potential	Examples
Green bonds	Bonds are debt issued by public authorities or private companies to raise funds from capital markets (also privately. "Green" bonds seek to certify that proceeds are used for environmentally beneficial purposes base on voluntary standards. "Blue" bonds are a variant of green bonds that include support for ocean conservation.	Provide partial credit guarantees to de-risk bond issuance, or support capacity building for the creation of green bond facilities, as with existing readiness programme for "Caribbean Green Bond Listing on the Jamaica Stock Exchange". Also, the IDB Amazon Bioeconomy Programme (FP173[19]), which includes thematic bonds where the GCF resources will be used for structuring and issuing thematic (green and sustainable bonds). Small to large scale.	Green bonds can help overcome financial barriers to both public and private investment. Accredited multilateral development banks and private banks can issue green bonds at scale, with added value of GCF support likely focused on partial credit guarantees to de-risk issuance in new markets and sectors, including EES. GCF projects could adopt best practice bond certification standards (currently Climate Bonds Initiative) to ensure environmental integrity and transformative potential. Certification exists for land conservation and restoration, and (natural) water infrastructure, with further criteria for land use and fisheries under development. Policy guidance may be required for environmental and social standards (e.g., setting clear eligibility and reporting standards at the point of programme approval.	Netherlands Water Board Bank Water Bonds Seychelles Blue Bond Yangtze River Economic Belt Water Resources Protection, China Development Bank Althelia, owned by Mirova Natural Capital, launched a Sustainable Oceans Fund in early 2017 The Credit Suisse Rockefeller Ocean Engagement Fund IDB Amazon Bioeconomy Programme (GCF FP173)
Debt-for-climate and nature swaps	Debts purchased at discount rates are waived in exchange for new debt issued (partly or fully) in local currency, which is earmarked for ecosystem financing. Funds are deposited in an independently managed trust fund.	Provide technical assistance to design swaps (especially targeting SIDS). Risk guarantees could help reduce the cost of new or re-financed debt. GCF could directly purchase debt at a negotiated discount, which would be written down in exchange for local currency payments into a trust fund. Micro to medium scale. Seen as an opportunity for Covid-19 recovery efforts given rising debt burdens stressing	Possibility of significant co-benefits, including debt sustainability for SIDS and LDCs, if scaled up to incorporate programmatic not project-based approach. First generation swaps had uneven track record on governance, with top-down approaches sometimes excluding Indigenous Peoples and local stakeholders, and failures to ringfence proceeds. These problems can be addressed via multistakeholder platforms and use of independently administered trust funds. Can be used across whole range of EES.	Seychelles/Nature Conservancy Marine Conservation Debt Swap

[19] https://www.greenclimate.fund/project/fp173

Instrument	Definition	GCF role[17]	Transformational (paradigm shifting) Potential	Examples
		government balance sheets.		
Insurance and climate risk finance	Insurance products such as parametric insurance and risk pools help reduce risk of climate-related financial losses. Parametric insurance pays out a guaranteed amount against qualifying events (e.g., hurricanes) rather than indemnifying actual losses sustained. The direct role played by ecosystem-based adaptation (EbA) in disaster risk reduction should also be considered a form of climate risk management (IPCC 2012).	Provide initial grant finance (with repayment contingency) for an endowment fund, to fund EbA or restoration activities, as well as insurance products. GCF could also play a role in market development, including financing technical assistance for the creation of disaster risk facilities. Existing multilateral insurance mechanisms and EbA are micro to small scale.	Directly protecting and restoring ecosystems through EbA is often the best way to enhance climate resilience and reduce risk. Insurance products can play a supplementary role, de-risking private investment as well as protecting livelihoods in the face of climate-related disasters. Insurance and risk-related finance is relevant to all types of EES and has particularly been used in relation to coastal ecosystems and programmes that combine ecosystem services with more sustainable agriculture.	Coastal Zone Management Trust, Quintana Roo Mesoamerican Reef Rescue Initiative ResilNam Caribbean Biodiversity Fund Global Ecosystem Resilience Facility
Public-private partnerships	PPPs entail various types of contractual arrangements between public and private sector actors. Strictly speaking, it refers to private sector involvement in public infrastructure investment (such as build-own-operate contracts for construction of sea defenses, water and sanitation infrastructure), or long-term concessions for the management of public services. The term PPP is also used more broadly to describe any kinds of private and public sector collaboration, including PES, sustainable forest management and supply chain initiatives.	Technical assistance and institutional strengthening to ensure PPP infrastructure investment or long-term concessions deliver value for money. Micro to large scale.	PPPs are used to leverage private investment for the provision of public goods. Public-private collaboration as part of multistakeholder processes is an important component in planning for transformational impacts (Table 4). Promoting innovative EES investments often involves civil society and non-governmental organisations, philanthropic foundations, and research institutions alongside public and private sectors. PPPs are often used to circumvent budget constraints but keeping project costs and contingent liabilities "off balance sheet" can expose public finances to significant fiscal risks. PPPs can also be expensive, in particular when delivering infrastructure with "natural monopoly" characteristics in situations where public bodies or regulators have limited expertise or governance capacity. Best practice is to ensure "no institutional, procedural or accounting bias either in favour of or against PPPs", with value for money evaluated against conventional procurement routes (OECD 2012, 12).	Chumbe Island Coral Park Zanzibar

Instrument	Definition	GCF role[17]	Transformational (paradigm shifting) Potential	Examples
Adaptation Trust Funds	A trust fund operates as a managing entity that can accept, manage, and disburse donor contributions. A trust fund can create partnerships and platforms for financial, knowledge, and other forms of collaboration at the global, regional, and country levels (World Bank 2018).	Make contributions, leverage contributions from other donors, liaise with managing entities such as development banks or finance houses working pro bono, assist with establishment of governance mechanisms.	Trust funds currently account for about 10% of ODA globally. They complement core funding, and help to address limitations in bilateral aid, coordinate funding from multiple donors, and can support programme longevity.	Tuvalu Trust Fund Kiribati Revenue Equalisation Reserve Fund (RERF)
Solutions integrating grey and green infrastructure	National and subnational governments engage private sector corporations operationally dependent on water and set targets for monetisable and non-monetisable results and develop integrated ecosystem-based and grey infrastructure solutions and proposals for financing, implementing, and maintaining ecosystem-based infrastructure for watersheds providing critical ecosystem services.	Provide partial credit guarantees to de-risk bond issuance, or support capacity building for the creation of green bond facilities.	Stable legal systems strengthening land registry systems to allow traceability support ecosystem-based infrastructure, as are governance structures that allow the efficient transfer of funding between natural infrastructure managers and beneficiaries. These systems must support continued and growing investment in natural infrastructure and also address policies that incentivise degrading ecosystems that would otherwise provide infrastructure-like service. Governments should especially consider redirecting environmentally harmful agricultural subsidies. For any ecosystem-based programme to work, there needs to be an ongoing effort at building capacity at the level of local governments who enforce laws and may regulate water markets, governance bodies that can distribute payments and pass on best management practices to watershed decision makers, and organisations that can address some of the challenges inherent to sustainably managing watersheds.	IUCN Global Standard for Nature-based Solutions The US Army Corps of Engineers Engineering with Nature (EWN) program Ecosystem Investment Partners “pay for success” private equity funds Philadelphia Green City Clean Waters plan

In deciding the type and level of GCF financing, several factors should be considered, such as (GCF B.09/05):

- Increased focus on new and innovative financing for adaptation.
- Strengthening developing countries' capacity to finance and implement nationally determined contributions (NDCs) or national adaptation plans (NAPs).
- De-risking and addressing barriers to mobilise private sector resources.
- Supporting climate-oriented local financial systems, green banks, markets and institutions, with a strong focus on local private sector actors.

The overall approach to finance in the EES result area needs to place more emphasis on the broader ecosystem and ecosystem condition, to determine the value of a wide range of ecosystem and ecosystem services benefits. “Stacking” multiple benefits in EES projects can open up a wider range of investment streams and achieve multiple outcomes from project interventions.

It is important to ensure that financial innovation does not impede broader transformational potential. For example, aggregating projects and interventions to scale up investment can risk undermining multi-level and multi-sectoral governance and coordination unless a clear policy framework is established, with transparency and accountability baselines that extend to sub-project level.

Some of the most promising innovations combine a range of financial instruments to overcome government budget constraints and a lack of incentives and adequate structures for private investment. Grant financing is often required to structure new investment opportunities at their earliest stages, while high concessionality (including through blended finance) or risk guarantees are needed to advance pilot projects. The GCF can potentially harness significant transformative potential at these stages of financing, which tend to precede the scaling up that attracts institutional investors and market-rate capital.

The diversity of financial instruments in the EES result area should be indexed against balancing the portfolio. Tracking existing financial flows reveals significant regional divergences, for example, with limited green bond issuance and private equity investment in Latin America and Africa. The GCF can play an important role in developing new markets, but in situations where existing institutional capacity is low and investor risk perception is high, this would initially be in the form of technical assistance and policy development to create an enabling environment, rather than supporting significantly scaled up financial flows. In this regard, grant financing will remain an important tool, although new modalities are needed to reach community organisations, MSMEs and “bottom of the pyramid” organisations (B.23/12/Add.01), including via a dedicated small grants facility and a support mechanism for business incubation. Debt-for-climate and nature could be particularly promising for SIDS and some LDCS, and a number of SIDS have already indicated interest in technical assistance in developing debt-for-climate swaps (GCF 2020, 29).

The GCF 2020-23 Strategic Plan recognises that the GCF is designed to take more risks than other major public and private investors and accept some failures in the interest of demonstrating innovative solutions and delivering climate impact. Risk financing unlocks projects that would not have happened without GCF financing. Mobilising conventional sources of finance further multiplies that impact. The GCF private sector strategy aims to become more risk-inclined to catalyse private sector projects, initiatives and programmes with high climate impact and paradigm shift potential; support climate-oriented local financial and insurance systems, green banks, markets, and institutions; and act as a market maker for climate transformation in key sectors and regions in accordance with national priorities and objectives. GCF will develop complementary programming with other funders to deliver large-scale transformative changes, strategically leveraging its competitive advantage (country ownership, open collaboration, flexibility of financing instruments and risk appetite).

5 CASE STUDIES

Recently, many countries have pledged to restore, protect, and ensure sustainable management in EES. All NAPs include actions on ecosystem adaptation and resilience, while 66% of NDCs commit to the restoration, protection, and management of ecosystems and approximately 40% to ecosystem-based adaptation actions (Seddon et al. 2018). For example, Ethiopia's NAP highlights improving ecosystem resilience by conserving biodiversity and enhancing sustainable forest management through PES. Grenada is piloting EbA in coastal and marine ecosystems and exploring options to address vulnerability of dry forest ecosystems.

The following selected case studies illustrate how barriers to climate solutions can be addressed for successful transformations in the EES result area.

5.1 Blue Action Fund (BAF)

Theme:	Reducing or avoiding climate change impacts through ecosystem-based adaptation for vulnerable coastal populations.		
Country:	Tanzania, South Africa, Madagascar, Mozambique	Project size:	USD 62.6 million (Medium)
Emission reduction:	35.1 million tCO2e (June 2020)	GCF financing:	USD 34.1 million (Grant)
EES category:	Intermediation 2	Co-finance:	USD 28.4million (Grants)
Accredited entity:	KfW	Co-finance ratio:	45.5%
Approved:	November 2019	Completion:	NA
Information:	www.greenclimate.fund/project/fp122		

Impact potential. Coastal regions in the West Indian Ocean are facing severe impacts from extreme weather events, which are worsened by climate change and by the high density of vulnerable coastal populations. These damages are likely to increase in the years to come as climate change and sea-level rise cause more frequent and intense storms (Oppenheimer et al. 2019). The Blue Action Fund project aims to reduce or avoid climate change impacts through ecosystem-based adaptation for vulnerable coastal populations across four countries in Africa.

Country ambition. The objective is to enhance, through a management of the coastal zone based on its conservation and sustainable use, ecosystem services that contribute to reducing climate change-related risks for vulnerable coastal communities. The outcome will increase the resilience of vulnerable coastal populations to climate change. The programme focuses on EbA to strengthen the resilience of vulnerable coastal populations to climate change effects, such as floods, cyclones, and heavy rainfalls. Significant co-benefits for mitigation are to be expected, through the protection of carbon-rich ecosystems, such as mangroves, coral reefs, coastal marshes, and seagrass beds.

Barriers addressed. Implementation of adaptation strategies in coastal ecosystems lags behind in the four programme countries. Institutional, financial, and technical barriers slow down the implementation of adaptation action. Identified local barriers across the region include lack of understanding of the relevance of coastal ecosystems for climate adaptation; lack of technical and financial capacities and funds for innovative solutions; lack of information and knowledge exchange across countries; and lack of legal frameworks for sustainable management of marine habitats.

Approach to paradigm shift. The programme seeks to shift the paradigm towards climate-focused coastal and marine conservation projects across four countries creating awareness of the benefits of EbA approaches on national and local levels for mangroves, reefs and seagrass and sustainable approaches for coastal planning

and management. Upscaling will be generated through an open call for proposals and coordinating sub-projects, and exchanging experiences and lessons learned from the implementation practice of NGOs and local communities. Through its focus on similar coastal and marine ecosystems and climate adaptation needs, replication of experiences and best practices are more realistic. It includes extensive collaborations across local and international NGOs as well as with national governments, regional platforms and international research organisations providing a strong community of practice and a global network. Stakeholder participation will occur from the beginning of the planning process.

Expected impact. Impacts beyond a one-off project investment will be catalysed by building a project pipeline; complementing multilateral projects; and leveraging funding from bilateral, multilateral, and civil society partners. An enabling environment for EbA approaches in coastal and marine ecosystems will be sustained after programme implementation through contribution of results and lessons learned to the national planning and effective implementation of adaptation measures.

5.2 Coastal Zone Management Trust, Quintana Roo, Mexico

Theme: In 2018, the government of the Mexican state of Quintana Roo established the Coastal Zone Management Trust in partnership with multiple stakeholders, including the local hotel association, The National Parks Commission and The Nature Conservancy. The fund is for ongoing reef maintenance and repair after severe storms (TNC 2019). An innovative component of this project is the purchase of an insurance policy to cover the coral reefs against storm damage.

Information: https://www.ser-rrc.org/resource/coastal-zone-management-trust-quintana-roo-mexico/

Impact potential: Coral reefs are integral to the tourism industry of the area, producing white sand beaches that attract divers and snorkelers, reducing beach erosion and protecting the coast from storms. Protecting reefs is therefore critical to the local tourism industry. In 2005, two hurricanes caused USD 8 billion in damage to the area (Kousky and Light 2019). Damage was less severe around Puerto Morelos because it was protected by a coral reef system. Natural reefs can reduce wave energy by as much as 95%, but increasingly stronger storms are breaking them apart, reducing the protective effect. This is exacerbated by the general increase of storm energy from climate change. Developing capacity within coastal communities to maintain and repair coral reefs after severe storms can increase their climate adaptive capacity.

Country ambition: In partnership with local businesses, NGOs and the insurance industry, the State Government of Quintana Roo intends to strengthen the physical and financial resilience of coastal communities against climate change and the increased storm damage that it is predicted to bring.

Barriers addressed: Three main barriers that exist to the restoration and repair of reefs after storms are: (1) lack of understanding the role of coral reefs in coastal protection, hindering uptake of protection measures and funding; (2) lack of capacity within the local community to repair and clean the reef after a storm; and (3) insufficient funding within the community to finance repair and clean-up work after storms.

Approach to paradigm shift: Using insurance to protect a natural resource represents a paradigm shift in natural asset investment. The Trust is funded by beachfront property owners, along with other private and public sources. Funds support reef maintenance and to an insurance policy that protects 160 km of reef. The insurance is a parametric policy that pays when wind speed tops 100 knots and increases with increasing wind speeds (TNC 2019). Parametric policies do not require an assessment, which can be difficult, costly, and time-consuming after a severe storm. This allows rapid payments for the removal of debris and repairs to the reef. The faster this work is done, the better the chances of reef survival and recovery of tourism. A team of “first response divers” has been trained to conduct rapid early assessments and repairs. This enhances capacity within the community and provides alternative incomes, especially during the hurricane season, which is when tourism is at its lowest.

Expected impact. This project generates multiple benefits for reef sustainability and coastal community livelihood, as well as local capacity building and enhanced ecological resilience. The project started in 2020,

and therefore has no measured impact yet. However, efforts are underway to adapt this model in Hawaii and Florida and see if it works for mangrove and wetland conservation or to replant forests after fires.

5.3 Great Green Wall across Africa

Theme: The Great Green Wall is an African-led initiative launched in 2007 by the African Union to restore degraded landscapes and transform people's lives in one of the world's poorest regions, the Sahel. It is now being implemented in more than 20 countries across Africa. More than USD 8 billion has been mobilised and pledged. The initiative brings together African countries and international partners under the leadership of the African Union Commission and Pan-African Agency of the Great Green Wall.

Information: https://www.greatgreenwall.org/about-great-green-wall

Impact potential. The ambition is to restore 100 million hectares of currently degraded land by 2030, sequester 250 million tons of carbon and create 10 million jobs. This will support communities develop fertile soil, climate resilience, food security and economic opportunities.

Country ambition. The Great Green Wall is now being implemented in more than 20 countries in a region spanning an arc of 8,000 km across Africa.

Barriers addressed. The initial idea of a "wall" or line of trees from east to west through the African desert has evolved into one of a mosaic of interventions addressing challenges people face in the African drylands: droughts and land degradation, lack of opportunities and income, widespread poverty, and hunger. The main barrier addressed is a fragmentation of effort.

Approach to paradigm shift. From a simple vision this project changed towards multiple goals including: the improvement of ecosystem health in African drylands and of the conditions for people living there. Particular emphasis is in creating opportunities for women, with a strong drive from local communities to strengthen resilience to land degradation, drought, and climate variability.

Resource mobilisation for implementation at scale was based on establishing efficient partnerships between national and international stakeholders, with support by the European Union (EU), Food and Agriculture Organisation of the United Nations (FAO) and the Global Mechanism (GM-UNCCD). The UNCCD's Global Mechanism (GM) implemented a flagship initiative called FLEUVE, financed by the European Commission between 2014-19. Additional funding came from Ireland. Micro-investment projects were implemented under FLEUVE in 23 communities across five Sahel countries – Burkina Faso, Chad, Mali, Niger, and Senegal. A portfolio of transformative projects for future donor funding is planned. The UNCCD supports the programme with a public awareness campaign, aiming to inspire a global popular movement to create a unique "new world wonder".

Expected impact. Since its launch in 2007, the initiative is roughly 15% underway and has seen major progress in restoring the fertility of Sahelian lands. Success claims include restoring millions of hectares of degraded land across Ethiopia, Senegal, Nigeria, and Sudan. In Burkina Faso, Mali, and Niger, about 120 communities have been involved, and a green belt has been created over degraded and drylands, with seedlings planted from fifty native species of trees.

5.4 Global Fund for Coral Reefs Investment Window

Theme:	First at-scale private sector programme in the blue economy supported by the GCF. The Global Fund for Coral Reefs (GFCR) Investment Window will create a private equity fund to encourage investments in the blue economy, protecting coral reefs, targeting 17 countries in Africa, the Asia-Pacific, Latin America and the Caribbean.		
Country:	17 countries in 3 regions	Project size:	USD 500 million
Beneficiaries:	35.2 million	GCF financing:	USD 125 million (Equity)

EES category:	Intermediation 2	Co-finance:	USD 375 million (Equity)
Accredited entity:	Pegasus Capital Advisors	Co-finance ratio:	75.0 %
Approved:	October 2021	Completion:	NA
Information:	www.greenclimate.fund/project/fp180		

Impact potential. The programme is designed to deliver ecological, social, and economic resilience to coral reef ecosystems and the communities that depend on them, which are currently threatened by climate change and other drivers of degradation (e.g., pollution, overfishing, destructive fishing techniques) through a blended finance model that can unlock private capital and address current financing barriers. The GFCR Investment Window is the first at-scale solution focusing on addressing the degradation of coral reef ecosystems through enhanced adaptation, based on the latest science. This means not only supporting direct restoration activities on reefs that have the greatest chance of survival, but also creating new economic opportunities that address key drivers of degradation while sustaining livelihoods in the long-term.

Country ambition. This programme will be implemented in full alignment with national development plans and global commitments including Nationally Determined Contributions, National Adaptation Plans, post-2020 CBD Global Biodiversity Framework, the 2030 Agenda for Sustainable Development, the UN Decade of Action for SDGs, and the UN Resolution on 'Sustainable Coral Reef Management'. Country's will be highly involved in site selection for project implementation with clear alignment on assisting vulnerable communities. Pegasus and its consortium partners have been engaged in regular dialogue with NDAs and country representatives. For approval, the programme received 17 NOLs from the following countries: Brazil, Bahamas, Belize, Colombia, Comoros, Ecuador, Fiji, Guatemala, Indonesia, Jamaica, Jordan, Mexico, Mozambique, Panama, Philippines, Seychelles, and Sri Lanka. In the future, additional countries may be added to the programme.

Barriers addressed. Coral reefs are among the world's most threatened ecosystems by climate change impacts. In parallel, multiple local pressures continue to influence the health and longer-term resilience of coral reefs, including destructive fishing techniques, overfishing and pollution. To enhance the resilience and adaptive capacity of the communities, productive systems and businesses that depend on coral reef ecosystems, the GFCR Investment Window will unlock and de-risk private investment that enable activities that ameliorate or eliminate existing local stressors in the most resilient reefs and climate refugia. Efforts will also be supported to accelerate the recovery of reefs that have the highest chance of survival.

Approach to paradigm shift. GCF provides equity financing for the following activities: (a) Sustainable ocean production: supporting fishermen to adopt more sustainable fish capture techniques, helping fishermen manage stocks or transport more sustainably, and growth in mariculture and aquaculture; (b) Sustainable ecotourism: measures include supporting sustainable hotel and tourism activity businesses that incentivise the protection of coral reef ecosystems that the tourism industry is dependent upon; and (c) Sustainable infrastructure and waste (pollution) management: this includes among others improved plastic waste management from new business models and technologies, improved treatment of sewage and wastewater, and the adoption of organic fertilizers.

Expected impact. 29,000 ha of reef protected, equivalent to USD 10 billion per year of ecosystem services; over 12,737 direct employment opportunities in sustainable businesses for communities dependent on coral reef ecosystems; 2,990,048 fisherman households benefiting from investments aimed at the adoption of diversified, climate resilient livelihood options (including fisheries, agriculture, tourism); 35,236,406 indirect beneficiaries, based on the population that is dependent on reefs for protection from climate risks and for economic outputs (e.g., fishing, tourism).

6 INVESTMENT CRITERIA FOR IMPACTFUL PROPOSALS

Proposals to GCF need to align with GCF result areas and are assessed based on six GCF investment criteria, summarised here followed by examples of how these criteria could pertain to the ecosystems and ecosystem services projects/programmes. GCF supported actions can refer to individual projects at a site or to broader programmatic responses.

6.1 Impact potential

High-impact areas in EES are those where biodiversity is imminently threatened, those with high carbon density (tropical forests, wetlands, peatlands, and mangroves), and ecosystems that provide critical services (such as mountain ecosystems important for water security) interwoven with human needs. "Stacking" multiple ecosystem benefits achieves higher impact. In terms of mitigation, the highest impact is in protecting and restoring degraded tropical and peatland forests and coastal ecosystems, for example, reducing or ending human-driven loss of mangrove, salt marsh and seagrass ecosystems. *Proxy indicators* can be developed to rank land use categories in relation to carbon storage in such a way that any given intervention can identify both the direction of change, as well as the overall mitigation magnitude of the resulting landscape. Such methodologies have already been developed in the insurance industry (see for example Swiss Re Institute: Biodiversity and Ecosystem Services - a business case for re/insurance, 2020). Likewise, proxy indicators for adaptation can estimate the ability of ecosystems to maintain and enhance resilience (e.g., shifts in ecological niches).

6.2 Paradigm shift potential

For a paradigm shift to occur in the EES sector there is need for enhanced transformational planning and programming through context specific approaches that adopt sustainable and inclusive zero deforestation business models. Stakeholders must fully participate in the creation of an enabling environment for the paradigm shift, at the community level and at the policy and regulatory (national and local) level in countries. Sufficient time must be allocated to Free, Prior and Informed Consent (FPIC) when required, and to other types of consultation processes for Indigenous Peoples and local communities. Monitoring complex changes using culturally appropriate indicators is important to monitor progress and assess impact and document the 'shift'. Hence, participatory monitoring and impact assessment frameworks and systems need to be strengthened and expanded to include assessment of biodiversity, ecosystem integrity and ecosystem services. GCF projects and programmes should support technical capacities and enabling environments for monitoring and evaluation, especially where institutional capacity is low, and investor risk perception is high.

6.3 Sustainable development potential

Proposals to the GCF need to establish their sustainable development potential, as well as gender and minority sensitive development impact. Placing gender equality and women's empowerment at the core of projects and programmes is critical for achieving sustainable development. Proposals must show how they enhance synergies and reconcile trade-offs between carbon and other social and environmental goals and targets. Projects and programmes should take a pathway approach, by supporting enabling environment (e.g., laws, plans, capacity development), augmented using public funds/investments, and attract or incentivise private investment. Such approaches can be planned using Theories of Change. Environmental and social co-benefits are vital to build legitimacy and enable the depth of change required to ensure sustainability.

6.4 Needs of the recipient

To justify GCF support, a strong proposal would describe limitations in institutional support at the national level and include specific plants for developing capacity through education on regulations and mechanisms for

implementing and monitoring compliance. Local organisations can be involved in creating inclusive community level associations, knowledge hubs and co-management bodies to build legitimacy and share lessons (traditional and scientific) to contribute to understanding of applicable methodologies and standards. EES proposals can indicate the vulnerability in the environment and how the recipient will address this. A recipient may develop revenue models based on the improved terrestrial or coastal ecosystems. Monitoring systems should include tools available as well as training and integration with community stakeholders. Developing participatory monitoring is one important avenue to create ownership for local stakeholders.

6.5 Country ownership

Beyond alignment with national climate strategies and policies, country ownership requires extra effort to bring together ministries and constituents from different government areas, such as environment, forest, fisheries, agriculture, economics, family, and development, and from different levels of governance (national, sub-national, and local). Integrated ecosystem-based management approaches can bridge sectoral divides, enhance synergies, and maximise benefits. Engagement with civil society organisations and other relevant stakeholders is often conducive if not critical to success. Full and continuous participation of relevant underrepresented stakeholders such as Indigenous Peoples, women, and other vulnerable groups throughout the process must become commonplace as it recognises them as equal interlocutors. It is expected that countries will prioritize climate finance support from the GCF based on their climate targets and ambitions, commonly reflected in their NDCs.

6.6 Efficiency and effectiveness

To demonstrating efficiency and effectiveness, successful proposals show that a proposed project builds on best practices. Examples in the private sector should go beyond corporate social responsibility, including for example, alignment with the Equator Principles or the application of the High Conservation Value (HCV) approach. The project design should also include economic analysis and financial returns with or without the project to illustrate its proposed effectiveness in terms of contribution and impact. Key to ensuring successful projects and programmes will be to avoid detrimental trade-offs, minimising impacts on society and environment. Effectiveness can also quantify the values of a functioning ecosystem and how ecosystem services contribute to livelihoods, or sustainable practices.

6.7 Investment criteria examples for EES paradigm shifting pathways

The GCF investment criteria apply to the two EES Pathways in ways that involve a range of stakeholders from Indigenous Peoples and regional leaders to multinational companies and government ministries. A list of examples for each of the six investment criteria is in Table 9 below.

Table 9: Investment Criteria Examples for the two EES Paradigm Pathways

Impact	Adaptation: Increased resilience of vulnerable coastal populations to climate change effects, such as floods, cyclones, and heavy rainfalls, including enhanced livelihoods, improved health, well-being and food security, and enhanced resilience of threatened ecosystems and ecosystem services, including coastal and riverine ecosystems. Mitigation: Reduced tonnes of carbon dioxide equivalent (tCO_2 eq.) and increased carbon sequestration measured through carbon sinks in mangroves and seagrass beds.
Paradigm Shift	New practices, inclusive approaches, conservation models, restoration approaches, scalable innovations. Strong potential for replicability of approach (e.g., protected areas) or export of key structural elements. Access to new technology and science-based data that informs monitoring of climate change impacts on ecosystems health and dynamics. Contribution to market development and transformation, such as valuation of ecosystem services;

	contribution to strengthened regulatory frameworks, policies, and participatory planning processes.
Sustainable Development	**Environmental benefits:** improvements in soil quality, biodiversity, watershed resilience (e.g., natural freshwater ecosystems support dilution and filtration of agricultural and Industrial pollutants, human and animal waste). **Social benefits:** Ecosystem integrity reduce waterborne or water-related diseases through clean water for drinking, cooking, bathing, and washing clothes, and valuing local, traditional knowledge in decision-making, and recognising the need for widespread community support contributes to cultural preservation. **Economic benefits:** Job creation, poverty alleviation (e.g., freshwater fisheries provide a source of protein and income), energy security, water supply and land tenure security. **Gender-sensitive development impact:** Potential for reduced gender inequalities in climate change impacts and/or equal participation in project/programme activities.
Recipient Needs	**Vulnerability of the country:** Ecosystems exposed to climate change, including slow onset events. Population faced with livelihood and non-economic losses (cultural heritage, indigenous knowledge, societal/cultural identity). Socio-economic development in affected populations. Strengthening institutional capacity. **Vulnerable groups and gender aspects:** High vulnerability of certain groups due to: lack of access to affordable financing; degree of dependence on ecosystems heavily affected by external pressures; low-income livelihoods exposed to climate change impact; lack of legal protection and tenure uncertainty; particularly vulnerable groups in national climate or development strategies, with sex disaggregation.
Country Ownership	Consistency with national climate strategy or plan, including priorities identified in NDCs, NAPs, conservations plans related with the protection of biodiversity; coherence with other national and sub-national actions to conserve, restore or value EES; new institutional, governance, or coordinating mechanisms; stakeholder engagement, including showing that project has been developed in consultation with civil society organisations and other relevant stakeholders, with particular attention to gender equality; has sought the free, prior and informed consent of potentially affected Indigenous Peoples (where relevant) and includes mechanisms for the ongoing stakeholder engagement.
Efficiency and Effectiveness	Cost-effectiveness and efficiency regarding financial and non-financial aspects. Appropriateness of concessionality, for example does the project identify a market failure that justifies the need for public financing, or do the outputs have characteristics of public goods? Who else is financing similar interventions in the same geographies? Will promoting conservation and restoration of ecosystems create demand? What value would this have for efficiently managing a natural protected areas system? At what financial cost? Does the activity have the potential to catalyse other investment (co-financing)? Is there long run financial viability (after GCF)? Are industry best practices and a degree of innovation employed, including those of Indigenous Peoples and local communities, and best available technologies?

6.8 Programmes, initiatives, and coalitions supporting investment pathways

Protection and restoration of ecosystems in terrestrial and freshwater, as well as coastal zones are based on the principle of joint management of the coupled human-environmental system. Coalitions align interests and articulate efforts and these collaborative spaces have become widespread, including: the United Nations Framework Convention on Climate Change (UNFCCC); the dedicated Grant Mechanism for Indigenous Peoples and local communities; the Convention on Biological Diversity Alliance; the Natural Climate Solutions Alliance; the Ocean & Climate Platform, the International Alliance to Combat Ocean Acidification and the Climate Land Ambition and Rights Alliance.

When enhancing complementarity and coherence, it remains important to avoid top-heavy coalitions and instead include Indigenous Peoples and women, to reflect their experiences, knowledge, and priorities. Involving those sectors and actors – commonly with contradictory development priorities – to coordinate and align goals through discussion, negotiation and planning may produce more effective outcomes. Recognising

and responding to stakeholders that have unequal access to power is often more equitable than top-down, uni-sectoral or expert-driven approaches. Processes can be designed to address such inequalities through procedural justice and inform decisions with the perspectives of those most affected by them to reach collective decisions.

Knowledge sharing is key and creating alliances and synergies (e.g., Working Groups for the new GCF Coalition on Land and Forests) with already existing platforms is an effective way to strengthen coalitions. Dialogue and consultation processes, especially with Indigenous Peoples and local communities, can serve as a way to resolve conflicts, remove blockages, and contribute to transformative changes. Rather than observe, under-represented groups should participate equally in management and decision making.

7 CONCLUSION

Current levels of biodiversity and ecosystem degradation and loss need to be reduced to achieve the Paris Agreement and the 2030 Sustainable Development Goals. The EES Sectoral Guide presents two key paradigm-shifting investment pathways that can increase the resilience and functionality of ecosystems and its services. Transformative pathways require climate compatible policy frameworks and strengthened institutional capacity across different levels (local, subnational, and national) and actors (sectoral ministries, such as forests, agriculture and environment, the private sector, and civil society). High-impact projects and programmes at the GCF require the expansion and replication of knowledge through new tools and data collection methods and through multistakeholder processes that enhance participation and increase legitimacy. Focusing on depth of change in monitoring and outcomes can address the immediate objectives of mitigation and ecosystem resilience and at the same time provide social, economic and gender co-benefits.

This guide supports stakeholders in developing robust funding proposals based on the two strategic investment pathways, in connection to the four key drivers of transformational change. It is important to highlight that environmental solutions are always context specific. Ecosystem services are distributed unequally across space, time and segments of society, and benefits and burdens are distributed and experienced differently among social groups, countries, and regions. Context specific solutions are best elicited through a common, “place-based” theory of change at the landscape scale that describes how the major asset types (natural, human, social, built-up and financial capitals) interact towards a jointly formulated goal. A paradigm-shift in ecosystem and ecosystem services will rely on participatory and multistakeholder approaches that recognise the need for widespread community support in local contexts.

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GLOSSARY

Additionality - Additionality is the requirement that a REDD-plus activity or project must generate impacts, such as reduced emissions or increased removals, that would not have happened without the activity, such as in the business-as-usual (BAU) scenario. In practice, this translates into + setting a realistic counterfactual or reference level, against which future emissions can be measured.

Benefit sharing - Direct and indirect gains (monetary and non-monetary) from the implementation of REDD-plus or other ecosystem-based activities is known as benefit sharing. Some use the term to also include the costs of REDD-plus, focusing on the net benefits. Cf. also co-benefit. Non-carbon (non-C) benefits are sometimes set apart from carbon benefits and refer to biodiversity, ecosystem services and social/spiritual benefits. Multiple benefits can be 'stacked' because ecosystem services overlap and the same natural solution can provide environmental, climate, biodiversity, hydrology, income, and spiritual services. Cf. also co-benefit

Benefit-sharing mechanisms - the needed financial and regulatory provisions and decisions on how benefits (proceeds from ecosystem-based interventions such as REDD-plus) will be shared among beneficiaries, based on mutual understanding of what is fair and equitable.

Blue carbon – this term denotes the portion of biomass carbon (in plants and marine soils) that is stored in coastal, plant-based aquatic ecosystems such as mangroves, salt marshes and seagrass meadows (not coral reefs). Although seagrasses account for less than 0.2% of the world's oceans, they sequester approximately 10% of the carbon buried in ocean sediment annually (27.4Tg of carbon per year). Per hectare, seagrasses can store up to twice as much carbon than terrestrial forests. Mangroves provide at least USD 1.6 billion each year in ecosystem services. Blue carbon ecosystems are among the most threatened ecosystems. Up to 67%, 35% and 29%, respectively, of the global area of mangroves, marshes and seagrass meadows have been destroyed already. Human influence (mangrove deforestation, unsustainable marshland and seaside developments for urbanisation and infrastructure, aquatic pollution, sediment influx resulting from inland deforestation and ecosystem degradation) reduces the ability of these ecosystems for self-regulation and turns them from carbon sinks into sources.

Building with nature - a comprehensive engineering approach that seeks to enhance the use of natural ecological processes to achieve efficient and sustainable hydraulic infrastructural designs. It strives for a flexible integration of land in water and water in land using interactions and materials present in nature. (https://www.wetlands.org/casestudy/building-with-nature-indonesia/).

Carbon cycle - the series of processes by which carbon compounds are interconverted in the environment, involving the incorporation of carbon dioxide into living tissue by photosynthesis and its return to the atmosphere through respiration, the decay of dead organisms, and the burning of fossil fuels.

Carbon markets - A market in which carbon emissions reductions are traded, usually in the form of carbon credits. This can be: (i) a voluntary market, where emissions reduction targets are not regulated by a public authority; or (ii) a compliance market, where carbon credits are traded to meet emission caps (regulated emissions reduction targets).

Carbon stock - The quantity of carbon contained in a so-called carbon pool (e.g., in tree biomass or in soil, or in the ocean).

CO_2e or CO_2eq - see Greenhouse Gases

Co-benefit - These are the positive effects that a policy or measure aimed at one objective might have on other objectives. Co-benefits, also called ancillary benefits, are often subject to uncertainty and depend on, among others, local circumstances, and implementation practices. In REDD-plus, these may be social and environmental co-benefits, which result in better well-being outcomes. Environmental co-benefits might include the provision of ecosystem/environmental services.

Coral reefs - coral reefs, unlike marine vegetation, are a source, rather than a sink for CO_2, however they are critical marine ecosystems, providing habitat to millions of species and offering vital services to millions of

people, through coastal protection, food and resource provisioning, and the basis for a number of industries, including fisheries and tourism. In light of this, their protection and restoration are a priority.

Deforestation and degradation - deforestation and degradation are part of man-made land use change and represent the second-largest sources of global greenhouse gas emissions after those from fossil fuels (which were 36.6 ± 2 Gt CO_2e in 2018). Emissions from land use change have so far mostly remained stable in absolute terms (at around 5-6 Gt CO_2e per year), while falling in relative terms compared to emissions from fossil fuels, from a 39% contribution to global emissions in 1960, down to 14% averaged over 2009–2018. In contrast, protecting and restoring global forest landscapes, along with other solutions in the Agriculture, Forestry and Land Use (AFOLU) sector could deliver very significant greenhouse gas (GHG) emissions reduction required to reach the well-below-2 degree Celsius goal. Degradation is particularly problematic because it is hard to detect and quantify and leads to impoverishment of forest ecosystems and ecosystem function that can go undetected for a long time. Reducing emissions from deforestation, reducing emissions from forest degradation, conservation of forest carbon stocks, sustainable management of forests, and enhancement of forest carbon stocks is the REDD-plus definition under the UNFCCC that promotes results-based compensation to developing countries for preserved forests. Ecosystem services that can be stacked in forests are carbon, timber and non-timber forest products), non-C benefits such as livelihoods, and a wide range of water regulation services.

Drylands – drylands cover 41 % of the global land area, produce 44 per cent of the crops (often with irrigation), and are home to 2.1 billion people and half of the world's livestock. Drylands are regions of water scarcity yet with immensely rich biodiversity, including some of the most iconic species. They are characterised by a wide variety of ecosystems formations, from deserts over grasslands to dry forests with high biodiversity. There is often an important belowground C component in many dry forests where 70% of C stores are belowground, offering management options for multiple benefits (aboveground coppicing, belowground - C storage). Ecosystem services that can be stacked in drylands are carbon, timber, fruit, medicinal plants, bush meat, and solar energy (energy farms).

Ecoregions - Ecoregions are large geographical regions with similar biogeographical characteristics, such as endemic species, soils, environmental conditions, and ecological dynamics. Ecoregions are intended to represent the original distribution of distinct natural assemblages. The WWF has identified 867 terrestrial, and 450 aquatic ecoregions.

Ecosystems – Ecosystems are defined as dynamic complexes of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (Keith et al. 2019).

Ecosystem-based adaptation (EbA) - Ecosystem-based Adaptation (EbA) is formally defined by the CBD as the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change (CBD 2009). Also referred to as "ecosystem-based approaches." EbA also helps account for uncertainties in future scenarios under climate change.

Ecosystem-based approaches – Used interchangeably with "ecosystem-based adaptation" for the purposes of this guide.

Ecosystem-based management – an approach that recognizes the full array of interactions within an ecosystem, including humans, rather than considering single issues, species, or ecosystem services in isolation. (Christensen et al. 1996). Often it is understood as a synonymous of the landscape approach.

Ecosystem services or environmental services- Services provided by the environment or ecosystems, which provide benefits to humans (e.g., water provisioning or carbon storage). Payments can be made for the provision of these services (see PES). IPBES assessments use the term "nature's contributions to people" recognizing that many services fit into more than one category.

Emissions reduction - Emissions reduction (ER) is the difference between the actual emissions (AE) over a given time period, and the comparator (counterfactual) or reference level (RL): ER = AE – RL.

Enabling policies and measures - Enabling measures are policies and measures (sometimes abbreviated PAM) that create the appropriate conditions (enabling policy environment) for climate mitigation and adaptation initiatives to operate, but that in themselves do not necessarily lead to reduced emissions or other goals. Such measures include capacity building, and activities and policies aimed at clarifying ownership and access rights over forests, trees, and carbon.

Free, prior, and informed consent (FPIC) - FPIC refers to peoples' right to give or withhold consent to developments that may affect them. It is a specific right of Indigenous Peoples recognised by the United Nations Declaration on the Rights of Indigenous Peoples, but is also a fundamental principle in international law, embedded in the universal right to self-determination. It is widely considered a minimum ethical requirement for REDD-plus or other development, protection, and restoration activities. 'Free' refers to consent given voluntarily; 'prior' means consent given in advance of any activities beginning; and 'informed' refers to the quality of information available for the decision. Consent may also be withdrawn.

Grasslands - grasslands are ecosystems dominated by herbaceous and shrub vegetation, covering approximately 40% of the ice-free land surface. Grasslands include savannahs, shrublands and pastures, although the classifications and extent of these land types is uncertain. Grasslands often contain high soil carbon pools and high biodiversity and are increasingly under threat. Many areas categorised as degraded lands - often grasslands and pastureland - are critical for the livelihoods and cultures of rural and indigenous communities.

Greenhouse gases (GHGs) - The atmospheric gases responsible for causing global warming and climate change. The major greenhouse gases are carbon dioxide (CO_2), methane (CH4) and nitrous oxide (N2O). Their global warming potential (GWP) varies, for CO_2 is set as 1; the potential of methane is 28-36 times higher, and for nitrous oxide it is 265-298 times higher). Less prevalent, but very powerful (GWP above 1500) greenhouse gases are hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF6). In order to easily assess GHGs, the contribution of all gases is combined into so-called carbon dioxide equivalents (written as CO_2e or CO_2eg) by multiplying the GWP with the amount of each gases' emissions.

Incentive-based instruments - Policies or interventions that use positive economic incentives (monetary rewards) for actions that promote societal objectives. The intention is to stimulate desired action and to compensate stakeholders for any losses associated with the change in behaviour. Traditionally, the term 'incentive' has been used for conditional rewards (e.g., PES). Currently, incentives can be referred to as being both conditional and non-conditional, the latter referring to, for example, monetary transfers to forest users with 'no strings attached'.

Irrecoverable carbon – carbon that is vulnerable to release upon land use conversion and, once lost, is not recoverable on timescales relevant to avoiding dangerous climate impacts (Goldstein et al. 2020).

Jurisdictional approaches - Government-led, comprehensive approaches to forest and land use across one or more legally defined territories (e.g., municipalities, states). Jurisdictional sustainability approaches seek to protect forests, reduce emissions, and improve livelihoods across entire political-administrative territories.

Macroalgae – also known as seaweeds, while a type of marine vegetation, are generally not considered to be 'blue carbon' in the strictest sense as they lack root systems that sequester and trap carbon. Natural climate mitigation, therefore, is only though the transport of plant biomass to the seafloor and the loss of natural seaweed ecosystems reduces the potential for carbon sequestration, but does not contribute to increased emissions, as with the degradation and loss of other blue carbon systems. It is estimated that natural seaweed ecosystems sequester approximately 0.64 Gt CO_2 e annually (Krause-Jensen and Duarte, 2016). To ensure that this service is not lost and to enhance its potential it is important to protect and restore natural seaweed ecosystems.

Mangroves – mangroves are evergreen woody formations in the tidal range of the subtropics and tropics (water temperature above 20 degree Celsius). They are tree and shrub species showing tolerance to salinity in soil and water. There is at least 5 times more carbon in mangrove soil and roots as in aboveground biomass

parts of the mangrove vegetation. Carbon stored in mangrove biomass, particularly belowground, is about 3x higher than the carbon in other forested ecosystems in temperate and tropical environments. Indonesia is the country with the largest mangrove areas globally (20% of the global 14-15 M ha are in this country), but 123 countries globally have mangroves. Mangroves are important marine areas where fish and shellfish develop; hence they are utterly important for marine biodiversity. They are important coastal protector belts against storm surges and hurricanes, and they can adapt to rising sea levels. The total annual value of ecosystem services provided by mangroves is estimated at 1.6 billion US dollars. Mangroves are considered forests in most countries and thus can be the subject of REDD-plus activities.

Natural Capital Accounting - Natural Capital Accounting provides a method to integrate non-monetised benefits and costs of investments in actions related to ecosystems and ecosystem services. Several NCA and EA frameworks are in use, such as the System of Environmental-Economic Accounts (SEEA) adopted by the UN Statistical Commission, which is closely related to UK's Environmental Accounts. In 2017, 69 countries had SEEA programmes, including 32 developing countries (UN Committee of Experts on Environmental-Economic Accounting 2018). European countries have applied environmental accounting at varying degrees, using a variety of approaches (Ling et al. 2018; Brouwer et al. 2013).

Peatlands – are areas with or without vegetation, with a natural layer of peat on the surface. Peat is accumulated material containing at least 30% (dry matter) dead plant matter. Peatlands globally occupy about 3% of the land surface yet store the equivalent to ca. 30 % of all global soil carbon, ca.70 % of all atmospheric C, and 100% of all other terrestrial biomass. Peatlands are created when plant growth is faster than decomposition; they can be formed by mosses, sedges, grass, trees, shrubs and reeds. They grow slowly, accumulating at a rate of 0.5 - 1 mm per year in temperate regions. They are under threat from interests for land, fuel, garden supplements, and other uses. Their carbon is by all practical means 'irrecoverable', as it is destroyed quickly and built slowly. Many peatland areas have been lost globally, and peatland preservation has high priority.

Results-based payment - A transfer of money conditional upon achieving a predetermined performance target, thus a type of conditional incentive-based instrument. This is related to the last of three REDD-plus phases recognised by the UNFCCC and covered in the FLU Guide.

Rights-based approaches - Incorporating human rights in climate policies and actions is known as a rights-based approach. Rights-based approaches, including the rights of Indigenous Peoples, involve the full range of rights and protections to which States are already committed and requires that States take ambitious adaptation and mitigation measures that are inclusive and respectful of communities affected by climate change (OHCHR, n.d). Rights-based approaches can develop actor capacities; strengthen social cohesion through participatory processes; decrease risk by securing land tenure and strengthening laws, policies and programmes aligned with international conventions; institutionalise democratic processes.

Savannahs – savannahs and grasslands are often referred to interchangeably. See Grassland above.

Seaweeds – cf. Macroalgae.

System of Environmental-Economic Accounting (SEEA) - framework that integrates economic and environmental data to provide a more comprehensive and multipurpose view of the interrelationships between the economy and the environment and the stocks and changes in stocks of environmental assets, as they bring benefits to humanity. It follows a similar accounting structure as the System of National Accounts (SNA).

Well-being outcomes - Well-being impacts of REDD-plus and other land- and ecosystem-based interventions can be measured in terms of income, perceived well-being, distributive equity, and social capital. Other dimensions related to well-being, such as land tenure security, local capacities, institutions, and social networks, can also be impacted by REDD-plus. Well-being outcomes, when positive, can be viewed as social co-benefits.

Wetlands – wetlands are areas flooded or saturated by water for sufficient periods of time to support vegetation adapted to saturated soil moisture. They can be freshwater (including rivers) or marine (including coastal ecosystems). Wetlands, peatlands, mangroves, and other tidal areas are sometimes referred to interchangeably; however, wetlands are the overarching category. Ecosystem services that can be stacked in wetlands are biodiversity, water filtration and retention.

Zero deforestation commitments - voluntary commitments by companies to eliminate deforestation from their supply chains. These can include individual company or group- level adoption of voluntary standards; sector-wide supply chain-based initiatives; and mixed supply chain and territorial initiatives at jurisdictional levels.

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