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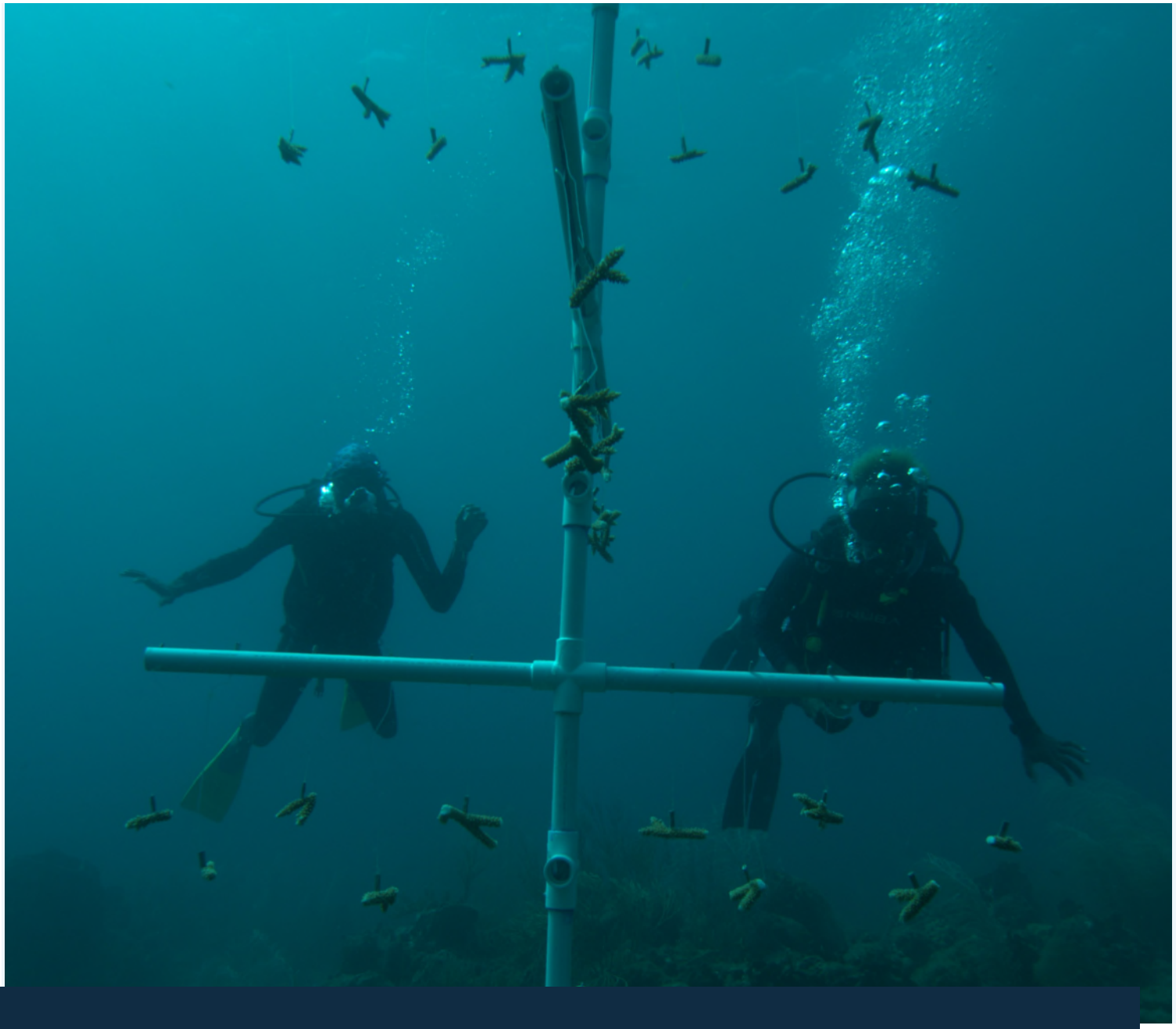

Ecosystem-based adaptation at tropical coasts: Stocktake and financing instruments

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DISCUSSION PAPER

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Key messages

Coastal Ecosystem-based Adaptation (EbA) for risk reduction and adaptation planning

- Coastal Ecosystem-based Adaptation (EbA) measurably reduce coastal climate risks, such as erosion, storm surges and flooding, while delivering co-benefits for biodiversity and local livelihoods. Growing evidence demonstrates EbA effectiveness, particularly in highly exposed coastal areas where grey infrastructure is often unaffordable or socially and environmentally contested.
- Mangroves and coral reefs have significant potential for coastal risk reduction. Several million vulnerable coastal residents live in areas where these ecosystems could provide protective benefits. EbA measures addressing these ecosystems are often considered low-regret or no-regret options that deliver benefits under a wide range of future climate scenarios.
- EbA is most effective when implemented as part of integrated adaptation strategies. Outcomes depend on site-specific biophysical conditions (including ecosystem health, sediment supply and geomorphology), evolving climate pressures as well as socio-economic factors. Meaningful stakeholder engagement in EbA processes is vital for developing locally appropriate solutions.
- EbA interventions can achieve greater and more sustained impact when embedded within broader coastal development and adaptation pathways. This includes spatial planning at the seascape level, ensuring coherence, scalability, and long-term resilience beyond individual projects.
- EbA projects benefit from being designed using forward-looking climate risk assessments and scenarios, incorporating projected future sea level rise, warming and extreme events, amongst other considerations, thereby strengthening their robustness and effectiveness under future climate conditions.

Financing EbA for long term sustainability and resilience

- Grant finance remains the backbone of EbA financing, particularly for early-stage costs such as planning, stakeholder engagement, capacity building and monitoring, and for de-risking interventions in high-vulnerability contexts. However, grants alone are insufficient to ensure long-term sustainability of EbA. Complementary financing approaches are required for scale, and to support long-term operation, maintenance and post-project monitoring.
- Blended finance is essential for the long-term success of coastal EbA. Public grants typically do not extend beyond the initial funding cycle, and projects risk stalling or being abandoned once that support ends. Combining public support with additional sources of finance and investment helps to sustain projects and can help to ensure long-term monitoring and maintenance, as well as reducing the risk of disruption if a funder should withdraw.
- Long-term EbA success depends not only on mobilizing financial resources but also on strong fund management. Stable institutional vehicles with transparent governance, clear allocation criteria, and defined procedures for allocating resources across different priorities are essential to successfully managing EbA projects.
- EbA proposals should explicitly plan for post-disaster recovery. Pre-arranged emergency recovery funds and parametric insurance mechanisms, which are triggered by hazard metrics such as wave height and wind speed, can enable rapid response after extreme events. They help safeguard prior investments in ecosystems and support rapid restoration.

Kernbotschaften

Ökosystembasierte Anpassung (EbA) an Küsten für Risikominderung und Anpassungsplanung

- Ökosystembasierte Anpassungsmaßnahmen (EbA) an Küsten verringern klimatische Risiken wie Erosion, Sturmfluten und Überschwemmungen und bieten gleichzeitig Vorteile für die biologische Vielfalt und die Lebensgrundlagen der lokalen Bevölkerung. Ihre Wirksamkeit ist zunehmend belegt, insbesondere in stark gefährdeten Küstengebieten, in denen ‚graue' Infrastruktur oft unerschwinglich oder sozial und ökologisch umstritten ist.
- Mangroven und Korallenriffe haben ein erhebliches Potenzial zur Risikominderung. Mehrere Millionen gefährdeter Küstenbewohner leben in Gebieten, in denen diese Ökosysteme Schutz bieten könnten. Daher gelten EbA-Maßnahmen in diesen Ökosystemen oft als ‚Low-Regret'- oder ‚No-Regret'-Optionen, die unter einer Vielzahl zukünftiger Klimaszenarien Vorteile erzielen.
- EbA ist am wirksamsten, wenn sie als Teil integrierter Anpassungsstrategien umgesetzt wird. Ergebnisse hängen von standortspezifischen biophysikalischen Bedingungen ab (z.B. ökologische Gesundheit, Sedimentzufuhr und Geomorphologie), von sich verändernden Klimabelastungen und von sozio-ökonomischen Faktoren. Eine wirksame Stakeholder-Beteiligung ist für lokal angepasste Lösungen entscheidend.
- EbA-Maßnahmen können eine größere und nachhaltigere Wirkung erzielen, wenn sie in umfassendere Küstenentwicklungs- und Anpassungsstrategien eingebettet sind. Dazu gehört eine Raumplanung auf Meereslandschaftsebene, die Kohärenz, Skalierbarkeit und langfristige Resilienz über einzelne Projekte hinaus gewährleistet.
- EbA-Projekte profitieren von vorausschauenden Klimarisikobewertungen und -szenarien, die u.a. prognostizierten Meeresspiegelanstieg, Erwärmung und Extremereignisse berücksichtigen.

Finanzierung von EbA für langfristige Nachhaltigkeit und Resilienz

- Sogenannte *Grants* (Zuschüsse) bleiben der Grundpfeiler für EbA-Finanzierung, insbesondere für früh anfallende Kosten, wie Planung, Stakeholder-Einbindung, Monitoring oder Kapazitätsaufbau. Zuschüsse allein reichen jedoch nicht aus, um die langfristige Nachhaltigkeit von EbA sicherzustellen. Für die Skalierung sowie zur Unterstützung von langfristigem Betrieb, Instandhaltung und Monitoring nach Projektabschluss sind ergänzende Finanzierungsansätze erforderlich.
- *Blended Finance* ist für den langfristigen Erfolg von Küsten-EbA entscheidend. Denn öffentliche Zuschüsse reichen meist nicht über den ersten Förderzyklus hinaus und Projekte geraten häufig ins Stocken oder müssen abgebrochen werden, sobald die Unterstützung durch öffentliche Gelder endet. Die Kombination öffentlicher Mittel mit zusätzlichen Finanzierungs- und Investitionsquellen trägt dazu bei, Projekte über den initialen Förderzeitraum hinaus zu tragen, langfristiges Monitoring zu sichern und Ausfälle zu kompensieren, falls ein Geldgeber aussteigt.
- Langfristiger EbA-Erfolg hängt nicht nur von der Mobilisierung finanzieller Ressourcen ab, sondern auch vom wirksamen Management der finanziellen Mittel. Stabile institutionelle Trägerstrukturen mit transparenter Governance, klaren Zuteilungskriterien und definierten Verfahren zur Mittelvergabe mit klarer Priorisierung bestimmter Maßnahmen sind essenziell, um EbA-Projekte erfolgreich zu steuern.
- EbA-Projekte sollten den Wiederaufbau nach möglichen Extremwetterereignissen ausdrücklich mitplanen. Vorab eingerichtete Notfall-Wiederaufbaufonds und parametrische Versicherungsmechanismen, die durch Gefahrenkennzahlen wie Wellenhöhe und Windgeschwindigkeit ausgelöst werden, ermöglichen eine schnelle Reaktion nach Extremwetterereignissen. Investitionen in Ökosysteme können so abgesichert und ein schneller Wiederaufbau unterstützt werden.

1 Background and introduction

Ecosystem-based adaptation (EbA) has emerged as a transformative approach to enhance resilience against climate change impacts, particularly in tropical coastal zones where communities and natural systems are highly vulnerable. By harnessing the protective functions of historic maintained or restored healthy ecosystems, such as mangroves, coral reefs, and coastal wetlands, EbA offers a pathway that integrates biodiversity conservation with socio-economic development. However, transitioning from conceptual frameworks to tangible outcomes remains contingent upon the availability and accessibility of financing, as well as sufficiently predictable outcomes that can demonstrate a return on investment (ROI). Financing not only underpins the implementation of EbA measures but also shapes their scalability, sustainability, and equity. Despite growing recognition of EbA's multiple benefits, financial barriers persist. Fragmented funding mechanisms, limited access to climate finance for local actors, short planning horizons of development budgets, and stringent eligibility criteria of international funds often constrain investment in EbA at the scales required. In tropical coastal regions, which are characterized by diverse governance contexts, varying institutional capacities, and acute development pressures, these constraints are amplified, hindering the translation of scientific knowledge into on-the-ground action.

Conversely, emerging opportunities in climate finance, including innovative public-private partnerships, for-profit value propositions and evolving policy frameworks present new avenues for supporting EbA. The increasing prioritization of Nature-based Solutions (NbS) within global climate agendas has expanded the pool of potential funding sources, while blended finance models offer mechanisms to de-risk investments and attract private capital. Moreover, participatory planning processes and evidence from successful implementations are strengthening the case for more inclusive and sustained financing strategies.

This discussion paper explores the chances and limitations of EbA at tropical coasts with a focus on different financing instruments supporting coastal EbA. It builds on insights from the project 'Ecosystem-based adaptation for coastal regions worldwide' (TROPICAL ADAPT), which is supported by the German Federal Agency for Nature Conservation (BfN) with funds from the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety (BMUKN). As part of this initiative, a first workshop was held in Berlin in October 2025, bringing together approx. 40 practitioners, policymakers, and researchers to share experiences and lessons from ongoing EbA measures across different regions.

Fig. 1: Image from the workshop (Photo: Ecologic Institute)

Drawing on insights from both research and implementation, we examine different financing instruments to support coastal EbA in various case studies. By amplifying voices from practitioners, policymakers, and researchers, we seek to illuminate not only the gaps in current financing landscapes but also the potential levers for unlocking more effective equitable and profitable investment in EbA.

1.1 Introduction to EbA

EbA uses biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change (CBD, 2009; FEBA, 2017). It includes the sustainable management, conservation and restoration of ecosystems to reduce their vulnerability and enhance the resilience of people and nature to climate change. EbA falls under the broader concept of nature-based solutions (NbS) (IUCN, 2020).

Definition and characteristics of EbA

A well-known definition of Ecosystem-based Adaptation (EbA) was provided in a technical briefing by the Convention on Biodiversity (CBD, 2009, S. 6): *„Ecosystem-based adaptation uses biodiversity and ecosystem services in an overall adaptation strategy. It includes the sustainable management, conservation and restoration of ecosystems to provide services that help people adapt to the adverse effects of climate change."*

EbA is often characterized by:

- Reducing vulnerability to climate change while co-delivering benefits like food security, biodiversity conservation, and carbon sequestration.
- Being more cost-effective than traditional engineering solutions for climate change adaptation.
- Supporting community involvement and integrating a variety of actors (including different economic sectors, governments, civil society etc.).

Coastal EbA refers to the use of natural coastal ecosystems to enhance climate resilience and reduce coastal risks. These ecosystems act as natural buffers, reducing storm surges, preventing erosion, and mitigating flooding while also supporting fisheries (e.g. through nursery and spawning habitats for juvenile fish), water quality, and biodiversity. For coastal communities, EbA enhances resilience by integrating NbS with local livelihoods, governance structures, and long-term climate adaptation strategies, ensuring both environmental and socio-economic benefits (Favero & Hinkel, 2024; H. P. Jones et al., 2020a). For tropical and subtropical coastal regions, mangroves and coral reefs are the most addressed ecosystems regarding EbA approaches (see e.g. Giffin et al., 2020), therefore this paper focuses primarily on these two ecosystems.

While adaptation pathways include protection, accommodation, retreat, and land reclamation, the success or failure of adaptation remains one of the largest uncertainties shaping future coastal risk. Enabling conditions such as long-term planning, cross-scale coordination, public participation, and equity considerations are therefore central to effective coastal responses.

Within this context, coastal EbA has emerged as a critical pillar of coastal resilience. Synthesized evidence shows that mangroves, coral reefs, and saltmarshes can measurably reduce wave energy, stabilize shorelines, and lower extreme water levels. In doing so, these ecosystems provide both risk reduction and co-benefits for biodiversity and communities (Narayan et al., 2016; Perricone et al., 2023).

1.2 Coastal EbA under climate change

Coastal adaptation increasingly unfolds against the backdrop of accelerating relative sea-level rise. This rise is driven by the combined effects of global ocean warming, ice-sheet melt, regional climate variability, and local processes such as land subsidence (Nicholls et al., 2021). Together, these processes increase both the frequency and magnitude of coastal hazards.

These climatic drivers interact with non-climatic pressures, including coastal urbanization, delta subsidence, and land-use change. The result is a complex and spatially uneven coastal risk landscape, in which exposure is particularly high in island nations, such as Small Island Developing States (SIDS), delta regions, and rapidly growing coastal cities (Vousdoukas et al., 2023; Zhang et al., 2025).

Challenges in implementing EbA

However, the effectiveness of EbA in coastal settings is highly site-specific and fundamentally constrained by a range of climate change-related biophysical factors (Nalau et al., 2018; Temmerman et al., 2023). Coastal wetlands and biogenic habitats often require sufficient sediment supply to maintain surface elevation relative to rising sea levels, and where sediment deficits exist, restored systems may fail to accrete fast enough to keep pace with accelerated sea-level rise, undermining their protective function (Liu et al., 2021). Restoration outcomes are therefore strongly dependent on local geomorphic and sedimentary conditions, in addition to the restoration design, which challenges the implementation of EbA in many contexts. Moreover, ongoing and projected sea-level rise can lead to the loss of intertidal habitats and coastal squeeze, where natural space for ecosystem adjustment is restricted by hard infrastructure or adjacent development (Lansu et al., 2024; Leo et al., 2019). Ecosystems such as mangroves, salt marshes, and coral reefs are also subject to direct anthropogenic physiological, disease, competitive and ecological stresses including climate change (e.g., increased inundation, salinity shifts, thermal stress, storm surges), as well as additional pressures such as invasive species and deforestation, which can slow recovery and impair their capacity to deliver protective services or degrade ecosystems before EbA measures can become effective (H. P. Jones et al., 2012; Lacambra S et al., 2024; Vardi et al., 2021). These biophysical limits intersect with uncertainties in the pace and magnitude of future climate change, including uncertainty regarding how EbA strategies will perform across different climate scenarios and the difficulty of quantifying success due to complex ecosystem interactions influencing service provision, complicating the prediction of long-term EbA performance and highlighting the need for integrated planning that explicitly accounts for climate-driven thresholds and constraints on ecosystem resilience (Hülsen et al., 2025; IPCC, 2022; Trégarot et al., 2024).

Hybrid solutions

In cases where EbA alone cannot fully address coastal risks within a required time horizon, it can become effective when integrated into hybrid adaptation strategies that combine biological/ecological and engineered measures (Huynh et al., 2024). Hybrid systems can enhance reliability by allowing hard structures to immediately manage extreme conditions while ecosystems reduce everyday flood risk, improve stability, and deliver biodiversity and productivity as well as social, recreational, and aesthetic co-benefits (Bongarts Lebbe et al., 2021). Recent synthesis further shows that hybrid measures often outperform either grey or nature-based solutions alone in terms of resilience, cost-effectiveness, and multifunctionality (Huynh et al., 2024). In practice, integrating EbA with engineered infrastructure therefore represents a pragmatic pathway for managing escalating coastal risks under uncertain future sea levels.

EbA as no-regret-solution

Together, these insights underline that EbA must be understood as part of a broader, iterative, and learning-oriented adaptation process (Giffin et al., 2021). EbA measures can often be understood as a no-regret or low-regret option, meaning interventions that generate positive outcomes regardless of the magnitude or trajectory of climate impacts, because they deliver benefits under both current and future conditions (IUCN, 2014). Delaying investments in EbA ultimately drives up future costs, as it necessitates more expensive, complex, or disruptive 'grey' infrastructure to cope with escalating damage from intensifying climate extremes. In a 10-year timeframe, every USD 1 invested in adaptation yielding returns of up to USD 10.50 (Brandon, Kratzer, et al., 2025). EbA enhances resilience by building time and flexibility into adaptation pathways: it allows natural systems to *adjust* over decades, supports ecosystem recovery, and can be modified in response to monitoring and new information, which is critical given the uncertainty in future sea-level rise and extreme events. EbA's *no-regret* character stems from its ability to simultaneously reduce risk exposure and generate multiple co-benefits, such as biodiversity conservation, carbon sequestration, improved livelihoods, and disaster risk reduction, that accrue even in the absence of extreme climate change, making investments in EbA justifiable across a range of plausible futures. However, realizing these benefits in the long-term requires addressing data gaps, scaling up long-horizon monitoring and evaluation, and embedding ecological measures within strategic, system-wide coastal planning frameworks that integrate adaptive management principles and stakeholder engagement (Riera-Spiegelhalder et al., 2023; Valente & Pinho, 2025). When combined with engineered and policy instruments through hybrid strategies, EbA contributes to robust coastal resilience outcomes while maintaining flexibility to adjust as ecological conditions, socio-economic contexts, and climate hazards evolve. These characteristics are illustrated by applied EbA initiatives that combine ecological restoration with adaptive management and community engagement, even under conditions of institutional and social constraint.

2 Stocktake of coastal EbA

2.1 Current state of coastal EbA in tropical and subtropical areas

Recent quantitative reviews clarify the extent of coastal EbA in tropical and subtropical regions. A systematic review by Giffin et al. (2020) identified 79 marine and coastal EbA projects implemented or planned across 24 countries in Asia and Oceania, with mangroves and coral reefs being the most frequently used ecosystems in such interventions. The study (ibid.) categorised project activities into three main types: 31% of projects implemented a conservation action, with the most common action being community awareness campaigns; 31% implemented a management and planning activity, with socio-ecological assessments being the most common type of activity; and 38% implemented a restoration process, e.g. restoring mangroves. Overall, mangrove restoration was the most frequently implemented approach.

On a global level, complementary literature syntheses show that mangrove restoration appears in about 62% and coral reef rehabilitation in about 51% of EbA studies reflecting a strong emphasis on these habitats in EbA research and practice, followed by wetland conservation more broadly (~47%) (Ardiyanti et al., 2025). A review of coastal NbS on a global level identified 252 relevant papers (Paxton et al., 2024) and the results showed that 30% of active NbS interventions for coastal protection were implemented in mangrove forests (26%) and coral

reefs (4%). Also, on a global scale, evaluations of ecosystem service potential indicate that millions of vulnerable coastal residents, approximately 30.9 million people, live in zones where mangrove and coral reef ecosystems could provide adaptive benefits against storm and sea-level risks, with these ecosystems covering 1.6–1.8 million hectares of coastline (H. P. Jones et al., 2020b). Despite growing project activity, there remains no comprehensive global inventory of coastal EbA measures in tropical and subtropical regions. Available information is fragmented, scattered across case studies and grey literature, making it difficult to assess overall implementation, scale, and effectiveness.

2.2 Supporting conditions for EbA implementation in tropical and sub-tropical coastal areas

For the successful implementation of EbA approaches, a set of enabling institutional, social, and ecological conditions must be established prior to and during implementation. A primary requirement is effective and inclusive governance arrangements. Key attributes of such governance include accountability, transparency, participatory decision-making, and coherence between policy objectives, legislation, and on-the-ground practice. (Nalau et al., 2018). Recent assessments further emphasize that weak governance and fragmented institutional mandates remain major barriers to EbA effectiveness in coastal regions (Seddon et al., 2020).

An important governance strategy is explicitly demonstrating the socio-economic benefits of EbA to local stakeholders, thereby increasing political, commercial and community buy-in (Perricone et al., 2023). Nalau et al. (2018) further advocate for locally grounded implementation, as EbA benefits, such as reduced flood risk or enhanced livelihoods, are often realized most directly at the community level. Recent coastal and marine NbS studies highlight that community-based and co-managed approaches tend to outperform top-down interventions, particularly where they are embedded within broader national adaptation frameworks (Armstrong et al., 2025; Raha et al., 2024; Vasseur, 2021). The importance of linking local action with national and regional governance structures, such as marine protected area networks, is well established (Grantham et al., 2011).

Many authors emphasize the particular relevance of EbA for developing and least developed countries, especially in tropical and subtropical coastal regions (Nalau et al., 2018; Reid et al., 2019). This is reflected in Giffin et al.'s (2020) review of EbA projects in Asia and Oceania, where the majority of documented cases are situated in low- and middle-income country contexts. Recent assessments attribute this pattern to heightened vulnerability driven by poverty, rapid population growth, and high exposure to coastal hazards, combined with limited access to capital-intensive engineering solutions (Reid et al., 2019). EbA approaches are frequently described as cost-effective, flexible, and locally accessible, making them particularly suitable for tropical coastal communities highly-dependent on marine and coastal ecosystems (Giffin et al., 2021; Perricone et al., 2023).

Beyond governance and contextual awareness, a robust understanding of the interacting ecological and social systems is essential. Planning processes must therefore consider ecological dynamics, socio-economic conditions, and all relevant drivers of environmental change, including climate and non-climatic pressures (Nalau et al., 2018; Seddon et al., 2020). Meaningful engagement and communication are further central enabling conditions for EbA success (Grantham et al., 2011). More recent studies reinforce that cultural relevance and locally appropriate communication strongly influence EbA acceptance and effectiveness (Nalau et al.,

2018; Reid et al., 2019). Johnson et al. (2022) revealed in their meta-review, that review papers on NbS and EbA rarely focus on social issues. However, actively including local communities in EbA process supports ownership, long-term stewardship, and the effectiveness of bottom-up EbA processes (Haines-Matos et al., 2025; UNEP, 2023a), as also demonstrated in the Case Study example in Box 1.

Box 1: Adaptive management and no-regret EbA through mangrove conservation in Trelawny, Jamaica

Mangrove ecosystems in Trelawny Parish, Jamaica, have experienced sustained degradation driven by informal coastal development, pollution, and land-use pressures, with more than 150 hectares affected over the past decade. In response, conservation efforts have focused on protecting ecologically critical mangrove areas, restoring degraded sites, and improving waste management in adjacent communities, particularly in the Salt Marsh area, where informal settlements border high-quality mangrove stands.

The intervention applies an adaptive management approach, combining targeted ecological restoration with long-term monitoring and community engagement. Field teams established permanent monitoring plots and recorded improvements in seedling density, mangrove forest structure, and site condition, following restoration measures such as propagule planting and the removal of fill material.

Beyond biophysical outcomes, the project generates co-benefits under both current and future climate conditions. Community-based activities, including clean-up campaigns, school programmes, and local events, have strengthened environmental awareness, supported behavioural change, and fostered local stewardship. Planned complementary measures, such as low-impact ecotourism infrastructure (like planned boardwalks or a bird observation tower) and a fish sanctuary, aim to diversify livelihoods and reinforce long-term incentives for conservation.

Despite these benefits, the project faces persistent challenges, including low participation in formal meetings, legal uncertainty around land tenure, administrative delays, and ongoing encroachment on mangrove habitat. Nevertheless, the project demonstrates that even under institutional and social constraints, EbA can deliver tangible risk-reduction and livelihood benefits, making it a robust no-regret investment that remains justified across a wide range of climate and socio-economic futures.

By Camilo Trench and Jason Grant (University of the West Indies, Discovery Bay Marine Laboratory)

Fig. 2: Pictures of mangrove conservation measures in Salt Marsh, Trelawny Parish (Photos: The University of the West Indies, Discovery Bay Marine Laboratory)

2.3 Constraints on the implementation of EbA approaches in tropical and subtropical coastal areas

Institutional barriers often arise from persistent mismatches between governance scales and the spatial or temporal nature of coastal hazards. Where vertical and horizontal coordination is weak, policy fragmentation limits coherent planning and decision-making, particularly when local customary governance operates separately from national adaptation frameworks. Top-down mandates without meaningful local input can reduce legitimacy, diminish community ownership, and impede implementation effectiveness (Nalau et al., 2018; Reid et al., 2019).

Financial limitations remain a significant constraint, as sustained funding for EbA, especially for long-term monitoring, adaptive management, and maintenance, is often lacking. Short project cycles and donor-linked budgeting hinder the establishment of iterative learning systems essential for adaptive EbA (e.g., future adjustments based on ecological feedbacks) (Meraj & Hashimoto, 2025; Nalau et al., 2018; UNEP, 2023a).

Knowledge and evidence gaps further constrain EbA learning and uptake. Knowledge differences between local population and scientific/technical actors can complicate problem framing and intervention design. Moreover, despite increasing interest in nature-based solutions, systematic, peer-reviewed documentation of EbA outcomes remains sparse, particularly in the global south, limiting opportunities for synthesis and comparative learning. Uncertainty about long-term performance under high-end climate scenarios also complicates decision-making for risk-averse planning and the limited evidence on the return on investment of EbA interventions further constrains the mobilisation of public and private finance (Nalau et al., 2018; Seddon et al., 2020; UNEP, 2023a). Furthermore, Giffin et al. (2020) criticise the lack of a comprehensive overview of where, why and how EbA projects have been implemented in marine and coastal ecosystems. This lack of documentation limits the ability to learn from past experiences and identify synergies between EbA and related approaches, such as ecosystem-based disaster risk reduction. This can also result in a concentration and duplication of activities in communities that offer particularly favourable conditions for pilot implementation and are therefore selected more frequently than others. In addition, misaligned incentives may arise in some cases, for example where the expectation of renewed funding leads to a lack of maintenance or stewardship of restored ecosystems, such as mangrove seedlings. Equally important are the correct monitoring and evaluation mechanisms and indicators in order to assess whether implemented EbA measures, such as mangrove restoration, are successful in the long term and plants survive a required number of years (Su et al., 2021).

Socio-cultural constraints include divergent risk perceptions, differing ecosystem values, and contested preferences for landscape change, which can impede consensus on EbA priorities. Cultural framings of climate concepts can also affect communication and uptake of EbA; for example, adaptation language may not translate intuitively across cultural contexts, further reducing stakeholder engagement (Amorim-Maia & Olazabal, 2025; Reid et al., 2019).

Finally, the limited integration of EbA within broader climate adaptation and disaster risk governance architectures restricts its potential. Where EbA remains siloed, practitioners struggle to link restoration efforts with sectoral risk reduction strategies (e.g., coastal engineering, land-use planning), reducing potential synergies and scalability (Amorim-Maia & Olazabal, 2025; Corgo et al., 2024). These constraints are not merely theoretical but are evident in many coastal contexts, where fragmented governance and unstable financing undermine otherwise promising nature-based initiatives; the case study presented in Box 2 is explicitly grounded in

these baseline challenges and explores pathways for overcoming them through integrated, multi-level action.

Box 2: Integrated Nature-Based Approaches for coastal resilience in Limbe, Cameroon (INBA-CRL)

Limbe, Cameroon, is exposed to multiple, interacting climate and environmental stresses, including coastal and riverine flooding, coastal erosion, heat extremes, and landslides. These hazards are amplified by rapid urbanization, ecosystem degradation, and weak spatial planning, making future risk trajectories highly uncertain. Previous nature-based initiatives in the area have delivered uneven outcomes, largely due to fragmented land ownership, short-term financing, and the absence of sustained governance and maintenance structures.

To respond to these challenges, researchers have developed a project proposal titled 'INBA-CRL', which frames ecosystem restoration as a no-regret adaptation strategy. Rather than relying on a single hazard scenario, the proposed project targets persistent underlying risk drivers, including degraded mangroves and wetlands, unmanaged floodplains, poor urban planning and limited community preparedness. Planned interventions combine coastal ecosystem restoration, climate-resilient infrastructure upgrades, circular brown-to-green economy and community-level risk preparedness, embedded within municipal planning and disaster risk management processes. Even under uncertain future climate and socio-economic pathways, the planned actions could deliver immediate co-benefits, including biodiversity enhancement, improved water regulation, urban improvement, and local employment opportunities.

Key lessons from the Limbe concept highlight that EbA delivers the greatest value when implemented as a system-wide, integrated intervention rather than as isolated restoration projects. The case proposes to embed EbA within formal planning frameworks, aligning ecological measures with economic priorities (e.g. ports and tourism), and invest in long-term governance and financing arrangements. These design principles are transferable to other rapidly urbanizing tropical coastal cities facing compound climate risks, particularly in contexts where uncertainty makes flexible, reversible, and multi-benefit solutions preferable to rigid, capital-intensive infrastructure.

By Johannes Amate Belle (University of the Free State-Disaster Management Training and Education Centre for Africa)

2.4 Building the evidence base of implemented coastal EbA measures

While awareness of, and interest in, EbA is increasing in the political, managerial, and NGO spheres, an analysis of the global potential of EbA strategies (particularly in the coastal context) is lacking. Assessments of this nature have also not been incorporated thoroughly with information about the co-benefits of protecting the ecosystems under consideration, threats and vulnerabilities, and their existing protections. This lack of data prevents prioritization of regions most in need of, or that would most benefit from, EbA solutions, which also obscures the ability to effectively distribute financial resources for EbA strategies (H. P. Jones et al., 2020a; Sack, 2023).

While many EbA projects have been implemented across numerous countries worldwide, particularly in tropical and subtropical regions, a comprehensive and fully consolidated evidence base remains fragmented. Although a growing number of web-based repositories and knowledge platforms compile valuable information on EbA and NbS interventions[1], these remain partial and dispersed, and there is currently no comprehensive database that systematically tracks the number of EbA initiatives, policies, or investments across scales, as stated in a recent UNEP report. This makes it difficult to develop a complete picture of global progress and trends in EbA implementation. A consolidated repository, by providing a clear evidence base, would improve project design, prevent duplication, and help direct scarce funding toward effective solutions (Beeston et al., 2023).

International organisations and networks also play a key role in strengthening the EbA evidence base by promoting standardised methodologies, supporting monitoring and evaluation, and facilitating knowledge exchange across regions. Institutions such as the IUCN, the Global Mangrove Alliance (GMA), or the International Coral Reef Initiative (ICRI) provide technical guidance, synthesis reports, and best-practice frameworks that help to make EbA outcomes more comparable and transferable. By supporting project documentation, enabling data sharing, and disseminating lessons learned from implementation, these organisations help to overcome fragmentation in the evidence base and increase the visibility of coastal EbA in policy and practice.

This highlights the need for a more robust evidence base and for improved measurements of EbA outcomes in coastal communities. As illustrated by the Saint Lucia coral restoration case study (Box 3), EbA evidence can be strengthened when implementation is coupled with systematic monitoring, skills standardization, and integration into existing coastal management frameworks, enabling learning beyond individual project sites.

Box 3: Building evidence for coral restoration through practice in Saint Lucia

Coral restoration and coral gardening initiatives within the Soufrière Marine Management Area (SMMA) in Saint Lucia provide an emerging evidence base on the feasibility, effectiveness, and institutional requirements of active reef restoration in tropical small island contexts. Since 2017, the program has progressively expanded local restoration capacity by training local coral gardeners, increasing their number from nine to 18 by 2022. This scaling process has enabled systematic experimentation with nursery design, outplanting techniques, species selection, and maintenance regimes under local ecological conditions.

A central contribution of the initiative is the standardisation of skills and monitoring practices. The development of a National Vocational Qualification (NVQ) in Coral Reef Restoration (2019), complemented by a PADI Coral Reef Restoration Specialty, has formalised training pathways and improved consistency and comparability of restoration practices.

[1] Such repositories are for example the IUCN PANORAMA website with examples of solutions for a healthy planet (https://panorama.solutions/en), the Nature-Based Solutions Database developed by the Equator Initiative (https://www.equatorinitiative.org/nature-based-solutions-database/), or the NbS Case Study platform (https://casestudies.naturebasedsolutionsinitiative.org/).

This institutionalisation supports learning across sites and over time, strengthening the empirical basis for coral restoration as EbA.

Ecological monitoring associated with the program provides applied insights into coral survivorship, growth, and maintenance needs in a high-use marine environment. While coral restoration alone cannot offset large-scale climate impacts, the Saint Lucia experience demonstrates how adaptive, practice-based interventions can generate transferable knowledge, support ecosystem recovery, and incrementally enhance coastal resilience when embedded within existing coastal management frameworks.

By Newton Eristhee (Clearcaribbean)

Fig. 3: Pictures from the coral restoration and coral gardening initiative in Saint Lucia (Photos: Clearcaribbean)

3 Financing landscape of coastal EbA

Valuation and financing often plays the central role in enabling the design, implementation, and the long-term sustainability of EbA in tropical and subtropical coastal and marine areas (Favero & Hinkel, 2024). The adequate and targeted use of financial resources is essential, not only to support the planning and execution of EbA measures, but also to ensure effective monitoring, maintenance and meaningful stakeholder and community engagement over time (GIZ, 2018). The financing landscape for coastal EbA is strongly shaped by the fact that coastal protection is widely treated as a public good and therefore has traditionally relied on public funding, while many projects still struggle to secure adequate resources for ongoing monitoring and long-term maintenance (Eiselin et al., 2022).

Because coastal resilience and flood risk management rarely generate direct reliable revenues, establishing stable cost recovery remains a major constraint for mobilizing private investment into nature based coastal infrastructure (World Bank Group, 2025). Public finance like grants is therefore often used to make projects investable by funding feasibility studies and evidence on benefits, particularly in early operational phases when benefits may not yet translate into covering costs (World Bank Group, 2025). However, since public funding is often limited to a defined project period, there is a strong need for blended finance approaches that combine public and private funding to cover long-term operation, monitoring and maintenance, which is central to long-term success and scaling up of coastal EbA.

Current adaptation finance gaps

Recent debates on climate-adaptation finance highlight a mismatch between political commitments and actual financial flows, which also remains a persistent issue for financing and scaling EbA. The UNEP Adaptation Gap Report (2025) highlights that global progress on climate adaptation remains inadequate despite widespread policy uptake. While 172 out of 197 countries worldwide have a national adaptation plan, strategy, or policy in place, financial resources remain far below what is required to implement these plans effectively (UNEP, 2025).

An analysis of the adaptation finance gap estimates adaptation costs for developing countries to amount to approximately USD 310–365 billion per year by 2035, while current international public adaptation finance flows reach only around USD 26 billion annually (UNEP, 2025). A recent study by the World Resources Institute (Brandon, Kratzer, et al., 2025) showed that in addition to the overall magnitude of the adaptation finance gap, not only increased volumes of finance are needed, but also a much more strategic allocation of resources . It is therefore essential to not only substantially scale up financial flows, but also to strategically prioritize cost-effective approaches such as EbA that can deliver adaptation, biodiversity, and development benefits simultaneously (Scarano, 2017; UNEP, 2025). The World Resources Institute further indicates that adaptation investments can generate substantial economic returns, with every USD 1 invested in adaptation yielding benefits of up to USD 10.50 over a ten-year period (Brandon, Kratzer, et al., 2025). Despite this information and growing interest among policymakers, donors, scientists and practitioners, the current scale and pace of EbA implementation remain below its potential (UNEP, 2022a), even though EbA has demonstrated a strong capacity to reduce climate risks while delivering co-benefits for biodiversity, livelihoods and long-term resilience, particularly in coastal contexts (Thomas et al., 2021).

Finance flows for coastal EbA are currently not systematically tracked, which makes it difficult to quantify how much adaptation finance is currently directed towards coastal EbA measures. As an indicator, global finance flows towards NbS are estimated around USD 154 billion per year, yet only about nine percent, which equals USD 14 billion, are allocated to marine NbS (UNEP, 2022b), suggesting that coastal and marine EbA remains a comparatively small share of overall nature-related investment despite its high relevance for climate risk reduction and resilience.

The role of national and international climate and adaptation funds

Despite growing adaptation needs, most climate finance is still directed toward mitigation measures, whilst adaptation finance continues to represent a relatively small share of overall climate finance (Climate Policy Initiative, 2025). In this context, the ability of countries to translate available adaptation finance into effective investment still depends heavily on domestic public financial management systems and fiscal space (OECD, 2025). Weaknesses in public financial management systems, including the limited integration of climate risks into budget planning, challenges in assessing the full benefits of adaptation investments, procurement practices that prioritize upfront costs over long-term resilience, and insufficient tracking of adaptation-related expenditures, further hinder effective investment in adaptation (OECD, 2025). These challenges are especially acute at the national and subnational level, where local authorities often lack fiscal autonomy, technical capacity, personnel, and access to reliable climate data (OECD, 2023; UNEP, 2025).

Over the years, many climate-vulnerable countries have established dedicated national climate adaptation funds to better coordinate domestic and international resources, strengthen

national ownership over adaptation finance, and ensure that adaptation priorities are not overshadowed by mitigation efforts. A prominent example is the Bangladesh Climate Change Trust Fund (BCCTF), which was established in 2009 and is financed primarily through the national budget of Bangladesh. The Fund supports adaptation measures such as flood protection, coastal resilience, water management, and climate-resilient livelihoods in Bangladesh. Approximately USD 450 million have been allocated to the fund to support these measures (United Nations, 2021). However, while domestic public finance remains a key source of adaptation investment, many countries currently face severe fiscal pressures, institutional fragmentation, and competing demands for public resources, which constrain adaptation spending and limit the scale and continuity of finance flows (OECD, 2025).

At the international level, adaptation finance is primarily channelled through several multilateral climate funds, which play a central role in supporting adaptation planning and implementation in developing countries, particularly in tropical and subtropical regions. The Green Climate Fund (GCF), for example, has approved more than USD 19 billion in climate finance since becoming operational, with its portfolio being approximately evenly split between mitigation and adaptation investments (MCFs, 2025). As of 2024, this means that roughly USD 9–10 billion of the GCFs cumulative approved finance had been allocated to adaptation, making it the largest single multilateral source of adaptation finance globally, with a strong focus on least developed countries, SIDS, and African countries (MCFs, 2025). The Global Environment Facility (GEF) also plays an important role in adaptation finance, primarily through the Least Developed Countries Fund (LDCF) and the Special Climate Change Fund (SCCF), which support adaptation action in vulnerable developing countries (GEF, 2024). The climate investment funds (CIF) also contribute to the international adaptation finance flows, most notably through the Pilot Program for Climate Resilience (PPCR), which supports large scale resilience investments embedded in national development strategies. In total, the Climate Investment Funds have mobilized over USD 12.5 billion in climate finance overall. Within CIF, the Pilot Program for Climate Resilience (PPCR) has approved 93 projects amounting to around USD 1 billion in dedicated adaptation funding and is expected to mobilize almost USD 3.1 billion in co-financing. The International Climate Initiative (IKI), an initiative of the German Federal Government, has committed approximately EUR 7.5 billion since 2008 across mitigation, adaptation, and biodiversity objectives (BMWE, 2023). However, mitigation projects still constitute the largest share of IKI-funding. Out of the committed EUR 1 billion in 2024, a total of EUR 529 million went directly into mitigation, whereas adaptation totaled EUR 129 million (IKI, 2024).

Multilateral Development Banks (MDBs) can be described as playing a complementary role to dedicated multilateral climate funds, but this complementarity needs to be specified carefully. Whereas dedicated climate funds are designed to provide targeted climate finance, often through more specialized and grant oriented windows, MDBs contribute greater scale, broader sectoral reach, and the ability to embed adaptation and resilience objectives within wider development operations, including investment lending and policy-based finance (Oxfam & CARE, 2025; World Bank Group et al., 2025). In 2024, MDBs reported USD 26.31 billion in adaptation finance commitments in low- and middle-income economies and USD 5.013 billion in high income economies, with adaptation finance in low- and middle-income economies rising by 6.5% from 2023 to 2024 (World Bank Group et al., 2025). However, MDB finance is not a substitute for dedicated climate funds, because concessionality remains a concern. It is estimated that MDBs provided 79% of their climate finance in 2021 and 2022 as loans, with grants accounting for only 12%. For this reason, MDBs are best understood as complementing

dedicated climate funds by scaling and mainstreaming adaptation finance, while grant based and highly concessional funds remain essential for vulnerable countries and communities that cannot sustainably take additional debt (Oxfam & CARE, 2025).

Beyond the large multilateral climate funds, more specialized funding has emerged to directly support EbA. In the Caribbean, the Caribbean Biodiversity Fund's EbA Facility provides a dedicated regional financing window for marine and coastal adaptation and is backed by EUR 55 million from Germany's International Climate Initiative (IKI) through KfW (Caribbean Biodiversity Fund, 2025). At the global level, the Global EbA Fund, implemented by IUCN and UNEP with support from IKI, finances catalytic projects that help create enabling conditions for the uptake and mainstreaming of EbA (IUCN, 2022). Together, these funds complement broader climate funds and MDB finance by channelling more targeted support to EbA-specific priorities and helping to strengthen its uptake and implementation in practice.

In summary, while adaptation finance has increased over recent years at both the national and international level, the allocation of current financial flows remains insufficient to meet the rapidly expanding adaptation needs (UNEP, 2025). National and international finance flows for adaptation measures continue to only represent a small share of overall climate finance and fall far short of estimated requirements. Closing the adaptation gap requires a substantial scale-up of public adaptation finance, including a stronger reliance on grants and other concessional instruments and an improved alignment between national and international public finance management systems (UNEP, 2025). At the same time the contribution of the private sector is expected to remain limited, underscoring the fact that public finance will continue to play a central role in funding adaptation measures with low or no commercial returns.

Building a sustainable financing architecture

Against this backdrop of fragmented and often insufficient adaptation finance flows, increasing attention is being paid to the need for more coherent and durable financing arrangements. In this context, a sustainable climate finance architecture can provide a useful framework for understanding how institutional, financial and government arrangements shape the mobilization and allocation of resources to support long term sustainability objectives. Climate finance flows through a complex and evolving set of multilateral, bilateral and national channels with differing governance structures, modalities, and objectives (Evéquoz et al., 2025). Rather than focusing on individual financing instruments in isolation, this perspective emphasizes the interaction between funding channels, policy frameworks, and institutional arrangements, while also drawing attention to the coordination, monitoring, reporting, and accountability challenges that can arise from this diversity. In the context of climate adaptation and conservation, this systemic perspective is particularly critical, as many initiatives continue to rely on short-term, project-based finance that struggles to sustain outcomes beyond initial funding cycles (UNEP, 2023b).

The Saint Lucia case (see Box 4) provides a concrete illustration of how a sustainable financing architecture for EbA and conservation can be operationalized at the national level. As documented in the case study, the Saint Lucia National Conservation Fund (SLUNCF) demonstrates how institutionalized trust fund structures can move EbA beyond short-term, project-based financing toward a more durable and programmatic approach. The core strength of the SLUNCF model lies in its capacity to attract and align multiple sources of funding to nationally determined conservation priorities and thereby helps to advance adaptation objectives in a coordinated and sustained manner. This leads to increased durability and predictability of

finance flows, supported by a strong focus on building alliances, which enable the optimization of resources through clearly defined courses of action.

The Saint Lucia model offers important learning opportunities for other Caribbean countries and SIDS, including those without existing trust funds or stable endowments, particularly through learning exchanges, partnerships such as memoranda of understanding, and regional initiatives. Experience indicates that sustainable EbA financing mechanisms, including trust funds and blue economy instruments, need to be tailored to national and local contexts and grounded in principles of accountability, reliability and flexibility in order to remain responsive to local needs.

Box 4: EbA sustainability and finance: A case study on the role of National Conservation Trust Funds (CTFs)

The case outlines a sustainable financing architecture for conservation and EbA in Saint Lucia, centered on the Saint Lucia National Conservation Fund (SLUNCF) and its integration into the Caribbean Biodiversity Fund (CBF) regional framework. Funding streams include national conservation trust fund endowments, sinking funds for regional EbA and circular economy projects, and partnership agreements with CBF, Republic Bank EC Ltd., BIO-PAMA/IUCN, GCFI, and the other international donors. The mechanism blends grants, co-financing arrangements, and private-sector participation to support climate and biodiversity resilience, food security initiatives, capacity building, and sustainable livelihoods. Currently, 11 Caribbean countries are part of the CBF endowment structure, which has a match requirement and channels resources toward national and regional conservation actions. In Saint Lucia, priorities include mangrove restoration at Makoté and Esperance, marine protected area management, and reef-risk insurance schemes implemented jointly with regional partners. The model positions nature-based economic development within the blue economy as a pathway for long-term conservation finance and community-level resilience.

The SLUNCF demonstrates how sustainable financing can work through its ability to attract multiple sources of funding and resources to advance nationally determined conservation and EbA activities in a programmatic way.

By Craig Henry (Saint Lucia National Conservation Fund)

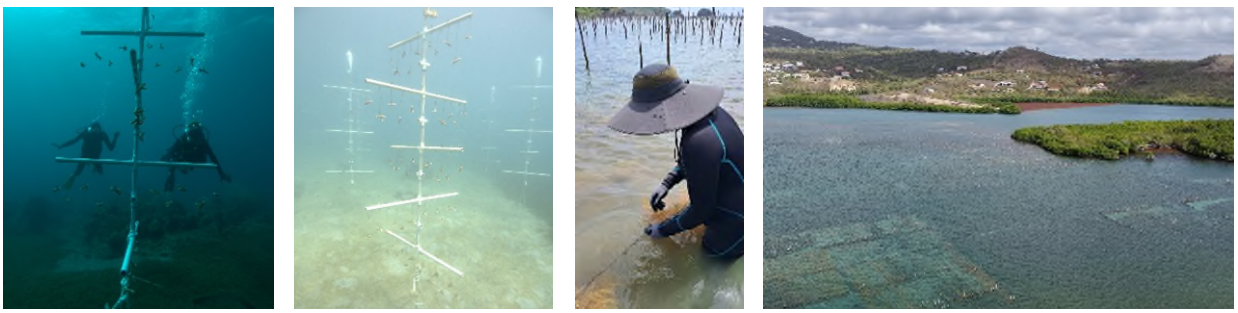

Fig. 4: Coral gardening and Sea moss farming in Saint Lucia (Photos: Saint Lucia National Conservation Fund)

Blended finance

A well-built financing architecture can support the use of multiple funding sources over the lifecycle of EbA interventions. Rather than relying on a single instrument, blended finance combines public, philanthropic and private capital in a structured manner to address different risk profiles, financing needs and time horizons.

In practice, blended finance structures for adaptation frequently rely on concessional loans and public finance in the early project phase to enable project preparation, infrastructure investments and ecosystem restoration activities. Multilateral development banks and climate funds play a central role at this stage by providing below-market loans, guarantees or technical assistance that help overcome initial investment barriers and improve project bankability (Brandon, Aggarwal, et al., 2025). These early-stage instruments are often essential for establishing the ecological and institutional foundations of EbA interventions, particularly in coastal and marine settings where restoration benefits can often only be realized over longer timeframes.

As projects mature, blended finance aims to gradually crowd in private sector engagement to support long-term operation, maintenance and associated livelihood or value-chain activities (Brandon, Aggarwal, et al., 2025). This transition is critical to reduce long-term dependence on public funding and to sustain EbA outcomes beyond the initial implementation phase (GIZ, 2018). Private capital may be mobilized through revenue-generating components such as sustainable fisheries, eco-tourism, aquaculture or ecosystem service-based business models, which are often embedded alongside restoration activities. In this way, adaptation benefits are coupled with economic activities that can support financial sustainability over time.

The following case study (Box 5) shows how such a phased and multi-source blended financing approach can be applied in practice, demonstrating the role of stakeholder collaboration and public–private funding in sustaining ecosystem restoration and resilience outcomes.

Box 5: Ashton Lagoon restoration: A case study of stakeholder collaboration and public-private funding to support resilience in St Vincent and the Grenadines

Ashton Lagoon, the largest mangrove ecosystem in St Vincent and the Grenadines, plays a critical role in biodiversity conservation, coastal protection, and local livelihoods. Located on Union Island, the lagoon has repeatedly buffered storm impacts during major hurricanes, demonstrating its function as natural coastal defence in a highly exposed small-island context. Led by Sustainable Grenadines Inc. (SusGren), the Ashton Lagoon Restoration Project shows how blended finance can be mobilised in the absence of stable public funding.

After the withdrawal of an initial grant in 2014 due to prolonged approval processes, the project faced a substantial financing gap. Implementation resumed in 2018 through a sequenced financing package combining private investment, public oversight, donor grants and community in-kind contributions. Early catalytic funding was provided by a private resort island, which invested approximately USD 200,000 to initiate the first restoration phase, including the development of an eco-trail. This upfront private capital absorbed early implementation risk and enabled visible progress, which subsequently helped unlock grant financing from the Caribbean Community Climate Change Centre. While the Government of St Vincent and the Grenadines did not provide direct financial resources, it played

a critical enabling role through regulatory approvals, technical oversight and institutional backing.

Community contributions formed a further layer of the finance structure. Local residents helped by providing labour, materials and stewardship, while private contractors supported implementation through equipment, boats and technical services at no cost. Over time, restoration finance was complemented by revenue-generating livelihood activities linked to ecosystem recovery, including eco-tourism infrastructure, guided visits, mangrove honey production and training programmes.

The Ashton Lagoon case highlights how blended finance for EbA can function as a dynamic process rather than a fixed instrument, combining monetary and non-monetary inputs, sharing risks across actors, and aligning restoration outcomes with local economic benefits.

By Orisha Joseph (Sustainable Grenadines Inc)

Fig. 5: Photos from the Ashton Lagoon case study (Photos: Sustainable Grenadines Inc)

4 Instruments for financing EbA

Financing EbA can be supported through a diverse set of instruments, drawing on public as well as private funds and often combining them into blended sources of finance, as mentioned above. The successful application of financing instruments depends on the context in which they are applied, including institutional capacity, governance arrangements, stakeholder engagement, benefit sharing mechanisms, scalability, and monitoring systems, which often determine whether a given financing instrument is feasible and effective in a specific setting (Ashton, J. et al., 2025). In addition, access to early-stage capital, the potential for generating financial returns, and the presence of international and domestic market demand to generate those returns are key factors shaping the viability and uptake of certain instruments.

Enabling conditions of different financing instruments

Some financing instruments link ecosystem outcomes to quantifiable and monetizable indicators, while others rely on public finance or broader development and conservation outcomes that are not easily priced. As a result, the suitability of different instruments for EbA varies widely, depending on context and objectives. Across different financing approaches, effectiveness not only depends on the design of a specific instrument but also on the presence of appropriate enabling conditions that allow a financing mechanism to function in practice. In many cases, public and philanthropic finance plays a catalytic role in early project phases by establishing these enabling conditions, reducing risk, and creating the foundations necessary to mobilize longer-term and more diversified sources of capital for EbA (Ashton, J. et al., 2025).

The enabling conditions presented below represent some of the most common conditions relevant to different financing instruments, but they do not constitute an exhaustive set, as additional and more specific conditions may apply depending on the instrument and project context.

Key enabling conditions (modified according to Ashton, J. et al., 2025)

- **Accessible formal financial services:** Access to banking, insurance and other formal financial services is particularly important in remote or marginal areas, where local communities and micro, small, and medium-sized enterprises may otherwise face barriers to participation in financing mechanisms. For some instruments, such financial infrastructure is necessary to ensure that funds can be channelled, managed, and distributed effectively and equitably.
- **Generation of financial returns:** This condition is especially relevant for instruments that depend on debt-based or equity-based investment and therefore require a return on investment. By contrast, public or philanthropic finance may remain viable even where direct monetary returns are limited, provided that positive environmental or social outcomes can be demonstrated through clearly defined indicators.
- **International market demand:** Refers to demand from global markets or from buyers outside the country in which the project takes place. Where EbA-related products, services, or ecosystem-service-linked assets are intended for sale beyond the domestic market, the ability to generate revenue depends on sufficient external demand, which may also be supported by incentives for certified sustainable products and services.
- **Domestic market demand:** Refers to demand for project-related products or services within the country itself. Domestic demand can be equally important for financing viability, particularly because it often relies on shorter and less complex supply chains and is shaped by local market conditions, consumer preferences, and policy incentives.
- **Access to early-stage capital:** Many EbA initiatives require upfront financial resources during the design and preparatory phases, long before returns can materialize. Such investment may be needed for stakeholder engagement, capacity and knowledge building, understanding the regulatory context, establishing baseline data and methodologies, project design, risk identification, and the development of essential infrastructure such as data systems and financial flows.
- **Large scale:** Some financing instruments are only viable when projects are implemented at a sufficiently large scale or when benefits are measurable and attributable across a large enough area to justify transaction costs and attract finance. Where individual projects are too small, aggregation can provide an alternative pathway to reach the scale required for financial viability.

The following table, inspired by Rare Europe and Conservation International (2025), summarises the most common enabling conditions associated with different financing instruments. Rather than ranking instruments, it can be used as a practical screening tool to assess the feasibility of financing options in specific local contexts, identify potential barriers, and inform decision makers.

Tab. 1: Enabling conditions needed for diverse financing instruments. Modified according to: "Beyond Carbon Credits: Demystifying non-carbon market approaches for blue carbon ecosystems." (Ashton, J. et al., 2025)

Financing Approach	Financing Instrument	**Enabling conditions:** What conditions are needed to design and implement different financing instruments for EbA? Note that further unique enabling conditions may apply for each instrument.					
		Accessible formal financial services	**Generation of financial returns**	**International market demand**	**Domestic market demand**	**Access to early stage capital**	**Large scale**
Enabling and Catalytic finance	**Grant based financing**	Often	Sometimes	Sometimes	Sometimes	Always	Often
	Debt-for-nature swaps	Often	Often	Sometimes	Sometimes	Often	Always
Performance and results-based finance	**Blue Carbon Credits**	Always	Always	Often	Sometimes	Always	Often
	Biodiversity Credits	Often	Always	Often	Often	Always	Sometimes
	Payments for Ecosystem Services	Always	Always	Often	Often	Always	Sometimes
	Community Eco-Credit	Sometimes	Sometimes	Sometimes	Sometimes	Always	Sometimes
Risk and resilience-based finance	**Parametric insurance and risk transfer**	Always	Always	Often	Always	Sometimes	Often

The categories in the columns should be interpreted as follows:

Always: The financing instrument requires this enabling condition. If it cannot be fulfilled, the instrument should not be pursued.

Often: The financing instrument frequently requires this enabling condition, though exceptions may exist. If it cannot be fulfilled, further assessment is necessary.

Sometimes: The financing instrument may require this enabling condition in certain cases. If it cannot be fulfilled, further assessment is necessary.

Overview and differentiation of financing instruments

A broad range of financing instruments is used to support EbA in tropical and subtropical coastal and marine settings. These instruments reflect diverse adaptation objectives, governance contexts, and financing needs. The instruments addressed include public and concessional mechanisms such as grant financing and debt-for-nature swaps; market- and incentive-based approaches including blue carbon credits, biodiversity credits, payments for ecosystem services, and community eco-credit models; as well as risk-transfer instruments such as parametric insurance.

Given the diversity of EbA objectives and implementation contexts, financial resources must serve different functions across the project lifecycle (GIZ, 2018). Therefore, rather than considering financing instruments solely by type, it is often more useful to differentiate them according to the functional role they play within the financing cycle of EbA interventions. In this perspective, the first group (see chapter 5.1) focuses on enabling and catalytic finance, which supports early-stage project development by creating enabling conditions, absorbing initial risks, and mobilizing additional public and private capital (OECD, 2023, 2025). Other instruments (see chapter 5.2) are designed to link financial flows to reward measurable ecosystem outcomes, like carbon sequestration rates, habitat condition indicators, avoided damage or social indicators. A third group (see chapter 5.3) primarily addresses risk management and financial resilience in the face of climate-related shocks (GIZ, 2018; World Bank, 2017). The following case studies illustrate how these different functional categories are applied in practice to support EbA implementation.

4.1 Enabling and catalytic financing instruments

4.1.1 Grant financing

Grant-based finance plays a central role in adaptation finance and remains one of the most important instruments for supporting EbA, particularly in early project phases and in contexts characterized by high vulnerability, limited institutional capacity, and uncertain financial returns. As non-repayable resources, grants are well suited to address upfront barriers that frequently prevent adaptation initiatives from being developed or financed through other instruments. These barriers include the costs of feasibility studies, participatory planning processes, and initial capacity building, which are essential for preparing and operationalizing adaptation measures (UNEP, 2022).

Historically, grants have accounted for a dominant share of adaptation-related finance in developing countries. In 2018, approximately 85 percent of adaptation funds deployed in developing countries were provided in the form of grants, reflecting the limited revenue-generating potential of many adaptation measures and their strong public-good characteristics (Swann et al., 2021). According to the Adaptation Gap Report (2025), grants will persist and continue to play a crucial role in financing adaptation measures. Further, grants play a critical role in establishing enabling conditions for adaptation investments. Public and philanthropic grants are frequently used to support the early stage of EbA project-cycles, through stakeholder engagement processes, capacity building and the implementation of monitoring systems. Evidence from EbA practice shows that grants are often required to cover high transaction and coordination costs, particularly in community-based and participatory approaches, which are typically higher than for conventional infrastructure investments (GIZ, 2018).

They often serve a catalytic function within broader financing structures by reducing financial and institutional risks at early stages, by lowering entry barriers and strengthening project readiness. Grant-based financing can help create the conditions under which additional sources of finance may later be mobilized, even though grants themselves often remain the primary source of funding throughout the project lifecycle (OECD, 2025). Box 6 exemplifies the funding approach of *Blue Action Fund*.

Box 6: Funding EbA in the Western Indian Ocean: lessons learned from the Blue Action Fund funding window

Through its €50M EbA funding window, co-financed by the Green Climate Fund, Blue Action Fund provides the largest coastal ecosystem-based adaptation investment in the Western Indian Ocean. The programme supports nine projects in Madagascar, Mozambique, Tanzania, and South Africa, focusing on protection, restoration, and sustainable management of coastal and marine ecosystems relevant for climate change adaptation, as well as measures to support livelihoods, governance, and institutional capacity building.

Consistent with Blue Action's established principles, this funding window confirms that to enhance the likelihood of long-term impact, EbA financing should be designed using a livelihood-centered approach. Considering societal benefits alongside ecological benefits helps break down silos and strengthens the post-project sustainability of EbA initiatives. Ecosystem management and restoration should go hand in hand with targeted livelihood measures, such as restoration-related jobs, the promotion of sustainable fishing gear, and the development of alternative income sources. This type of grant financing builds community-level capacity for sustainable self-financing, helping to sustain EbA impact over the long term.

One example of this approach is WILDTRUST's systematic beneficiary selection based on social and climate vulnerability in South Africa. Household surveys assess resource use, health, education, and income structures to develop vulnerability profiles and support efforts to move the most vulnerable households above the poverty line. Another example is Rare's project in Mozambique, which integrated EbA into non-fishing livelihoods, such as climate-smart agriculture. By diversifying income sources, these approaches reduced pressure on marine ecosystems while strengthening household resilience, demonstrating how livelihood-centered EbA approaches can foster sustainability beyond project lifetimes.

By Thyrza Zoons (Blue Action Fund)

Fig. 6: Photos from different EbA implementation measures funded by the Blue Action Fund (Photos from left to right: Garth Cripps, Tavindrainy [Mamy Carimot, Blue Ventures], Tanguy Nicholas)

4.1.2 Debt for nature swaps

Debt for nature swaps are not an entirely new financing instrument. They were already discussed in the academic literature in the late 1980s and have recently gained renewed attention in the context of nature conservation and climate adaptation (Hansen, 1989). This mechanism refers to agreements in which a portion of a countries sovereign debt is forgiven or restructured in exchange for a commitment to invest in climate and environmental protection measures (GIZ, 2018). These arrangements aim to create fiscal leeway and provide countries with additional financial flexibility to pursue environmental objectives for which only insufficient resources would otherwise be available within the national budget.

A particularly illustrative example is Ecuador. In 2023, the country concluded one of the largest debt for nature swap agreements worldwide. As part of this transaction, a portion of Ecuador's high risk sovereign bonds with an interest rate of 17 percent and a total value of approximately 1.6 billion US dollars was repurchased and converted into a new loan amounting to 656 million US dollars (M. Jones et al., 2023). This transaction implied a buyback of the bonds at a price of around 40 percent of their nominal value. The repurchase below par reflected the depressed market price of Ecuador's bonds at the time of the transaction, with tender prices ranging from approximately 35.5 to 53.25 cents on the dollar (Campos & Jones, 2023). The repurchase was facilitated by Credit Suisse, which acted as dealer and manager for the bond buyback. The coupon rate of the new loan of 656 million US dollars was reduced to 5.645 percent, compared to the previous 17 percent, in addition to the lower overall repayment amount (M. Jones et al., 2023). This reduced interest rate was made possible by the US Development Finance Corps, which provided a 100 percent guarantee for both interest and principal repayments. In return, Ecuador committed to investing the fiscal space created by the debt reduction into the Galapagos Life Fund. Over a period of 18 years, annual allocations of 12 million US dollars are to be provided for immediate projects, while an additional 5.41 million US dollars per year will be invested into an endowment fund to ensure the long-term financing of conservation activities (DFC, 2023; Green, 2025).

Another prominent example took place in the Seychelles through the Seychelles Conservation and Climate Adaptation Trust (SeyCCAT), which was created in 2015 through a debt-for-nature swap and now allocates USD 700,000 annually to marine and coastal adaptation efforts, especially coral restauration (SeyCCAT, 2025).

Overall, this instrument demonstrates significant potential for mobilizing financial resources for environmental and nature conservation. At the same time, the requirements related to stakeholder identification and engagement, as well as legal frameworks and governance structures, are substantial. The successful implementation of such arrangements therefore requires a high level of international, cross-sectoral, and interdisciplinary coordination and cooperation.

4.2 Performance and results-based financing instruments

4.2.1 Blue carbon credits

Blue carbon refers to carbon captured and stored by coastal and marine ecosystems. Blue carbon actions are focused on protecting, restoring and sustainably managing the blue carbon ecosystems (mangroves, seagrasses, and tidal salt marshes). Beyond their role in climate mitigation, these blue carbon ecosystems provide vital benefits for people, like supporting

sustainable livelihoods and resilience, safeguard biodiversity, and strengthen coastal protection.

Among market-based instruments, blue carbon markets have emerged as one of the most prominent and widely discussed examples. They mobilize finance by monetizing carbon sequestration benefits in coastal ecosystems (Farahmand et al., 2025). A recent study analysing the current carbon markets found that there are currently around 81 blue carbon credit projects, collectively reducing emissions by around 20 million tons of CO_2 per year while channeling climate finance into coastal ecosystem restoration (Farahmand et al., 2025). Restoring and preserving such blue carbon ecosystems may also yield adaptation co-benefits like flood risk reductions, enhanced coastal resilience against erosion, supporting fisheries and livelihoods, as well as the conservation of often biodiversity-rich habitats, and therefore aligning blue carbon projects with EbA strategies (GIZ, 2018; IFC, 2023). Policymakers, Investors and NGOs are increasingly exploring innovative models to integrate blue carbon into EbA efforts (Farahmand et al., 2025; IFC, 2023). The funding approach of *Rare* is illustrated in Box 7.

Box 7: Blue carbon finance for community-based EbA (Rare's Approach)

Rare's blue carbon and nature-based finance portfolio emphasizes small-scale, community-based approaches that balance carbon finance opportunities with on-the-ground realities. Examples of existing blue carbon projects like Vida Manglar (Colombia, led by Conservation International) and the Tahiry Honko project (Madagascar, led by Blue Ventures) further demonstrate the value of community engagement, expectation management, and equitable benefit sharing, while highlighting the need for blended financing approaches in the long-term.

Key takeaways highlight that carbon markets are one of several financing instruments that can support coastal blue carbon ecosystems and their related EbA actions. Blended finance approaches that employ multi-component models bridging carbon finance and other financing instruments beyond carbon (e.g., Rare's blue carbon readiness and community microbusiness approach in the Philippines through the Blue Carbon Accelerator Fund), can maximize both climate and community benefits, strengthening resilience while ensuring inclusive participation.

By Lisa Schindler-Murray (rare)

However, carbon market mechanisms are primarily designed to reward mitigation outcomes, such as permanence and measurable emission reductions. Many of the most relevant adaptation benefits provided by mangroves, seagrasses, and saltmarshes, such as coastal protection, flood risk reduction, security of livelihoods and biodiversity conservation, are locally realized public goods and therefore cannot be easily standardized or commodified within carbon market mechanisms (Ashton et al., 2025).

4.2.2 Biodiversity credits

Biodiversity credits are increasingly discussed as a financing instrument for conservation and restoration efforts. However, they are not fully established yet and are better understood as an emerging approach that seeks to generate finance for measurable positive biodiversity outcomes, while standards, methodologies, governance arrangements, and demand models are

still evolving (Palmegiani et al., 2023; Wunder et al., 2025). Biodiversity credits are not inherently limited to coastal and marine ecosystems. However, in the context of coastal and marine EbA, especially in comparison with blue carbon mechanisms, they may help direct attention and finance to ecosystems where carbon sequestration alone does not adequately capture ecological value, such as coral reefs or other marine animal forests (Shefy et al., 2025). A carbon-centric approach alone may fail to capture these values and can overlook restoration outcomes that are critical for ecosystem resilience. In theory, biodiversity credits can recognize gains in habitat quality, species diversity and ecosystem integrity, and can therefore complement blue carbon finance by making a broader range of ecological benefits visible (Wunder et al., 2025). Combined approaches such as co-crediting, bundling, or stacking may in some cases increase the financial attractiveness of restoration projects, but they also require careful design because they can raise additionality and accounting concerns if the same ecological outcome is effectively claimed more than once (Wunder et al., 2025).

Because biodiversity credits remain a new and still limited market, important concerns persist regarding how biodiversity outcomes are defined, measured, monitored, verified, and governed. Current initiatives differ substantially in what they actually credit. Some Initiatives are more clearly outcome-based, while others are still based on actions and their uncertain projected effects, which means that claimed biodiversity impacts are not always demonstrated through verified ecological outcomes after implementation (Wunder et al., 2025).

Together, blue carbon and biodiversity credits could contribute to a more comprehensive financing framework for coastal and marine EbA and better reflect the wider range of services healthy ecosystems provide beyond carbon sequestration alone. For now, however, biodiversity credits should be framed as a promising but still experimental component within a broader finance mix that continues to depend on further empirical evaluation (Palmegiani et al., 2023; Wunder et al., 2025). Further Information on Biodiversity Credits can be found below.

Further reading on biodiversity credits

- Although biodiversity credits were not discussed in detail at the workshop, they are increasingly discussed financing instrument. Selected resources for further reading are provided here.
- The Biodiversity Credit Alliance (BCA): with a Discussion paper on “Communities and nature markets: Building just partnerships in biodiversity credits” (BCA, 2023).
- The International Advisory Panel on Biodiversity Credits (IAPB) was established in 2023 to facilitate the creation and growth of high-integrity biodiversity credit markets, published as a framework (IAPB, 2024).
- “Biodiversity Credit Markets - Charting pathways for early investment and sustainable market.” A report by ClimateFocus (Palmegiani et al., 2023).
- “Making the market work for nature - How biocredits can protect biodiversity and reduce poverty.” An Issue Paper by IEED (Porras & Steele, 2020).
- “Biodiversity credits and offsets: A review of effectiveness, challenges, and future directions.” A short review paper (Boruah et al., 2025).

- "Biodiversity Credits: An Overview of the Current State, Future Opportunities, and Potential Pitfalls." A review on pilot projects (Wunder et al., 2025).

4.2.3 Payments for ecosystem services

Payments for Ecosystem Services (PES) is an incentive-based financing mechanism. Voluntary transactions are made in which a well-defined ecosystem service is purchased by a service beneficiary, conditional upon the continued provision of that service (Wunder, 2005). While this definition presents PES as a relatively straightforward market-based mechanism, its application in practice is often more complex, as ecosystem services can be difficult to define, measure, and monitor, particularly in dynamic coastal environments.

Coral reefs and mangroves illustrate this complexity well, as they provide a wide variety of ecosystem services that are important for human well-being in coastal areas. Both ecosystems support food security and livelihoods through fisheries, help reduce climate- and weather-related risks by attenuating waves and storm impacts, and generate cultural and economic benefits through tourism and local traditions. These benefits depend on healthy habitats and biodiversity and are shaped by interactions between ecological processes and human use (Bimrah et al., 2022; Woodhead et al., 2019). Further, coral reefs are particularly important for reef-based tourism, which also makes them attractive to private investors from the tourism sector (see also Box 8 for a case study). Mangroves on the other hand play a distinct role in long-term carbon sequestration and storage.

Some of those ecosystem services, like carbon sequestration, can be monetized through standardized market-based instruments such as Blue Carbon Credits. This is partly because carbon sequestration can be quantified in relatively consistent units. Many other coastal ecosystem services produce benefits that are more context specific, and shaped by complex ecological and social interactions, which makes them harder to measure and to translate into tradable units. In these cases, monetization often depends less on standardized market instruments than on negotiated, site specific arrangements between service providers and beneficiaries (Barbier et al., 2011). PES can therefore serve as a more flexible financing approach, as it accommodates locally defined services, simplified indicators, or activity-based conditionality and thus play a bridging role between fully standardized market instruments and public or grant based finance, enabling incentives for ecosystem stewardship where clear beneficiaries exist but market conditions remain insufficiently developed (Barbier et al., 2011).

Box 8: Coral restoration: Unlocking private sector investment in ecosystem services

Values and payments for *ecosystem services* can emerge through direct partnerships between coral (reef) restoration professionals and private-sector beneficiaries, or the direct contracting of deliverables, particularly in coastal tourism contexts. In the Caribbean, and more recently elsewhere, coral (reef) restoration is being implemented through a service-oriented approach linking ecosystem services and their restoration to return on investment and clearly identifiable benefits for tourism operators, coastal developers, and public authorities. Enhancement and restoration activities are primarily financed by hotels and resorts investing in improvements in "house reef" aesthetics and recreation (snorkeling/diving) and blue/green branding, monetized primarily through improved visitation. Further motivation is impact mitigation or remediation of development and reclamation

impacts (permitting). Investments are in development and maintenance of specific ecosystem services/outcomes rather than to standardized ecological indicators.

More recently, coral reef restoration is being applied to wave attenuation beach and coastal protections and climate-adaptation objectives. The CBF-funded WANSEC initiative is a multi-island partnership of the University of the West Indies exploring and restoring regionally endemic branch-lattice shallow reef structure, at scale, to develop and demonstrate capacities and processes, while developing hydrodynamic models that quantify wave attenuation, sediment accumulation, and shoreline stabilization with these historic reef forms re-established. WANSEC's open-source models will quantify these hydrodynamics for the public and/or private investments in restoration, including insurance incentives, all-coral and hybrid blue-grey infrastructure solutions.

By Andrew M. Ross, Ph.D. (Seascape Caribbean)

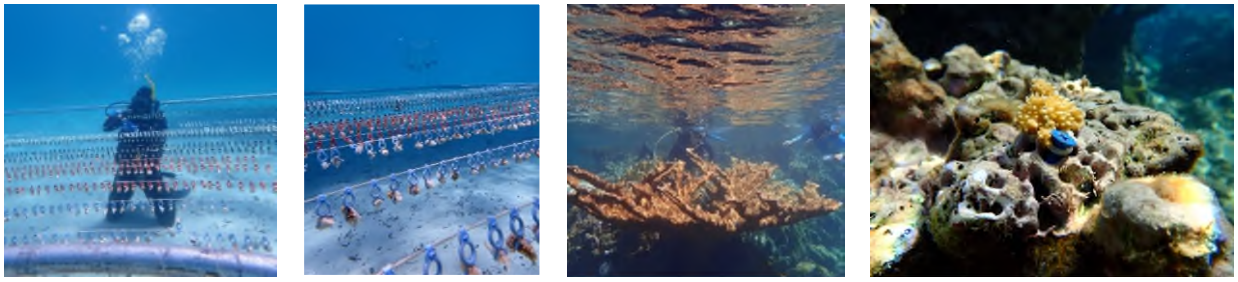

Fig. 7: Photos coral reef restoration measures (Photos: Seascape Caribbean)

4.2.4 Community eco-credit

Community Eco-Credits are an innovative, community-based financing instrument that links access to small-scale credit with the delivery of locally defined ecological actions. Rather than financing a predefined project or infrastructure, this model directly invests in people and their capacity to adapt, manage ecosystems sustainably, and strengthen local livelihoods (MWAMBAO, 2026). Community Eco-Credits combine different financing logics, as the initial capital injection to savings groups can be understood as enabling or catalytic finance, while access to loans is subsequently conditioned on the implementation of agreed eco-actions. Rather than rewarding ecological outcomes in a narrow sense, the model creates a performance-based incentive structure around locally relevant environmental practices that support EbA objectives.

This new methodology has been pioneered by the MKUBA Eco-Credit Model (see Box 9), which was developed by the Mwambao Coastal Community Network in collaboration with Greenfi on the Tanzanian coast. The development of the model has been supported by the Blue Action Fund and other development partners. It builds on the widely established savings group model and provides community savings groups with a one-off capital grant to expand their revolving loan funds. Access to loans is conditional upon the fulfilment of agreed “eco-actions”, such as the use of legal fishing gear, participation in community patrols, mangrove planting, or engagement in local ecosystem governance processes. Through this design, ecological performance is directly embedded in terms of credit, creating tangible incentives for sustainable resource use.

Box 9: MKUBA: Mfuko wa KUtunzau Bahari (naArthi) 'Fund to steward the sea (and land)'

The MKUBA Community Eco-Credit Model is a community-based financing mechanism that links access to small loans with mandatory ecological actions included in loan terms (eco-credit). It was developed by Mwambao Coastal Community Network and Greenfi on the Tanzania coast and is now being more widely adopted, including in terrestrial areas. Based on the widespread savings groups model, groups receive a capital grant to expand their savings-based loan fund, and borrowers must fulfil ecosystem management or restoration actions, such as using legal fishing gear, participating in community patrols, planting mangroves, or joining ecosystem-governance meetings to qualify for a credit (MWAMBAO, 2026). This instrument can help to strengthen local livelihoods while simultaneously improving ecosystem management, leveraging existing social capital and traditional knowledge within communities.

A grant is given to a community, which manages these as revolving loan schemes in groups of 30 people – Community Eco-Credit groups. The groups own and manage the funds. The groups are interconnected and support the community ecosystem governance institutions. The loans may be used for household needs (e.g. health and education) or business, provided that these do not harm ecosystems. The primary objective of community eco-credit model is to increase effective community participation in ecosystem management and restoration, while also generating a wide range of co-benefits, including livelihood improvements and strengthened resilience.

By Robert Wild
(Mwambao Coastal Community Network)

4.3 Risk and resilience financing instruments

4.3.1 Parametric insurance

Insurance instruments are increasingly considered as complementary mechanisms to support EbA. The restoration of mangroves and coral reefs can significantly reduce coastal flood risk by attenuating wave energy and storm surges and thereby lowering expected annual damage to buildings and infrastructure. From an insurance perspective, these risk-reducing effects are relevant, as they can influence loss probability and expected payouts (Lumbroso et al., 2025). At the same time, insurance instruments are recognized as important components of climate risk management, as they can provide post-disaster liquidity and create incentives for investment in risk reduction (OECD, 2025).

However, the protective capacity of reefs and mangroves is highly site-specific and strongly dependent on the ecosystems' condition (Lumbroso et al., 2025). The absence of scalable and standardized methods to quantify these protective effects remains a major barrier to integrating EbA into conventional catastrophe models and insurance products. Against this background, parametric insurance has emerged as a more promising approach for EbA-related applications. Parametric insurance triggers payouts based on predefined and independently verifiable parameters, such as wind speed or wave height, rather than on assessed damages. This structure allows for rapid disbursement of funds following extreme events, often within

weeks, which is critical for the timely restoration of damaged ecosystems. Parametric insurance solutions have been highlighted as particularly relevant in contexts where traditional loss assessment is complex and transaction costs are high (GIZ, 2018). For both coral reefs and mangroves, rapid access to liquidity is especially important, as early post-storm interventions can substantially influence recovery outcomes. By avoiding lengthy claims processes, parametric reef insurance can help ensure that response measures are implemented while restoration windows remain open.

Within EbA financing frameworks, parametric reef insurance often plays a safeguarding role. It helps protect prior public, donor, or community investments in coastal EbA projects from being undermined by extreme events. However, important limitations remain. Basis risk, like the potential mismatch between trigger parameters and actual ecosystem damage, cannot be fully eliminated, and insurance mechanisms do not address chronic stressors such as ocean warming, acidification, or pollution (GIZ, 2018). Moreover, the commercial viability of such insurance schemes often depends on public-sector support or donor co-financing, reflecting the public-good nature of reef ecosystems and the limited affordability of insurance in many vulnerable regions (GIZ, 2018; OECD, 2025).

5 Conclusion and lessons learned

This discussion paper aimed to highlight both the potential and the limits of ecosystem-based adaptation (EbA) at tropical coasts, drawing on experiences from research and implementation across diverse geographic and institutional contexts. Overall, the stocktake confirms that coastal EbA has moved beyond the conceptual stage and is increasingly applied in practice. EbA measures demonstrably contribute to climate risk reduction, biodiversity conservation and livelihood support, and are especially relevant in highly exposed coastal areas where conventional grey infrastructure is either unaffordable or socially and environmentally contested. Taking stock of current EbA efforts shows that EbA is not a stand-alone solution. Its effectiveness is strongly context-dependent and constrained by biophysical limits, accelerating climate change impacts, and governance and capacity challenges. EbA delivers its greatest value when embedded in broader coastal adaptation pathways, including hybrid green/grey solutions and when integrated into spatial planning frameworks.

Existing EbA repositories provide valuable but fragmented evidence, highlighting the need for greater harmonisation and integration. Strengthening these platforms would improve knowledge uptake, enable better tracking of progress, and support more effective allocation of finance and resources. While individual case studies demonstrate positive ecological and socio-economic outcomes, systematic and comparable evidence on long-term performance, cost-effectiveness and resilience benefits is still limited. Fragmented documentation, short project cycles and insufficient monitoring frameworks constrain learning across projects and regions. Gathering evidence and data is most effective when monitoring and evaluation are embedded directly into implementation processes and are supported by standardized indicators. Strengthening links between research, practice and policy is therefore critical. A more robust evidence base not only improves the design and adaptive management of EbA measures but also can help with their credibility in policy processes and investment decisions, particularly where EbA is expected to compete with or complement conventional infrastructure solutions.

Despite growing political recognition of adaptation needs, the global adaptation finance gap remains substantial and is projected to widen further. At the same time, climate finance continues to be mainly channelled towards mitigation, with adaptation receiving a significantly smaller share of overall funding flows. Within the adaptation space, only a small percentage of funding is aimed at coastal/marine EbA, and grants remain the dominant, and in many contexts, indispensable financing instrument for EbA. Grant-based finance is particularly critical in early project phases and in settings characterized by high vulnerability, limited institutional capacity and uncertain or non-monetizable returns. Grants often play a catalytic role by covering transaction costs and the high upfront costs of EbA preparation, including baseline assessments, feasibility studies and detailed site design. They also enable participatory planning with local communities and capacity building, and they often remain the backbone of financing throughout the project lifecycle. At the same time, the analysis shows that grant finance alone is rarely sufficient to ensure long-term sustainability. Many successful EbA initiatives rely on blended finance structures that combine grants with other public, philanthropic and, in some cases, private sources of capital. Blended approaches help to distribute risks, extend funding horizons and link ecosystem restoration with livelihood activities, service provision or risk management instruments. However, private finance for adaptation remains limited and highly context specific. Instruments such as PES, community eco-credits or parametric insurance can complement grants, but often cannot substitute for public investment.

Looking ahead, scaling coastal EbA will depend on how consistently it is mainstreamed into coastal planning and national adaptation processes, rather than remaining a collection of standalone projects. EbA's role in adaptation decision making will be strengthened where its economic value is made more visible through robust cost benefit assessment and credible reporting of risk reduction outcomes. From a financing perspective, long-term success will hinge not only on mobilizing resources, but also on building a durable finance architecture with strong fund management with transparent allocation rules and the ability to blend complementary sources of capital over longer time horizons. Therefore, one key aspect for future work should be the focus on developing fit-for-purpose financing mechanisms, including blended finance approaches and dedicated funding windows, alongside capacity building for project preparation, implementation, and long-term stewardship.

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Abbreviation	Explanation
ADB	Asian Development Bank
BCA	Biodiversity Credit Alliance
BCCTF	Bangladesh Climate Change Trust Fund
BfN	German Federal Agency for Nature Conservation
BMUKN	German Federal Ministry for the Environment, Climate Action, Nature Conservation and Nuclear Safety
CBD	Convention on Biodiversity
CBF	Caribbean Biodiversity Fund
CTF	Conservation Trust Fund
EbA	Ecosystem-based Adaptation
FEBA	Friends of Ecosystem-based Adaptation
GCF	Green Climate Fund
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GMA	Global Mangrove Alliance
ICRI	International Coral Reef Initiative
IKI	International Climate Initiative
IPCC	Intergovernmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
NGO	Non-Governmental Organization
NbS	Nature-based Solutions
NVQ	National Vocational Qualification
OECD	Organisation for Economic Co-operation and Development
PES	Payments for Ecosystem Services
PPCR	Pilot Program for Climate Resilience

ROI	Return on investment
SeyCCAT	Seychelles Conservation and Climate Adaptation Trust
SIDS	Small Island Developing States
SLUNCF	Saint Lucia National Conservation Fund
SMMA	Soufrière Marine Management Area
UNEP	United Nations Environment Programme
WANSEC	Wave Attenuation: Natural Solutions with Elkhorn Coral
WRI	World Resources Institute

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Coastal Ecosystem-based Adaptation (EbA) uses ecosystems such as mangroves, coral reefs and coastal wetlands to reduce climate risks while supporting biodiversity and local livelihoods. This discussion paper takes stock of coastal EbA in tropical and subtropical regions and focuses on how such measures can be financed in practice. It provides an overview of financing instruments, including grants, debt-for-nature swaps, blue carbon and biodiversity credits, payments for ecosystem services, community eco-credit models and parametric insurance. Drawing on case studies and practitioner insights, it discusses enabling conditions, governance needs and practical constraints for applying these instruments in different coastal contexts.

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