

Making the Case for Ecosystem-based Adaptation



Building Resilience to Climate Change



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SUMMARY OF KEY POINTS

- Ecosystem-based Adaptation (EbA) provides numerous opportunities for natural solutions to manage the impacts of climate change.
- EbA interventions generate a range of significant social, economic, and environmental co-benefits by reducing society's vulnerability to natural hazards, improving the availability of ecosystem services essential to support livelihoods and protecting biodiversity through sustainably managing ecosystems.
- Evidence shows that as part of an integrated adaptation approach, EbA requires comparatively small investment relative to the long-term social, economic and environmental benefits it generates.
- Despite the numerous advantages of EbA, its implementation remains limited by three key challenges: lack of information, lack of financial resources, and institutional resistance.
- Action is needed to mainstream ecosystem-based approaches into national climate change adaptation strategies to make full use of their many opportunities.
- This brief illustrates six policy options for national policymakers to consider in order to address the main challenges faced by EbA and to further encourage its implementation.

Introduction

Healthy ecosystems provide valuable services such as food, clean water, protection from disease, and flood and erosion control, while at the same time building resilience against climate change impacts. This has been recognized by the UNFCCC in decision 1/CP.16 inviting Parties to enhance action on adaptation by **“building resilience of socio-ecological systems, including through economic diversification and sustainable management of natural resources”**.

This policy brief makes the scientific and economic case for mainstreaming Ecosystem-based Adaptation (EbA) into national policymaking. It is aimed at national governments that are considering investing in EbA as an effective means of building community and ecosystem resilience at national and regional scales, with the aim of reducing vulnerability to climate change impacts.

“the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change”



What is Ecosystem-based Adaptation?

Ecosystem-based Adaptation is defined by the Convention on Biological Diversity (CBD) as **“the use of biodiversity and ecosystem services to help people adapt to the adverse effects of climate change”**. As further elaborated by Decision X/33 on Climate Change and Biodiversity, this definition also includes the **“sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy that takes into account the multiple social, economic and cultural co-benefits for local communities”**.

EbA embraces ‘the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way’, in the context of supporting communities in coping with climate change impacts. It therefore employs familiar tools and measures but conceptualizes and implements them specifically for adaptation to climate change.

Figure 1 demonstrates how EbA can help alleviate major pressures from climate change on ecosystems by managing and restoring ecosystems and the services they produce and in turn enhancing the adaptive capacity of local communities.

The main opportunities provided by EbA include:

- Strengthening the collaboration between sectors involved in managing ecosystems and benefiting from ecosystem services;
- Involving local institutions and stakeholders as key actors in adaptation planning so as to enhance

- participation and compliance;
- Incorporating traditional knowledge and practices and gender-sensitive tools and approaches in adaptation planning and activities
- Reducing the risk of maladaptation by harnessing ecosystem resilience as part of a broader range of adaptation actions;
- Facilitating collaboration and financial transfers between developed and developing economies; and
- Providing intensified research and development, technology transfer and infrastructure development.

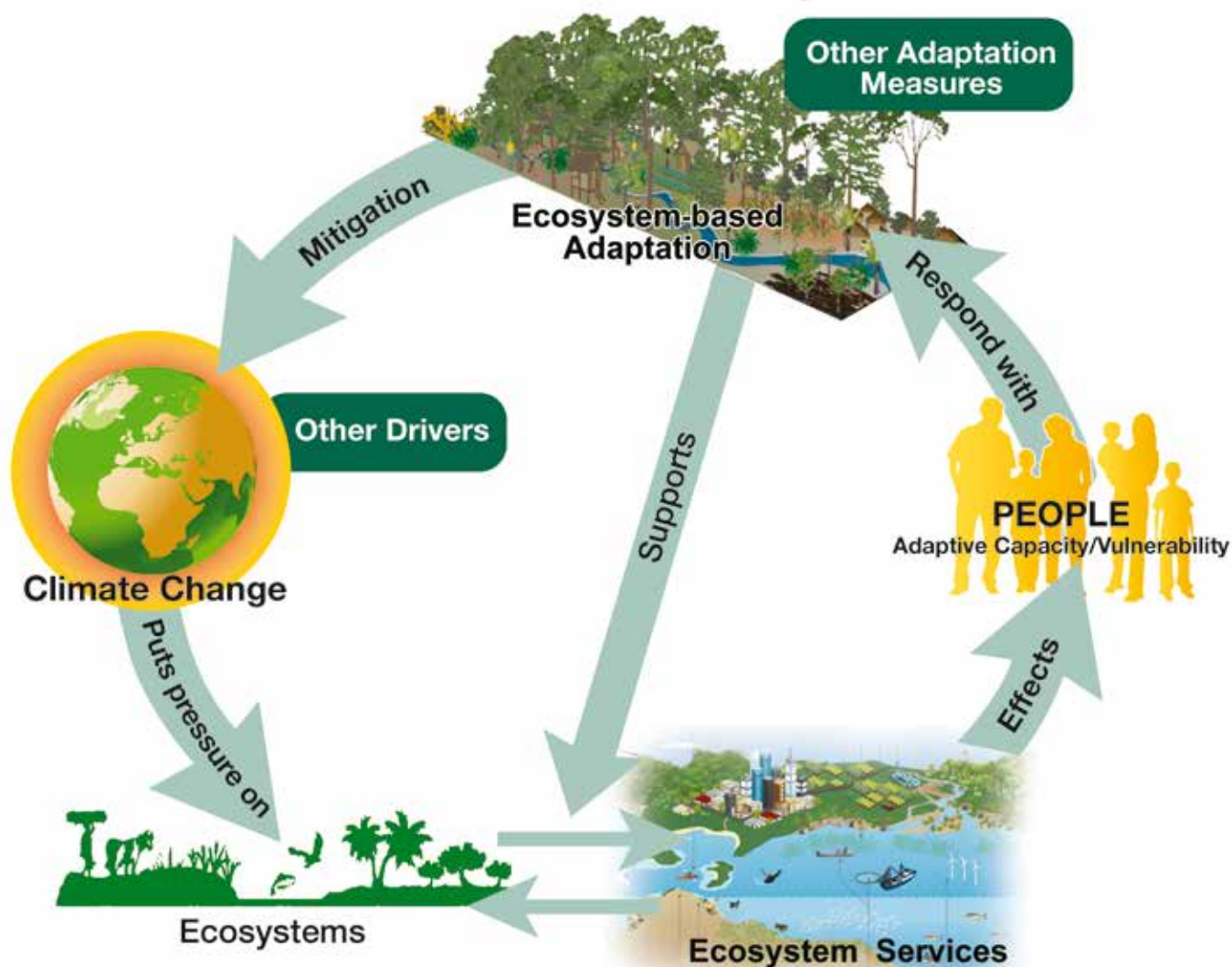
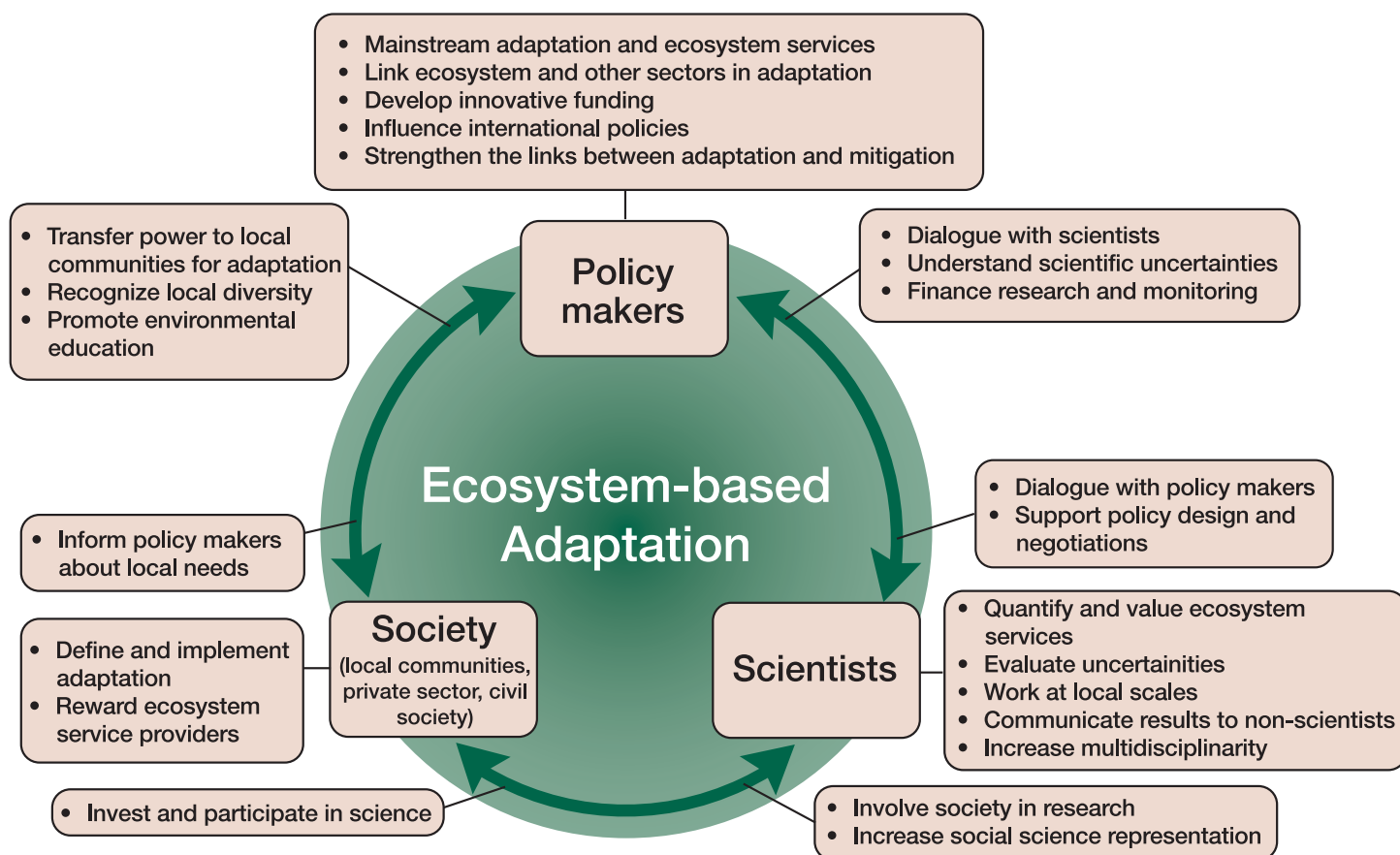


Figure 1: Ecosystem-based Adaptation conceptualized in the Driving Forces-Pressures-State-Impacts-Responses (DPSIR) framework.

Figure 2: Roles of stakeholders in implementing EbA. Adapted from Vignola et al. (2009)



EbA is applicable across a wide range of geographical areas, sectors and stakeholders in both developed and developing countries. It can be incorporated into many areas including coastal defence, flood and drought management, agriculture, resource provision, urban planning, disaster risk reduction, conservation and tourism.

The involvement of policymakers and multiple stakeholders with distinct roles and responsibilities (Figure 2) is critical to successful EbA because ecosystems typically support diverse sectors and different social groups in multiple ways. For instance a forest may provide local communities with forest goods for their livelihoods (e.g. timber, game, nuts and fruits, fibre), while at the same time supporting

commercial tourism and timber harvesting. Furthermore, the hydrological regulation provided by these forests also benefits geographically distant sectors such as agriculture and hydroelectric plants through provision of water flow and flood regulation as well as minimization of erosion and siltation.

The growing interest in EbA has prompted discussion and development of a number of guiding documents. These include a draft set of principles developed to guide national planning and implementation (see Box 1) and a decision support framework focused on the operational level, that assists adaptation practitioners on the selection, design and implementation of adaptation projects.



Advantages of EbA

EbA presents three key advantages over other adaptation approaches: it can deliver multiple co-benefits, help avoid maladaptation and contribute to a 'no regrets' approach to address climate change. Unlike many more narrowly focused engineering adaptation measures, such as for example seawalls or

dams, EbA delivers simultaneously for climate change adaptation and mitigation, environmental protection, biodiversity conservation and sustainable economic development.

Co-benefits of EbA

EbA has the capacity to deliver multiple co-benefits in a range of ecosystems (Table 1).

Box 1: Draft Principles for Ecosystem-based Approaches to Adaptation

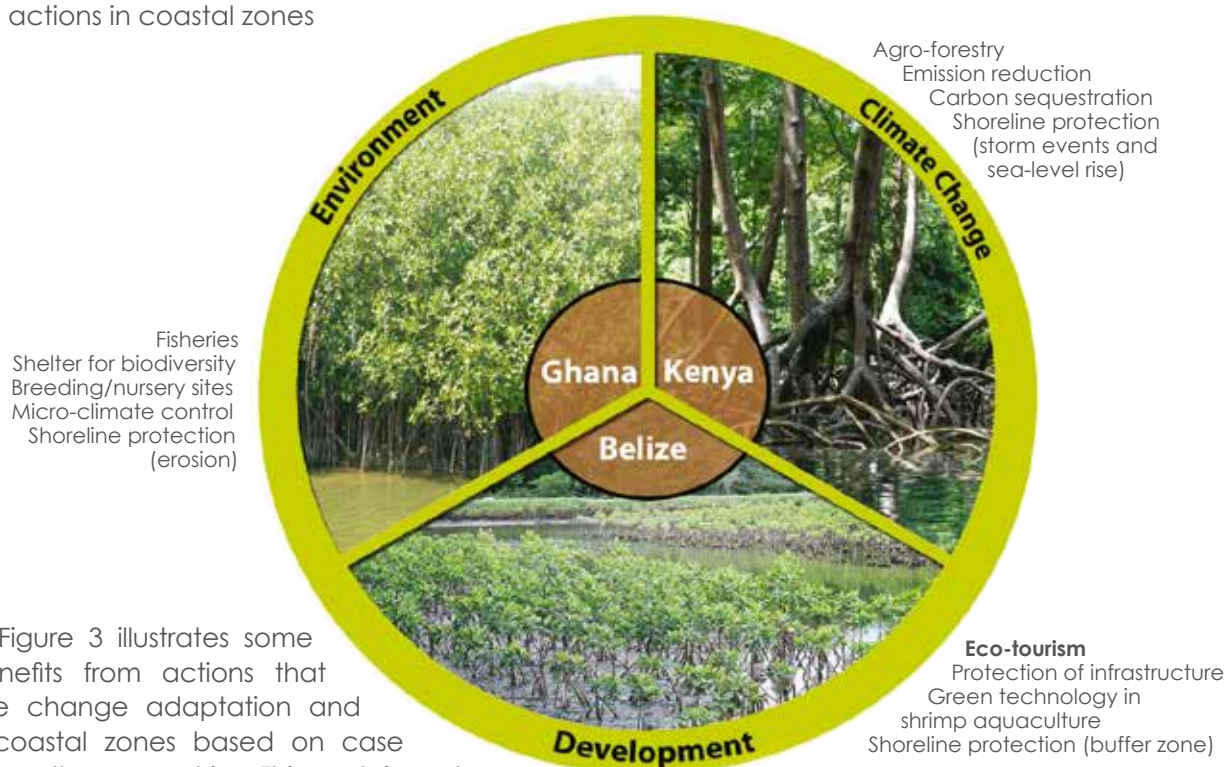
EbA:

1. Promotes multi-sectoral approaches.
2. Operates at multiple geographical scales.
3. Integrates flexible management structures that enable adaptive management.
4. Minimises trade-offs and maximizes synergies with development and conservation goals to avoid unintended negative social and environmental impacts.
5. Incorporates best available science and local knowledge, and fosters knowledge generation and diffusion.
6. Promotes resilient ecosystems and nature-based solutions to provide benefits to people, especially the most vulnerable.
7. Is participatory, transparent, accountable, and culturally appropriate, while actively embracing equity and gender issues.

EbA interventions	Benefits
Restoring fragmented or degraded natural areas	Enhances critical ecosystem services, such as provision of water, food & fisheries
Protecting groundwater recharge zones & restoring floodplains	Secures water resources to assist communities in coping with drought & flooding
Connecting expanses of forests, grasslands, reefs & other habitats	Enables people, flora & fauna to migrate as climate changes
Protecting and restoring natural infrastructure such as barrier islands, dunes, mangroves, coral reefs, wetlands & forests.	Protects communities & infrastructure from sealevel rise, natural hazards, erosion & flooding

Table 1: Examples of Ecosystem-based Adaptation interventions and their benefits

Figure 3: Co-benefits from climate change adaptation and mitigation actions in coastal zones



For example, Figure 3 illustrates some of the co-benefits from actions that deliver climate change adaptation and mitigation in coastal zones based on case study work across three countries. This work is part of an ongoing project⁶ aiming to identify climate smart investment strategies for the coastal zone.

Making a Case for EbA

A number of initiatives worldwide use EbA to restore, maintain and harness ecosystem resilience in order to deliver a host of ecosystem services. Results indicate a strong scientific case for applying EbA as an adaptation approach. For example, the use of coastal wetlands, including marshes and mangroves, can sequester significant amounts of atmospheric carbon. As a conservative estimate, mangroves sequester an estimated 112 ± 85 Tg C per acre, which is comparable with the sequestration rate of tropical terrestrial forests^{7,8}.

Strengthening and protecting ecosystems is a relatively small, long term investment that generates an array of short- and long-term environmental, social and financial benefits. Examples of the cost effectiveness of EbA generally indicate that benefits outweigh costs⁹. However, cost-benefit comparisons between EbA and non-EbA options, or between integrated interventions that include EbA vs those that do not, are rare, indicating a clear information gap that needs to be filled.

The Economics of Ecosystems and Biodiversity (TEEB) initiative estimated the costs and benefits of ecosystem restoration for adaptation across nine biomes, and found that benefit/cost ratios over 40 years ranged from around 3 to 75, indicating large net benefits¹⁰ from investing in EbA¹¹. In addition, a recent European Commission-funded project¹² compared information on the costs and benefits of ecosystem-based approaches against more traditional engineering approaches for addressing climate change impacts across Europe. Although the study did not carry out a comprehensive assessment of costs and benefits due to the lack of quantitative data, it concluded that *"the majority of projects using ecosystem-based approaches can be considered beneficial from an economic point of view if one takes account of the long-term social and ecological benefits that are associated with the projects [...] making those projects using ecosystem-based approaches potentially more cost-effective than traditional engineered approaches."*

The protection and restoration of mangroves provides a powerful example of social, ecological and economic benefits provided by EbA (see Box 2). In addition to this example, there are many other ecosystems where EbA has been shown to be successful^{13,14}.

EbA Challenges

The implementation of EbA remains hampered by three key challenges: lack of information, lack of financial resources, and institutional resistance.

Lack of information includes uncertainties in future projections of climate impacts, ecological and societal vulnerability and economic growth. These forecast uncertainties are exacerbated by the relative paucity of information from monitoring and evaluation of the effectiveness of past and ongoing EbA interventions. Developing climate risk analyses and vulnerability assessments that make use of scientific and traditional knowledge on ecosystem services and adaptation potential are possible solutions.

The financial challenge includes lack of financial resources for project implementation as well as for capacity building. Increased financial allocation for EbA from new and existing sources, dissemination of information on EbA and general education and awareness-raising exercises are possible solutions.

The institutional challenge arises because EbA requires cooperation across institutions, ministries, communities and the private sector. Often the benefits of EbA are spread across numerous sectors and most visible over the long-term while institutional decision-making tends to be focused sectorally and on shorter timescales. Establishing integrated approaches to adaptation planning and sustainable development, streamlining procedures, adopting bottom-up approaches and fostering public private partnerships are potential solutions to address this challenge.



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