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PRIMER FOR POLICY-MAKERS
& VOLUNTARY GUIDELINES

VOLUNTARY GUIDELINES FOR THE DESIGN AND EFFECTIVE IMPLEMENTATION OF ECOSYSTEM- BASED APPROACHES TO CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION AND SUPPLEMENTARY INFORMATION



**Primer for policymakers and voluntary guidelines for the design and
effective implementation of ecosystem-based approaches to climate
change adaptation and disaster risk reduction**

April 2019



**Convention on
Biological Diversity**



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CBD foreword



Around the world, people, ecosystems and species are suffering from the effects of climate change, from hurricanes, severe droughts, to record-breaking temperatures.

Biodiversity is facing its own crisis, declining globally at rates unprecedented in human history, at a time we need it most to help mitigate and adapt to climate change. Ecosystems and their biodiversity - which underpin economic growth, sustainable development and human well-being - are exposed simultaneously to several stressors such as climate change, land-use changes and pollution, increasing the vulnerability of communities to the impacts of climate change.

Nature-based solutions, such as ecosystem-based approaches to climate change adaptation and disaster risk reduction, have the potential to increase the resilience of ecosystems and human livelihoods to the impacts of climate change. Such approaches can also make significant contributions to climate change mitigation by reducing emissions from deforestation and other land-use changes, and by enhancing carbon sinks. It doesn't stop there, ecosystem-based approaches can be cost-effective, and provide employment and income generating opportunities, while also contributing to food security. It is those social, economic and environmental co-benefits that make nature-based solutions so attractive.

Parties to the Convention on Biological Diversity have long recognized the importance of ecosystem-based approaches for climate change and in multiple decisions have encouraged Parties to implement them. A number of reports were prepared by the Secretariat to support Parties in this effort.

Most recently, the Conference of the Parties, at its thirteenth meeting, requested the preparation of voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction. These voluntary guidelines were adopted by the Conference of the Parties at its fourteenth meeting. Although nature-based solutions to climate change have gained significant attention in recent years, and are increasingly being integrated into national plans and strategies, there remain a number of gaps and challenges.

The present report provides information on principles, safeguards, tools, and a flexible framework for planning and implementing ecosystem-based approaches, to support countries in integrating ecosystem-based approaches into their national biodiversity strategies and action plans, but also into other sectoral policies. The voluntary guidelines can also be used by relevant organizations, indigenous peoples and local communities, the private sector and civil society.

I am grateful to the numerous experts and organizations who contributed to the development of the present report, and to the European Union, the Governments Sweden and Germany, and to the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), for their generous support.

I believe that this report makes an important contribution to enhancing implementation and showcasing the effectiveness of ecosystem-based approaches to climate change adaptation and disaster risk reduction, and I hope that it will be used by a wide range of actors and stakeholders

A stylized blue ink signature of Cristiana Paşca Palmer.

Cristiana Paşca Palmer, PhD
Executive Secretary
Convention on Biological Diversity

GIZ foreword

Few concepts have acquired as much prominence in such a short time span in the conservation and development sectors as Ecosystem-based Adaptation (EbA) and Disaster Risk Reduction (Eco-DRR). This is due to that fact that the adverse effects of climate change are becoming more and more perceptible. Extreme weather events such as storms, droughts and floods capture the news headlines more and more frequently and are causing considerable human and economic losses. These events are of natural origin, but landscape degradation contributes significantly to increased disaster risk. Extreme climatic events that triggered past disasters are predicted to increase in frequency and intensity in the future.

Responding to one of the biggest challenges that nations, especially the least developed countries and small island developing states, are currently facing, the approaches must be cross-sectoral, interdepartmental and in cooperation between different actors of the society namely science, policymakers at different levels and practitioners. The approaches of Ecosystem-based Adaptation and Disaster Risk Reduction aim at the sustainable management, conservation, and restoration of ecosystems to cope with the adverse effects of climate change and reduce the impacts of natural hazards. They provide multiple benefits from risk reduction to the provision of food and water, prevention of soil erosion, carbon sequestration and biodiversity conservation. They constitute a key element of a comprehensive climate change adaptation and risk reduction strategy next to political, social financial and technical solutions such as hard infrastructure and early warning systems.

These guidelines offer concise information for policymakers on why integrating ecosystem-based approaches into policy frameworks matters; they provide practical steps for planners and practitioners to design and implement effective strategies for ecosystem-based adaptation and disaster risk

reduction; furthermore, they provide guidance on how to reach out to key sectors such as planning, finance, agriculture, infrastructure, water and forestry.

By combining key policy elements and tools applied under the United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD), they make a significant contribution towards the achievement of multiple targets under UN conventions, in particular on biodiversity conservation, climate change, disaster risk reduction and combatting land degradation.

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) was delighted to support the Secretariat of the Convention on Biological Diversity in the development of these guidelines via the Global Project Mainstreaming Ecosystem-based Adaptation funded by the International Climate Initiative of the German Federal Ministry for Environment, Nature Conservation and Nuclear Safety. The project facilitates the International EbA Community of Practice as a key knowledge network of policymakers and practitioners working with ecosystem-based approaches. Their valuable experience from policy advice to project implementation forms part of these guidelines. They provide guidance for our daily work to overcome the challenge of adverse effects of climate change.



Vera Scholz

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Abbreviations

CBD	Convention on Biological Diversity
CCA	Climate change adaptation
COP	Conference of the Parties
CSA	Climate-smart agriculture
CSO	Civil society organization
DRR	Disaster risk reduction
EbA	Ecosystem-based adaptation to climate change
EC	European Commission
Eco-DRR	Ecosystem-based disaster risk reduction
EIA	Environmental impact assessment
ES	Ecosystem services
EURAC	EURAC Research, European Academy of Bozen-Bolzano
FAO	Food and Agricultural Organization of the United Nations
FEBA	Friends of EbA
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH
IIED	International Institute for Environment and Development
IKI	International Climate Initiative of the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)
ILO	International Labour Organization
(I)NDC	(Intended) Nationally determined contributions
IPBES	Intergovernmental Panel on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPLCs	Indigenous peoples and local communities
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management
LDC	Least developed countries
M&E	Monitoring and evaluation
NAP	National Adaptation Plan
Nbs	Nature-based solutions
NBSAP	National Biodiversity Strategy and Action Plan
NGO	Non-governmental organization
NOAA	National Oceanic and Atmospheric Administration (U.S. Department of Commerce)
PEDRR	Partnership for Environment and Disaster Risk Reduction
REDD	Reducing Emissions from Deforestation and Land Degradation
SDG	Sustainable Development Goals
SEA	Strategic environmental assessment
SREX	IPCC Special Report on Extreme Events (IPCC 2012)
UN	United Nations
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UN Environment/UNEP	United Nations Environment Programme
UNEP-WCMC	UN Environment World Conservation Monitoring Centre
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
UNISDR	United Nations International Strategy for Disaster Reduction
WWF	World Wide Fund For Nature

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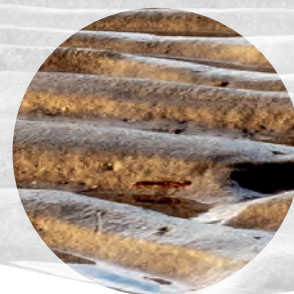
The Secretariat of the Convention on Biological Diversity would like to acknowledge the financial assistance from the European Union and the Government of Sweden towards the preparation of the voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction and supplementary information.

The Secretariat acknowledges the guidance and feedback provided by experts at an informal meeting convened in collaboration with BirdLife International and UN Environment World Conservation Monitoring Centre for developing a framework for the guidelines, held in July 2017 in Cambridge, United Kingdom of Great Britain and Northern Ireland.

The Secretariat gratefully acknowledges the support from the Government of Germany, the Government of Sweden, the European Commission and the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH for the “technical workshop for review of the draft voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction”, held in Bonn, Germany, from 20–22 November 2017, and thanks all its participants for their substantive contributions.

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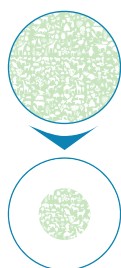
The present report was prepared by Veronica Lo (consultant for the Secretariat) under the guidance of the Secretariat and with the support of GIZ as well as experts and reviewers mentioned above. The report was reviewed and edited by David Cooper, Sakhile Koketso, Lisa Janishevski and Annie Cung of the CBD Secretariat. The Secretariat acknowledges the kind support from GIZ for the design and publication of this report.



Preface



People and nature are facing unprecedented climate change, altering the ecosystems that provide life-sustaining services and contribute to human well-being. Extreme weather and climatic events such as floods, droughts, and heat waves are also changing in frequency, intensity and timing, causing mortality, damage to infrastructure and settlements.¹ Responding to these changes are some of the greatest challenges that nations, especially the least developed countries and small island developing states, are currently facing.



Biodiversity underpins the ecosystem processes and functions that provide critical services.² The loss of biodiversity, due to many drivers including climate change, alters ecosystem functioning across temporal and spatial scales, reducing ecological integrity and the corresponding capacity to provide ecosystem services.³ In recent years, “ecosystem-based adaptation to climate change” (EbA) and “ecosystem-based disaster risk reduction” (Eco-DRR) have gained increasing attention. These approaches emphasize the importance of biodiversity and ecosystems in effective overall climate change adaptation (CCA) and disaster risk reduction (DRR) measures.

EbA and Eco-DRR build on other practices such as ecosystem conservation and restoration which seek to increase the resilience of ecosystems for the benefit of people. EbA and Eco-DRR have gained traction because they provide multiple benefits for people, ecosystems and biodiversity, enable planning for CCA and DRR on longer time scales, can be cost-effective compared to standard engineered infrastructure, and emphasize community

participation and the use of traditional and local knowledge systems.⁴ Due to their participatory nature and cross-sectoral approaches to adaptation and disaster risk reduction, EbA and Eco-DRR can achieve multiple policy objectives, including local, regional and national strategies for climate change, disaster risk reduction, and sustainable development, among others.

EbA and Eco-DRR are cross-cutting approaches for achieving numerous agreements and have strong policy support in the international policy arena. In implementing EbA and Eco-DRR, countries can work towards the achievement of several of the Aichi Biodiversity Targets and implementing the Strategic Plan for Biodiversity 2011 – 2020 adopted under the Convention on Biological Diversity. Other major agreements such as the Paris Agreement, the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction have called for enhancing the resilience of ecosystems and societies to the impacts of climate change and reducing disaster risks. Increasingly, countries are integrating ecosystem-based approaches into national plans and strategies to reduce the risk of impacts and hazards (climate and non-climate related). Examples of mainstreaming EbA and Eco-DRR have been synthesized in CBD Technical Series No. 85.⁵ However, there remains a gap between policy development and implementation. The objective of the present report is to support and enable the design and implementation of EbA and Eco-DRR strategies as part of an overall CCA or DRR strategy, on multiple scales - short, medium and long-term, and local, sub-national and national.

¹ IPCC 2012; IPCC 2014

² Cardinale et al. 2012

³ Perrings et al. 2010, Isbell et al. 2017

⁴ Hale et al. 2009, Jones et al. 2012, Munang et al. 2013

⁵ Lo 2016

Mandate

The CBD Conference of the Parties (COP), in decision XIII/4, requested the Executive Secretary to prepare, subject to the availability of resources, in collaboration with relevant organizations, in particular the United Nations Framework Convention on Climate Change and the United Nations Office for Disaster Risk Reduction, voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction, for consideration by the Subsidiary Body on Scientific Technical and Technological Advice prior to the fourteenth meeting of the Conference of the Parties.

Pursuant to this request, the Secretariat prepared the present report, which contains the voluntary guidelines and supplementary information. The present report builds on progressive work on EbA and Eco-DRR in recent years, including a synthesis report on experiences with ecosystem-based approaches to climate change adaptation and disaster risk reduction (CBD Technical Series No. 85)⁶ developed pursuant to decision XII/20, which identifies lessons learned as well as gaps and challenges with the implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction.

Process

The voluntary guidelines were developed in consultation with experts from governments, academia, indigenous peoples and local communities, NGOs, and intergovernmental organizations. An informal meeting with experts was convened in collaboration with BirdLife International and UN Environment World Conservation Monitoring Centre (UNEP-WCMC) for developing a framework for the guidelines (July 2017, Cambridge),

and a technical workshop was conducted with representatives of CBD Parties and other experts in order to review a draft version of the guidelines (November 2017, Bonn).⁷

The draft report, containing the voluntary guidelines as well as supplementary information, was submitted for peer review and revised in the light of the comments received. The draft voluntary guidelines were considered by the Subsidiary Body on Scientific, Technical and Technological Advice of the CBD at its twenty-second meeting (Montreal, Canada, 2–7 July 2018)⁸, and subsequently were adopted by the Conference of the Parties to the CBD at its fourteenth meeting (Sharm El-Sheikh, Egypt, 17–29 November 2018)⁹. The present report contains the version of the guidelines as adopted by the Conference of the Parties at its fourteenth meeting as well as updated supplementary information. The supplementary information consists of a primer for policymakers as well as briefs on integrating EbA and Eco-DRR into a number of sectors.

In CBD Decision 14/5¹⁰, the Conference of the Parties requested the Executive Secretary to update the guidance, tools and information on initiatives available in the voluntary guidelines as necessary, and based on information provided by Parties on activities carried out to implement the voluntary guidelines. Pursuant to this request, the Secretariat is compiling and presenting such information as it becomes available on its Adaptation Planning Database¹¹.

⁷ Technical workshop for review of the voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction. Convened by CBD with support from the Governments of Germany and Sweden, and the European Commission, 20–22 November 2017, Bonn, Germany. www.cbd.int/meetings/CCBWS-2017-01

⁸ The voluntary guidelines were presented in the annex of document CBD/SBSTTA/22/8 and supplementary information including a primer for policymakers, a list of relevant tools, and sectoral briefs on the use of EbA and Eco-DRR, was presented in an information document (CBD/SBSTTA/22/INF/1).

⁹ The voluntary guidelines as adopted by the Conference of the Parties at its fourteenth meeting are available in the annex of Decision 14/5.

¹⁰ Decision 14/5, available at: www.cbd.int/doc/decisions/cop-14/cop-14-dec-05-en.pdf

¹¹ The Adaptation Planning Database of the CBD is available at: <https://adaptation.cbd.int>

⁶ Lo 2016

Audience

The main audience for this report is policymakers (particularly Parts 1) and implementers including subnational governments (regions, provinces, cities and municipalities), indigenous peoples and local communities (IPLCs), NGOs, private sectors, research institutions and funding agencies. The voluntary guidelines can also be consulted when implementing related practices, such as community-based adaptation and public works programmes with an ecosystem focus. These guidelines may also be useful for different sectors in planning and implementing ecosystem-based approaches such as into the development, humanitarian aid, disaster relief, water management, construction, health and other fields.

Framework of the report

The full text of CBD Technical Series no. 93¹² is organized into three parts (Figure 1). The present report contains the Part 1 and 2, while a separate report contains Part 3¹³:

Part 1 Primer for policymakers



Part 1 provides high-level policy guidance for focal points to the CBD, UNFCCC, UNCCD and UNISDR, policymakers within governments at all levels, and other relevant agencies and organizations, including the private sector, researchers, donors, and advocates of EbA and Eco-DRR (such as within NGOs, CSOs, governments, etc.). Part 1 highlights the advantages of EbA and Eco-DRR, including how they promote multiple benefits, and demonstrates how they can be integrated into adaptation and DRR strategies and development frameworks. This information can be used to encourage decision-makers to implement EbA and Eco-DRR across different sectors and in policies and strategies addressing climate change, disaster risk reduction and sustainable development. Policymakers are also encouraged to make use of the mainstreaming section in Part 2 (guidelines for practitioners) and Part 3 (outreach into sectors).

¹² Secretariat of the Convention on Biological Diversity (2019). *Voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction and supplementary information*. Technical Series No. 93. Montreal, 156 pages

¹³ Secretariat of the Convention on Biological Diversity (2019). Outreach into sectors: integrating ecosystem-based approaches to climate change adaptation and disaster risk reduction. In: *Voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction and supplementary information*. Secretariat of the Convention on Biological Diversity. Technical Series No. 93. Montreal, 60 pages.

Part 2 Guidelines for practitioners



Part 2 provides guidelines for practitioners and implementers for operationalising EbA and Eco-DRR at the programme and project level. Part 2 outlines:

- Principles of EbA and Eco-DRR, which are key considerations throughout the process of designing and implementing EbA and Eco-DRR;¹⁴
- Safeguards to prevent maladaptation, ensure that rights are respected, and prevent harm to, or enhance, biodiversity and ecosystem services;
- A flexible and iterative framework outlining key stages in planning and implementing adaptation and DRR; and
- Toolboxes which provide examples of existing tools and guidance for each stage. These lists of tools are not exhaustive; users of these guidelines are encouraged to consult more comprehensive databases of tools.¹⁵

Annexes for Parts 1 and 2

- **Annex 1** is a glossary with definitions of key terms used in this report.
- **Annex II** presents the various policy instruments and frameworks related to EbA and Eco-DRR.

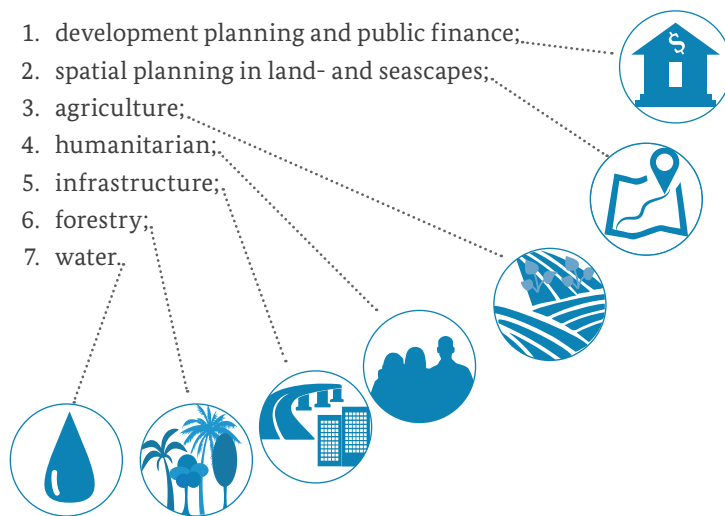
- **Annex III** provides an overview of existing guidelines and principles for EbA and Eco-DRR and related practices that were considered for the development of the principles and safeguards presented in this report.

Part 3 Outreach into sectors



Part 3 contains briefs to support advocacy by EbA and Eco-DRR practitioners for the integration of EbA and Eco-DRR into sectoral policies and plans. Opportunities for integration of EbA and Eco-DRR in the following sectors are presented:

1. development planning and public finance;
2. spatial planning in land- and seascapes;
3. agriculture;
4. humanitarian;
5. infrastructure;
6. forestry;
7. water.

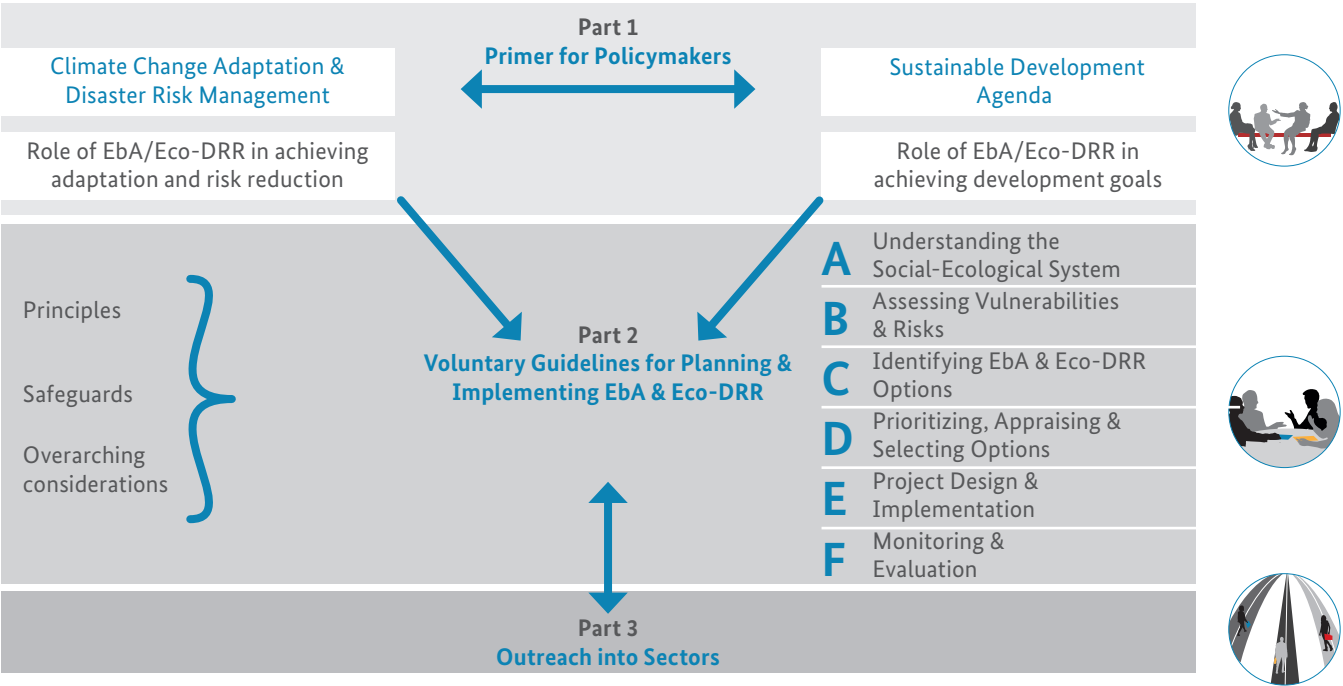


These sectoral briefs are self-contained with their own list of references and figures, as well as individual citations, to facilitate their separate use as outreach papers into specific sectors.

¹⁴ These principles are in alignment with the Ecosystem Approach developed under the CBD www.cbd.int/ecosystem

¹⁵ A draft inventory currently containing more than 200 tools related to EbA planning and implementation is available at www.iied.org/call-for-feedback-inventory-tools-support-ecosystem-based-adaptation, developed as part of the International Climate Initiative (IKI) funded global projects: Ecosystem-based adaptation (EbA): strengthening the evidence and informing policy implemented by IIED, IUCN and UNEP-WCMC with support from the project Mainstreaming EbA - Strengthening Ecosystem-based Adaptation in Planning and Decision Making Processes implemented by GIZ.

Figure 1 Framework for the report on voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction and supplementary information



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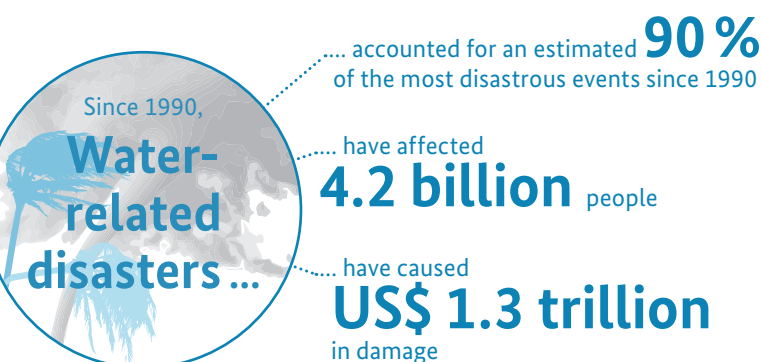


Primer for policymakers



1.1 Key messages

1. Ecosystem-based approaches to climate change adaptation (EbA) and disaster risk reduction (Eco-DRR) use biodiversity and ecosystem services to help people to adapt to the impacts of climate change and reduce disaster risk through the sustainable management, conservation and restoration of ecosystems.
2. In the face of current and future climate change impacts and disaster risks, governments urgently need to implement adaptation and risk reduction measures, including EbA and Eco-DRR, as part of overall adaptation and risk reduction strategies.
3. EbA and Eco-DRR:
 - a. Promote inclusive, participatory, and resilient approaches to risk reduction across scales;
 - b. Generate multiple benefits for people, nature and economies;
 - c. Are cross-cutting approaches that deliver on numerous agreements and have strong policy support, including within the framework of the Sustainable Development Goals, the Strategic Plan for Biodiversity 2011 – 2020 under the CBD, and the Paris Agreement under the UNFCCC;
 - d. Can be flexible, cost-effective and broadly applicable approaches for reducing the impacts of climate change and disasters.
4. EbA and Eco-DRR should be integrated into relevant social, economic and environmental policies and actions, contributing to resilient and sustainable development.



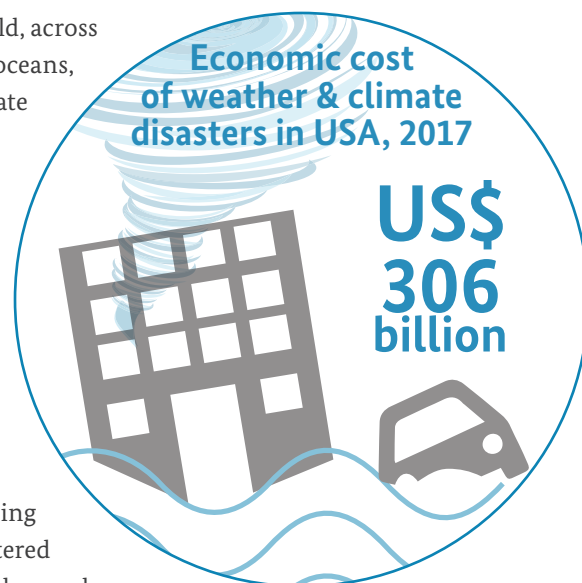
1.2 Introduction

All over the world, across continents and oceans, changes in climate have been impacting natural and human systems.

These changes are unprecedented – they include warming of the atmosphere and ocean, diminishing snow and ice, altered hydrological cycles, sea level rise, and ocean acidification.¹⁶

Extreme weather and climatic events such as floods, droughts, and heat waves are also changing in frequency, intensity and timing, causing mortality, damage to infrastructure and settlements¹⁷ These events have devastating costs. For example, the economic cost of weather and climate disasters in the United States in 2017 was an estimated US\$ 306 billion.¹⁸ Water-related disasters accounted for an estimated 90 per cent of the most disastrous events since 1990, affecting 4.2 billion people and causing US\$ 1.3 trillion in damage.¹⁹

At the same time, direct and indirect drivers of change are placing further pressure on life-sustaining ecosystems and their capacity to provide a buffer from climate change impacts and disasters. These drivers include not only climate change, but also habitat change, overexploitation of natural resources, and invasive alien species.²⁰ Projected population increases and urbanization are increasing vulnerability and disaster risk by placing addi-



¹⁶ IPCC 2013

¹⁷ IPCC 2012

¹⁸ NOAA 2018

¹⁹ United Nations 2015

²⁰ Millennium Ecosystem Assessment 2005

Small island developing states

are most sensitive to climate change impacts. Responding to these changes are some of the greatest challenges they face



tional development pressures in zones that are most sensitive to climate change impacts, including coastal systems and low-lying areas.²¹ Responding

to these changes are some of the greatest challenges that nations, especially the least developed countries and small island developing states, are currently facing.

Policyholders can choose from a wide range of interventions to adapt to climate change and reduce disaster risk. Such interventions can include 'soft' options such as policy frameworks, or 'hard' options such as built infrastructure. Within this spectrum, 'green' options include those based on conserving, managing or restoring ecosystems that provide services critical to reducing risks and impacts, and 'hybrid' options include those that integrate ecosystem-based options with other approaches. Hybrid approaches could include ecological engineering, green infrastructure, grey-green options, and building with nature solutions, among others.

'Hard' or engineered approaches have been by far the most common way to reduce the risk of climate impacts and disasters. However, these approaches tend to address single hazards, risking increasing vulnerability in the long-term by not considering future climate hazards or the interaction of multiple hazards. Due to their permanent and inflexible characteristics, engineered structures can also become obsolete in the face of unpredictable climate conditions.²² Thus, there is increasing support in the policy forum for implementing ecosystem-based or hybrid approaches as evidence of their effectiveness and their potential for generating multiple benefits is increasing.

²¹ IPCC 2014

²² Royal Society Science Policy Centre 2014

1.3 The role of biodiversity and ecosystems in adaptation to climate change and reduction of disaster risk

Ecosystems provide crucial services to society, particularly regulating and supporting services that help people adapt to the adverse effects of climate change and reduce disaster risk. For example, coral reefs and coastal vegetation can dissipate wave action and protect shorelines from erosion; peatland, marshes and floodplains provide a buffer from floods and water scarcity; and forested mountains and slopes can stabilize sediments, protecting from landslides.²³ Ecosystems can also prolong the sustainability and lifetime of built infrastructure, thus protecting investments in engineered defenses – such as restoring salt marshes adjacent to sea walls.²⁴

Biodiversity underpins the ecosystem processes and functions that provide such critical services²⁵ (see box 1 for key terms related to biodiversity). The loss of biodiversity, due to many drivers including climate change, alters ecosystem functioning across temporal and spatial scales, reducing ecological integrity and the corresponding capacity to provide ecosystem services²⁶. Thus, investing in actions to sustainably manage, conserve and restore biodiversity and ecosystems is essential for maintaining the ecosystem services critical for climate change adaptation and disaster risk reduction, reducing vulnerabilities and increasing resilience (figure 2).²⁷



²³ Hale et al. 2009, Ferrario et al. 2014, Renaud et al. 2016

²⁴ Temmerman et al. 2013

²⁵ Cardinale et al. 2012

²⁶ Perrings et al. 2010, Isbell et al. 2017

²⁷ Sumaila et al. 2017

According to the latest assessment report of the IPCC (AR5), 'successful adaptation will depend on our ability to allow and facilitate natural systems to adjust to a changing climate, thus maintaining the ecosystem services on which all life depends.'²⁸

Box 1 Key terms related to biodiversity

Biodiversity: the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems (CBD Article 2).

Ecosystem: the dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit (CBD Article 2).

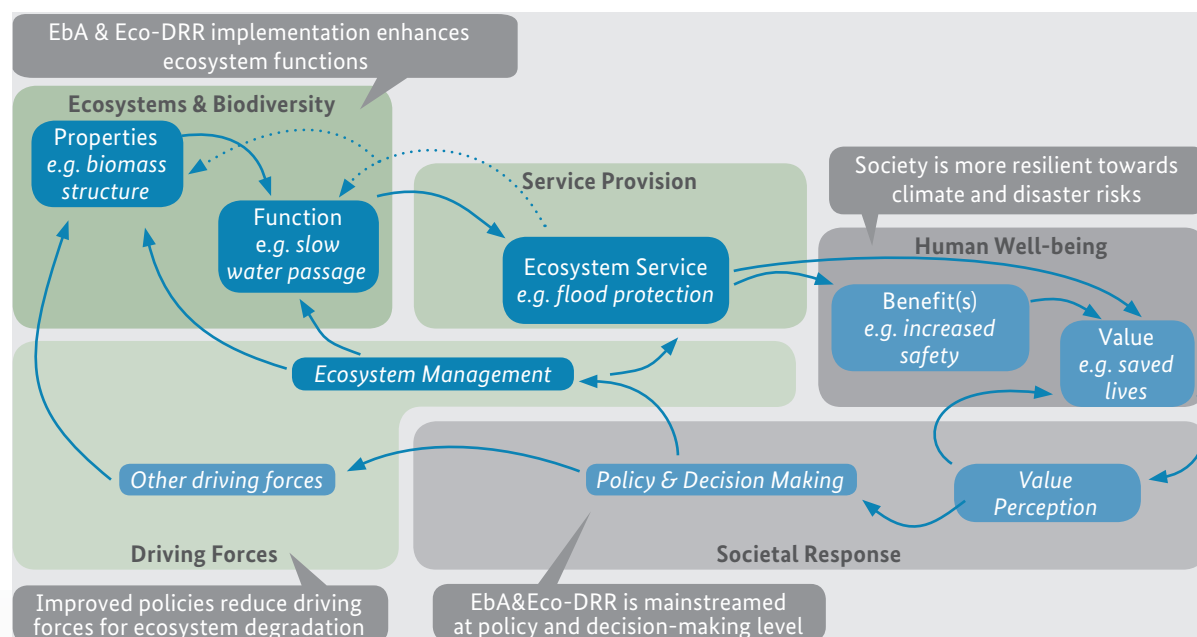
Ecosystem services: the benefits people obtain from ecosystems, which have been classified by the Millennium Ecosystem Assessment as: Provisioning services, such as supply of food, fibre, timber and water; regulating services, such as carbon sequestration, climate regulation, water regulation and filtration, and pest control; cultural services, such as recreational experiences, education and spiritual enrichment and supporting services, such as seed dispersal and soil formation (Millennium Ecosystem Assessment 2005).

Ecosystem approach: Strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (CBD).



²⁸ IPCC 2014

Figure 2 Linkages between policies, management, ecosystems and human well-being within a social-ecological system in the context of EbA and Eco-DRR



Ecosystems provide key services for human well-being which have a high value. Societal response, especially policy and decision-making shapes the way ecosystems are managed and the degree to which they can provide their services in a sustainable manner. Climate change is an important driving force that shapes current and future ecosystems and their services.

Source: GIZ, adapted from van Oudenhoven et al. 2013

1.4 EbA and Eco-DRR: integral components of adaptation and risk reduction strategies

The concepts and practice of ecosystem-based adaptation (EbA) and ecosystem-based disaster risk reduction (Eco-DRR) have been developed and refined in recent years as integrative approaches to reduce the risk of climate-related and other types of hazards (box 2). These approaches emphasize the importance of biodiversity and ecosystems in reducing risk, and build on other practices such as conservation and ecosystem restoration which seek to increase the resilience of ecosystems for the benefit of people.

Box 2 What are EbA and Eco-DRR?

Ecosystem-based adaptation (EbA) is the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of climate change. EbA aims to maintain and increase the resilience and reduce the vulnerability of ecosystems and people in the face of the adverse effects of climate change.” (SCBD 2009)

Ecosystem-based disaster risk reduction (Eco-DRR) is “sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim of achieving sustainable and resilient development.” (Estrella and Saalismaa 2013)

EbA and Eco-DRR are conceptually similar, sharing common underlying principles of sustainable management, conservation and restoration of ecosystems to increase the resilience of social-ecological systems, and both emphasize participatory approaches (figure 3). However, EbA largely addresses climate-related hazards, although there are examples of EbA interventions such as implementing protection forests that stabilize the soil to prevent landslides (which can be climate and non-climate-related). EbA also aims to address slow-onset climate change impacts, such as changing precipitation patterns, rising mean temperatures, and sea

level rise, which has not been a traditional focus of DRR. In contrast, Eco-DRR addresses hazard events that are not necessarily linked to climate change or climate variability.²⁹ Including both non-climate (e.g. earthquakes, tsunamis, etc.), and climate-related (e.g. hurricanes, heat waves, etc.) hazards. In practice, EbA and Eco-DRR are difficult to distinguish,³⁰ and therefore such approaches are referred to together in this report as EbA and Eco-DRR.

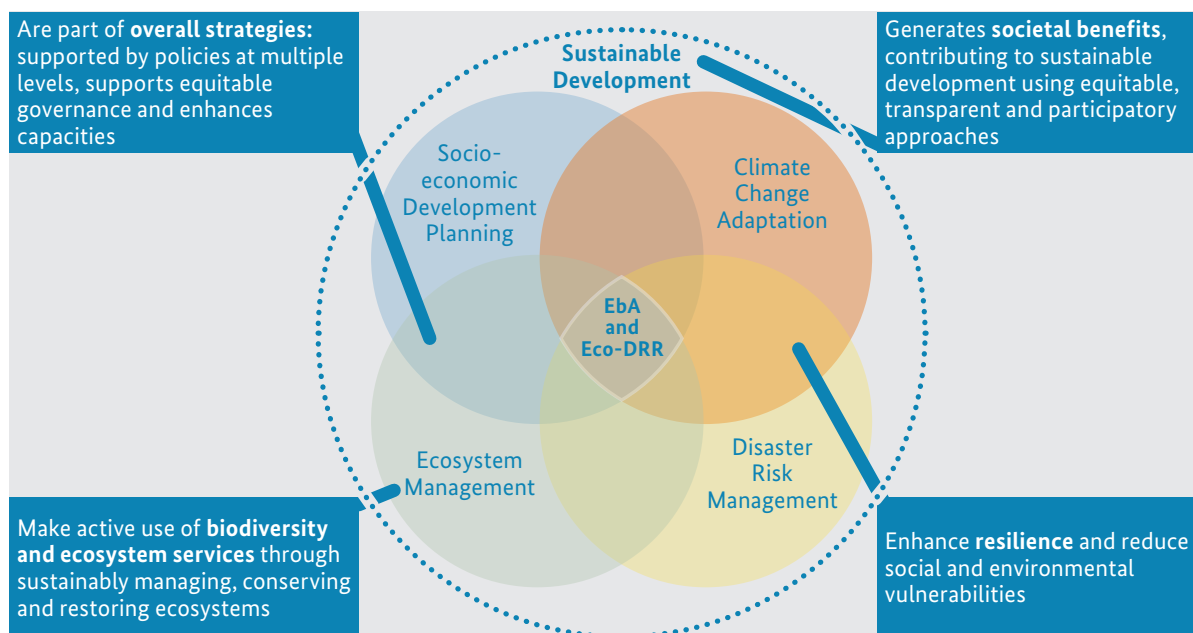
EbA, Eco-DRR and related practices span a spectrum of naturalness, from natural to semi-natural or hybrid, covering a wide range of natural to artificial ecosystems. For example, protected areas designed to reduce socio-economic vulnerability to climate change and disaster risk through enhancing the resilience of ecosystems are on the natural end of the spectrum, while green spaces, green roofs and walls in cities reduce the risk of heat shocks, or rainwater storage to alleviate water shortages can be considered hybrid or semi-natural options. EbA and Eco-DRR activities encapsulate the following characteristics:³¹

- a. Enhance resilience and reduce social and environmental vulnerabilities to current and future climate change impacts and disaster risk, contributing to incremental and transformative adaptation and disaster risk reduction;
- b. Generate societal benefits, contributing to sustainable and resilient development using equitable, transparent and participatory approaches;
- c. Make active use of biodiversity and ecosystem services through sustainably managing, conserving and restoring ecosystems;
- d. Be part of overall strategies for adaptation and risk reduction that are supported by policies at multiple levels, and encourage equitable governance while enhancing capacity.

²⁹ Renaud et al., 2016

³⁰ Doswald and Estrella 2015

³¹ FEBA 2017, DEA and SANBI 2017

Figure 3 Conceptual diagram of EbA and Eco-DRR

Ecosystem-based approaches to adaptation and disaster risk reduction (EbA and Eco-DRR) use ecosystems and biodiversity to integrate climate change adaptation, disaster risk management, ecosystem management and socio-economic development planning. The main elements of EbA and Eco-DRR are shown in the grey boxes.

(Adapted from Midgley et al. 2012, DEA and SANBI 2017, and Sudmeier et al. 2013).

Case studies and literature indicate that ecosystem-based approaches can be flexible, cost-effective and broadly applicable approaches for reducing the impacts of climate change.³² Examples of EbA and Eco-DRR include restoration of floodplains for flood protection and water storage; greening of cities to counter the heat island effect; crop diversification with indigenous varieties that are resistant to climate variability; the creation of protected areas to enhance ecosystem resilience and provisioning of essential ecosystem services such as erosion control, beach stabilization and water retention; sustainable management of grasslands and rangelands to enhance pastoral livelihoods and increase resilience to climate-induced drought and flooding; or training activities to enhance knowledge on the use of ecosystems for climate change adaptation.

EbA and Eco-DRR draw from, and share similarities with, other fields of practice that promote the sustainable management, conservation and restoration of biodiversity and ecosystems to adapt to change.³³ For example, conservation practices, such as protected areas or ecological restoration, aim to maintain or enhance biodiversity and ecosystem functioning. EbA and Eco-DRR specifically aim to reduce current and future impacts of climate change and disaster risk based on the ongoing identification or assessment of risks and vulnerabilities of a social-ecological system that includes both people and ecosystems. Although traditional conservation practices have a different main objective from EbA and Eco-DRR, they are an important complement to, and an important means to achieve, adaptation and disaster risk reduction efforts.

³² Munang et al. 2013

³³ Kabisch et al. 2016

Other approaches related to EbA and Eco-DRR include community-based adaptation, climate-smart agriculture, natural water retention measures, and building with nature solutions. EbA and Eco-DRR can also be considered under the wider umbrella concept of nature-based solutions as ecosystem approaches which specifically address the issues of climate change adaptation and disaster risk reduction ^{34, 35}. In practice, EbA and Eco-DRR have included many approaches that are considered nature-based solutions, including ecological restoration, integrated coastal zone management, integrated water resources management, green infrastructure, and protected areas management. The above-mentioned approaches are complementary and focus on developing holistic, integrated ways to enhance the resilience of social-ecological systems, reduce disaster risk, and/or help people adapt to change through the use of ecosystems and biodiversity in a sustainable manner. They often place emphasis on participatory processes and community engagement, which are crucial to improving community resilience, enhancing adaptive capacity, and ensuring local benefits are realized.

1.5 The policy context for EbA and Eco-DRR

EbA and Eco-DRR are recognized as instruments for promoting synergistic implementation of the Rio Conventions – the Convention on Biological Diversity (CBD), the UN Convention to Combat Desertification (UNCCD), and the UN Framework Convention on Climate Change (UNFCCC) (box 3).

Support for EbA and Eco-DRR has been embedded in other major agreements and promoted in the international policy arena. Other major agreements

are highlighted below, and summarized in more detail in Annex II.

- Several of **the Sustainable Development Goals** (SDGs) adopted by the UN General Assembly explicitly address sustainable ecosystem management, including SDG 13 on urgent action to combat climate change and its impacts and SDG 11 to make cities and human settlement inclusive, safe, resilient and sustainable, in addition to SDGs 1 (end poverty), 2 (end hunger), 3 (ensure healthy lives and well-being), 6 (access to water and sanitation), 14 (conserve oceans), and 15 (sustainably manage forests and halt biodiversity loss) (see figure 4 and Annex II for other relevant SDGs). The SDGs also promote sustained, inclusive and sustainable economic growth through full and productive employment.
- The **Sendai Framework for Disaster Risk Reduction 2015-2030**, building on the Hyogo Framework for Action 2005-2015, outlines seven global targets to be achieved over the next 15 years, prioritizing “ecosystem-based approaches...to build resilience and reduce disaster risk”. The role of ecosystems will need to be taken into account in disaster risk assessments (Priority Action 1), strengthening risk governance (Priority Action 2) and investments in disaster resilience (Priority Action 3). The Sendai Framework also calls for greater collaboration between institutions and stakeholders from other sectors, and calls for ecosystem-based approaches to be implemented in transboundary cooperation for shared resources, such as within river basins and shared coastlines.
- One of the **Ten Essentials for Making Cities Resilient**, building on the Sendai Framework, is to safeguard natural buffers to enhance the protective functions offered by natural ecosystems. It is encouraged to consider natural buffers in the rural hinterland of the city and the wider region, and to build regional resilience through trans-boundary cooperation with other municipalities (Essential #5).

³⁴ Nature-based Solutions (NbS) are actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g. climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits (IUCN)

³⁵ Cohen-Shacham et al. 2017

Box 3 EbA and Eco-DRR: achieving synergies in implementing the Rio Conventions

EbA and Eco-DRR are cross-cutting approaches to achieving implementation of the Rio Conventions.

- **The Strategic Plan for Biodiversity 2011-2020** and the Aichi Biodiversity Targets, under the Convention on Biological Diversity (CBD), aim to halt the loss of biodiversity to ensure ecosystems are resilient and continue to provide essential services, thereby securing the planet's variety of life and contributing to human wellbeing and poverty eradication. EbA and Eco-DRR are particularly relevant to **Target 15**, which aims, by 2020, to enhance ecosystem resilience and the contribution of biodiversity to carbon stocks, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification. EbA is encouraged in decisions X/33, XII/20, XIII/4 and 14/5 of the Conference of the Parties to the Convention on Biological Diversity. **National Biodiversity Strategies and Action Plans** (NBSAPs) are important entry points for prioritizing EbA and Eco-DRR.
- The **10-year Strategic Plan and Framework** (2008-2018) of the United Nations Convention to Combat Desertification (UNCCD) seeks to reverse and prevent land degradation and desertification, and specifically recognizes the important services provided by ecosystems, especially in dryland ecosystems, for drought mitigation and the prevention of desertification. By adopting the **Land Degradation Neutrality** (LDN) target, Parties have agreed that the amount of healthy and productive land should stay stable starting in 2030, enhancing land resilience to climate change and halting biodiversity loss linked to ecosystem degradation.
- The **Cancun Adaptation Framework** under the UN Framework Convention on Climate Change (UNFCCC), aims to enhance action on adaptation, reducing vulnerability and building resilience in developing country Parties. **National Adaptation Plans** (NAPs) aim to reduce vulnerability to the impacts of climate change by building adaptive capacity and resilience; and integrate climate change adaptation into policies, programmes and activities within all relevant sectors and at different levels. **(Intended) Nationally Determined Contributions** ((I)NDCs) set out high-level objectives and a vision for addressing adaptation goals. The NAP process is a key tool for coherent implementation of an (I)NDC adaptation component (see more information in box 5).
- **The Paris Agreement** recognises the protection of the integrity of ecosystems and biodiversity for both climate change mitigation and adaptation actions. It specifically lays out principles of adaptation that takes ecosystems into consideration. It also calls for integrating adaptation into relevant environmental policies and actions, where appropriate, as well as for building resilience of ecosystems through sustainable management of natural resources, taking into account the imperatives of a just transition of the workforce.

- The **IPCC Special Report on Extreme Events** (SREX) recommends investing in ecosystems, sustainable land management and ecosystem restoration and management.
- **UN General Assembly resolutions** (RES/70/195, RES/71/219, and RES/72/220) highlight the importance of sustainable land management for sand and dust storms which are among the emerging concerns of the global community.
- The **Fifth Assessment Report of the IPCC** (AR5) notes that “successful adaptation will depend

on our ability to allow and facilitate natural systems to adjust to a changing climate, thus maintaining the ecosystem services on which all life depends.”

- **The Ramsar Convention** Resolution XII.13 on Wetlands and Disaster Risk Reduction encourages Parties to integrate wetland-based disaster risk management and climate change adaptation into development policies and planning at all levels of government, including integration in vulnerability analysis, poverty reduction strategies and natural resource management plans

and sectors, and in multi-sector policies and plans.

- Eco-DRR has also been endorsed in the outcomes of **regional DRR platforms** of Asia, Africa, Latin America and Arab states, and of the European Ministerial meeting on DRR.
- The **World Humanitarian Summit** commits the UN Member countries to core responsibilities of humanitarian aid and disaster risk preparedness, including building community resilience.
- The **New Urban Agenda** adopted at the UN Conference on Housing and Sustainable Urban Development (Habitat III) contains three transformative commitments: leaving no one behind and fighting against poverty; urban prosperity and opportunities for all; and ecological and resilient cities and human settlements.
- The **Cancun High-Level Communiqué** adopted at the fifth session of the **Global Platform for Disaster Risk Reduction 2017** emphasizes the close nexus between climate change and water-related hazards and disasters and highlights Integrated Water Resources Management (IWRM) as an effective instrument for enhancing resilience and serving both DRR and CCA goals, in addition to investments in resilient infrastructure, including green infrastructure and housing. All countries, provinces and cities are urged to make integrated flood and drought management central to their planning and management processes.
- **The guidelines for a just transition towards environmentally sustainable economies and societies for all** recommends supporting public works and employment programmes, including initiatives linking poverty eradication and ecosystem protection, as well as those for workers affected by the transitioning to environmentally sustainable economies, including climate change, who have been laid off due to structural or technological change.³⁶

- **Local investments for climate change adaptation** highlights the importance of using employment intensive approaches, focusing on inclusive local practices for environmental sustainability and the impact that altering the quality and productivity of natural resources and ecosystems will have on biological diversity and environmental degradation.

1.6 Multiple benefits from EbA and Eco-DRR implementation

EbA, Eco-DRR and related approaches generate additional environmental, economic, and social benefits beyond adaptation and disaster risk reduction. They are often referred to as low-regrets or no-regrets options as they can generate benefits regardless of uncertainties in climate projections. For example, mangrove restoration can stabilize sediments and protect coastlines, and through increasing habitat for fish and other species, support livelihoods through employment creation programmes, and contribute to carbon storage. EbA and Eco-DRR also enhances biodiversity conservation, among other multiple benefits. In disaster risk management, the post-disaster reconstruction period offers an opportunity to “build back better.” In other words, such occasions provide new opportunities to conserve and restore biodiversity to strengthen the resilience of ecosystems and people as well as decrease vulnerability to disasters. As biodiversity underpins the services provided by ecosystems, investing in approaches that enhance biodiversity is like broadening a risk reduction investment portfolio to provide long-term returns for the future. Assessing multiple benefits of nature-based solutions can be challenging due to the considerations of benefits/costs across socio-cultural, socio-economic, environment, biodiversity, ecosystem, and climate elements, but is an area of active research.³⁷

³⁶ ILO 2015

³⁷ Raymond et al. 2017

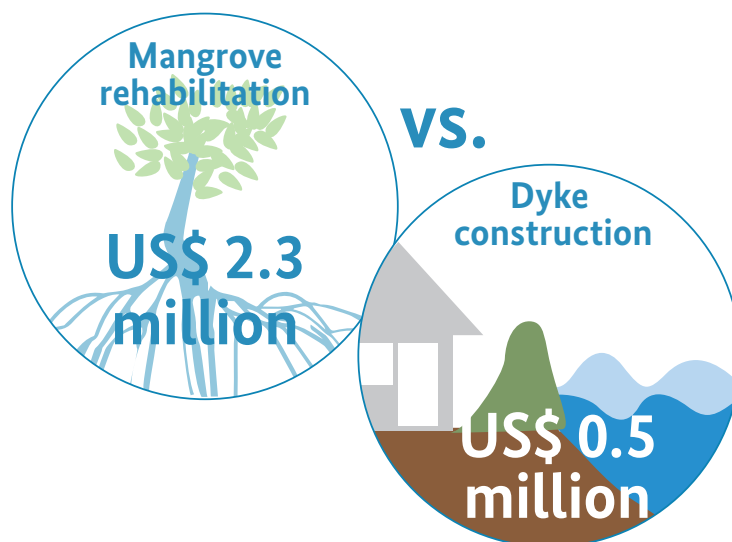
Several examples of how EbA and Eco-DRR in landscapes and seascapes can address the Aichi Biodiversity Targets under the Convention for Biological Diversity and the Sustainable Development Goals are shown in figure 4.

In economic terms, the benefits of EbA and Eco-DRR have been demonstrated in several case studies:³⁸

- In comparison to the economic loss caused by loss of ecosystem services, the cost-benefit ratio of return on investment of appropriate restoration of ecosystems may be as high as 3 to 75, depending on the ecosystem context and the measures taken.³⁹
- Mangrove rehabilitation at the village level is generating significantly higher wealth benefits from risk reduction and natural resource utilization (US\$ 2.3 million over 20 years) compared to dyke construction (only US\$ 0.5 million), according to a case study in Vietnam.⁴⁰
- A cost-benefit analysis indicates a significantly higher revenue (a net present value of US\$ 841,902 over 20 years) under an EbA scenario, including the low impact grassland management in a community with wild llamas, compared to a business as usual scenario (a net present value of US\$ 486,571 over 20 years) with intensive domestic cattle management (UNEP-IUCN-UNDP Mountain EbA Programme in Peru).⁴¹

- Early investment in climate resilience has been found to be more cost-effective than post-disaster relief. For example, a case study found that Barbados could cost-effectively avoid more than 30 per cent of expected losses by implementing risk mitigation initiatives such as beach nourishment.
- In hybrid solutions, EbA and Eco-DRR can complement more expensive infrastructure investments and prolong the lifetime of engineered flood protection measures.⁴²

Wealth benefits generated from risk reduction and natural resource utilisation at the village level over 20 years in Vietnam



³⁸ Examples from www.AdaptationCommunity.net and <http://panorama.solutions>

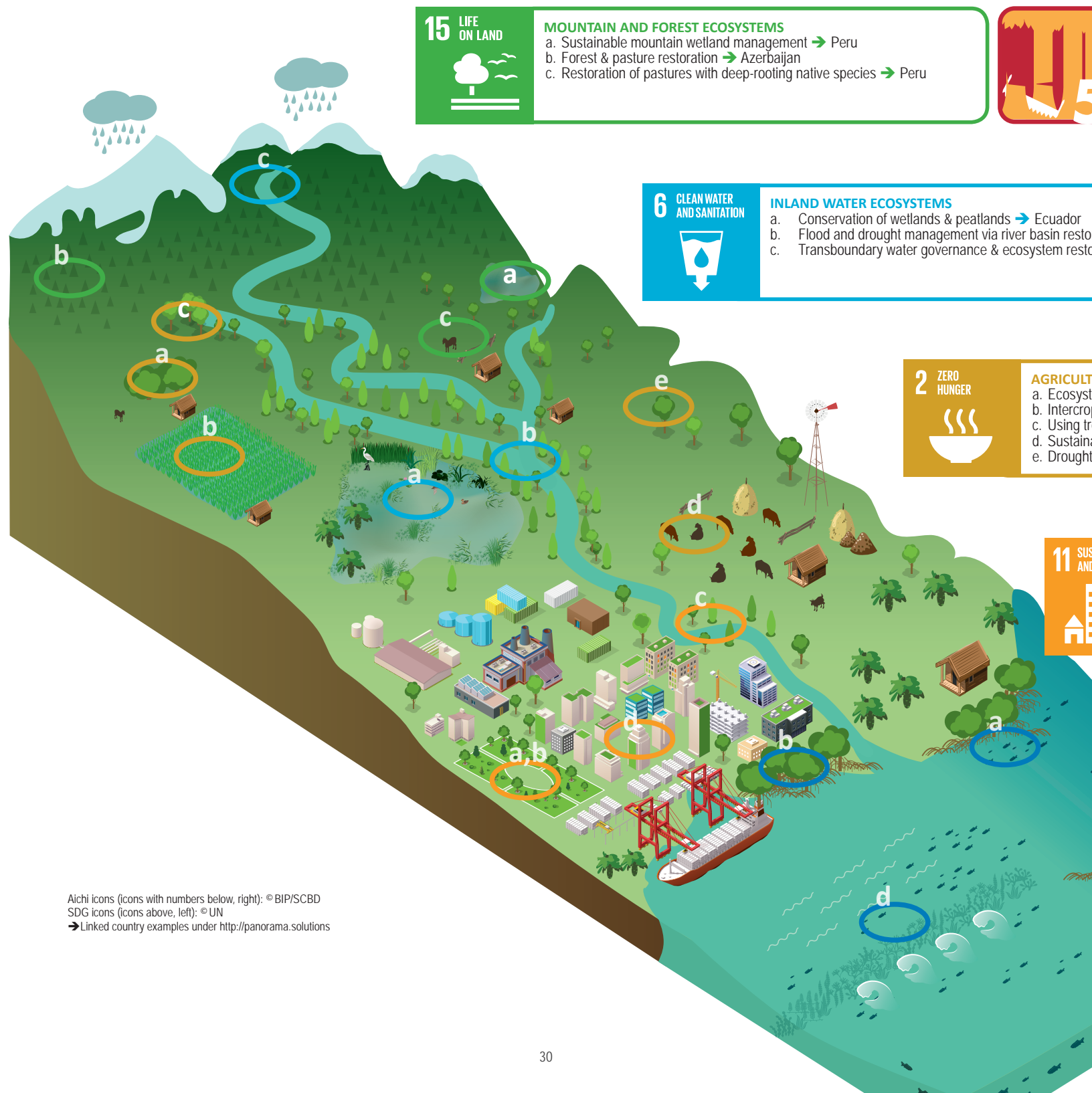
³⁹ United Nations 2015

⁴⁰ Köhler and Michaelowa 2013

⁴¹ Rossing et al. 2015

⁴² Munang et al. 2013, Temmerman et al. 2013

Figure 4 Examples of EbA and Eco-DRR in a landscape/seascape that help achieve adaptation and risk reduction goals under the CBD Aichi Biodiversity Targets and SDGs



Aichi icons (icons with numbers below, right): © BIP/SCBD
 SDG icons (icons above, left): © UN
 → Linked country examples under <http://panorama.solutions>



→ UK
 → Thailand
 → Guatemala & Mexico

URBAN AND DRYLAND ECOSYSTEMS

Forest restoration and agroforestry → India → Burundi
 Planting of adapted species → Sweden
 Trees to adapt to changing dry seasons → Pakistan
 Sustainable livestock management & pasture restoration → S. Africa
 Resilience by sustainable dryland management → Sudan

URBAN ECOSYSTEMS

- Green aeration corridors for heat wave buffering → Germany
- Storm water management by green spaces → Sweden
- Improving flood protection by river restoration → Germany
- Green facades for heat wave buffering → Austria








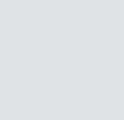
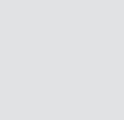



14 LIFE BELOW WATER



MARINE AND COASTAL ECOSYSTEMS

- Mangrove restoration and coastal protection
 → Indonesia → Grenada → Ecuador → Colombia
- Coastal realignment → UK
- Sustainable Fishing & mangrove rehabilitation → Mexico
- Coral reef restoration → Vanuatu



Ecosystem	SDG	Aichi	Hazards	Measures
				
The Aichi goals 4, 7, 11, 13, 14, 15 and SDG 13 apply to all ecosystems				
Mountain and forest			<ul style="list-style-type: none"> • Drought • Soil erosion • Erratic rainfall 	<ul style="list-style-type: none"> • Sustainable mountain wetland management • Forest & pasture restoration • Restoration of pastures with deep-rooting native species (Peru)
Inland water			<ul style="list-style-type: none"> • Erratic rainfall • Flood • Drought 	<ul style="list-style-type: none"> • Conservation of wetlands & peatlands • River basin restoration • Transboundary water governance & ecosystem restoration
Agricultural and dryland			<ul style="list-style-type: none"> • Erratic rainfall • Temperature increase • Shift of seasons • Drought 	<ul style="list-style-type: none"> • Ecosystem restoration and agroforestry • Intercropping of adapted species • Using trees to adapt to changing dry seasons • Sustainable livestock management & pasture restoration • Drought resilience by sustainable dryland management
Urban			<ul style="list-style-type: none"> • Extreme heat • Temperature increase • Floods • Erratic rainfall 	<ul style="list-style-type: none"> • Green aeration corridors for cities • Storm water management by green spaces • River restoration in urban areas • Green facades for buildings
Marine and coasts		 	<ul style="list-style-type: none"> • Storm surges • Cyclones • Sea level rise • Salinisation • Temperature increase 	<ul style="list-style-type: none"> • Mangrove restoration and coastal protection • Coastal realignment • Sustainable fishing & mangrove rehabilitation • Coral reef restoration

	Country examples	Impacts
	• Peru	<ul style="list-style-type: none"> • Improved water regulation • Erosion prevention • Improved water storage capacity
	• Azerbaijan	
	• Peru	
	• Ecuador / UK	<ul style="list-style-type: none"> • Improved water storage capacity • Flood risk reduction • Improved water provision
	• Thailand	
	• Guatemala & Mexico	
	• India / Burundi	<ul style="list-style-type: none"> • Improved water storage capacity • Adaptation to higher temperatures • Adaptation to shifting seasons • Improved water provision
	• Sweden	
	• Pakistan	
	• South Africa	
	• Sudan	
	• Germany	<ul style="list-style-type: none"> • Heat wave buffering • Adaptation to higher temperatures • Flood risk reduction • Improved water regulation
	• Sweden	
	• Germany	
	• Austria	
	• Indonesia / Grenada / Ecuador / Colombia	<ul style="list-style-type: none"> • Storm & cyclone risk reduction • Flood risk reduction • Improved water quality • Adaptation to higher temperatures
	• UK	
	• Mexico	
	• Vanuatu	

Box 4 The role of EbA and Eco-DRR in creating green jobs

As adaptation is inherently local, much depends on the capacity of communities to respond to climate change, which has far-reaching consequences in terms of participation, planning, information flow and fund allocation. Infrastructure investments and public employment programmes can be a catalyst for creating additional jobs, providing income security and building very much needed public assets and services (ILO 2015). Catalysing this opportunity, EbA and Eco-DRR provide several entry points to support local job creation:

- The involvement of local communities can support and contribute to the development of practical measures to protect, maintain and strengthen existing local infrastructure or building new infrastructure that can withstand the effects of climate change.
- Building climate resilience is also a way of contributing to a just transition by using public works and employment programmes as a vehicle to link poverty eradication to ecosystem protection.
- Infrastructure will need to be built to higher standards and improved designs will be needed to better withstand the local impacts of climate change, thus providing opportunities for job creation in the infrastructure sector.

Through greening infrastructure and natural resource management, in addition to the sustainable management, conservation and restoration of ecosystems, the public works sector can be sensitized to the risks of environmental degradation and disaster risk, and use employment schemes to build capacity for adaptation and risk reduction.

Beyond direct economic benefits, there are broader benefits of effective EbA and Eco-DRR, such as avoided costs of using artificial systems instead of ecosystem services, land or service value increases, local income enhancement, livelihood diversification, improved access to markets, improved food security and health, sustainable water provisioning, reduction of conflicts over resources, improved social cohesiveness, and knowledge enhancement. These are often broader than the direct financial benefits shown by cost-benefit calculations or other valuation techniques, and while difficult to quantify in monetary terms, they provide invaluable benefits to society. Other examples of multiple benefits of EbA and Eco-DRR include:

- Providing adaptation and DRR solutions that deliver on multiple commitments by supporting national development and adaptation goals such as coastal protection, conservation of natural resources, sustainable development and social well-being.⁴³
- Contributing to employment and income security – a national priority in many countries, by twinning the objectives of employment creation with environmental protection through public works programmes which already have an aim of CCA and DRR.
- Contributing to climate change mitigation targets via: (i) conservation or restoration of forests and coastal vegetation,⁴⁴ and rewetting of drained peatlands to reduce CO₂ emissions, which enhance carbon sequestration and (ii) reduction of deforestation and land degradation including peatland drainage, which aids in limiting further greenhouse gas emissions.⁴⁵
- Improving the quality of life and mental and physical health of people, for example, through providing urban green spaces which also provide relief from heat.⁴⁶

⁴³ WWF 2013

⁴⁴ Duarte et al. 2013

⁴⁵ Busch et al. 2015

⁴⁶ Kabisch et al. 2016

- Engaging people and communities, helping to build trust and responsibility while maintaining livelihoods and providing potential business opportunities.
- Addressing underlying key drivers of climate and disaster risk, generating more robust solutions for coping with future challenges and uncertainty due to climate change.

1.7 Planning and Implementing EbA and Eco-DRR

Key principles and safeguards and a flexible and iterative framework for planning and implementing EbA and Eco-DRR are detailed in Part 2. The framework integrates other related guidelines and processes, including the adaptation process under the UNFCCC, and is composed of key steps (see summary in table 1).

Governments urgently need to implement resilient adaptation and risk reduction measures in response to current and future climate change impacts and disaster risks. There is mounting evidence that sustainable management, conservation and restoration of ecosystems are effective solutions for these global challenges. By addressing risk across scales and through a social-ecological lens, EbA and Eco-DRR provide flexible and effective options as part of an overall strategy for adaptation and disaster risk reduction, while promoting multiple benefits for people, nature and the economy. Encouragingly, recent analyses of countries submitting (I)NDCs showed that 86 per cent of country submissions included an adaptation component in their plans which outline goals, activities and needs for adaptation⁴⁷. Many of these (I)NDCs include ecosystem-orientated visions for adaptation and propose a range of conservation, restoration, agroforestry and community-led approaches to achieve these visions⁴⁸ (see box 5 for further information). The voluntary guidelines provide a framework for translating such visions and ambitions into action.

Table 1 Framework for planning and implementing EbA and Eco-DRR

Overarching considerations: Integrating knowledge of IPLCs, mainstreaming, raising awareness and building capacity	Step	Purpose
	A. Understanding the Social-Ecological System (SES)	Identify key features of the target SES, including biodiversity and ecosystem services, and their inter-linkages with people
	B. Assessing vulnerabilities & risks	Identify the main climate change and disaster risks and impacts on the SES
	C. Identifying EbA and Eco-DRR options	Identify potential options within an overall adaptation/risk reduction strategy
	D. Prioritising, appraising and selecting options	Develop criteria for prioritizing and appraising options, including consideration of scale and monetary- and non-monetary benefits
	E. Project design & implementation	Design and implement selected options, ensuring ongoing stakeholder engagement, capacity-building, mainstreaming and monitoring
	F. Monitoring & evaluation	Improve implementation by providing information for adaptive management and encourage continual learning to help inform future policy and practice

⁴⁷ World Resources Institute 2017

⁴⁸ Seddon et al. 2016

1.8 Governance opportunities for EbA and Eco-DRR

Governance aspects are key considerations when planning EbA and Eco-DRR measures, as multi-level and multi-sectoral approaches are required to address holistic ecosystem management for risk reduction objectives. Key governance challenges relevant to nature-based solutions generally include:

- **Multi-level governance:** Climate change, disaster risk reduction and ecosystem governance occur within a complex web of stakeholders operating at different levels. Although climate variability occurs at different scales, the role of local and regional settings for the formulation of adaptation and risk reduction strategies is highly important.
- **Multi-sectoral governance:** The integration of adaptation and risk reduction issues in different sectors and corresponding policies is a central mechanism of governance.
- **Governing under uncertainty:** A challenge in formulating and implementing adaptation strategies is due to considerable uncertainties around the sensitivity of the climate system, regional climate impacts and the consequences for social-ecological systems. Governance arrangements should therefore be able to undertake process-oriented approaches, react flexibly to new scientific findings and develop strategic stakeholder relationships according to the needs and opportunities arising, but considering the long-term perspective of all climate-related planning.

Adapting to uncertain climate risks can provide a window of opportunity for institutional change. Since climate change and disaster risks are affecting societies, policy responses need to consider diverse contexts and socio-economic considerations beyond the relatively restricted means of national governments. Linking ecological dynamics with policies in complex, multi-jurisdictional settings with adaptive management and governance frameworks can move social-ecological systems toward greater sustainability.⁴⁹

Integrating ecological concepts into governance frameworks requires a dialogue across actors from multiple disciplines, including ecologists, hydrologists, climate experts, social scientists, resilience experts and legal scholars. Leveraging civil society and the private sector can considerably strengthen planning and implementation of EbA and Eco-DRR measures. A broad suite of stake- and rights holders should thus be considered in the planning phase, and windows of opportunity for joint action with government institutions on different levels should be identified and built into coherent climate change adaptation or risk reduction strategies. These plans should avoid duplication of efforts or gaps by clearly defining roles, responsibilities and mandates while respecting equity and human rights aspects.

In the context of EbA and Eco-DRR, policy integration is relevant at all levels of governance. Especially where vulnerabilities and risks are highly localized, subnational actors play a key role in effective governance and should address trade-offs between environmental and economic objectives through policy development, land use planning and permitting and licensing of infrastructure or economic activities.⁵⁰

⁴⁹ Cosens et al. 2014

⁵⁰ Ibid



Governance principles relevant for the mainstreaming of EbA and Eco-DRR include: inclusive decision-making, transparency, responsiveness and accountability. They are oriented towards effective, equitable and sustainable resource management and livelihood enhancement, and embrace diverse cultures and knowledge systems. In times of uncertainty, polycentric governance systems, with multiple centers of semiautonomous decision-making, can have numerous advantages such as enhanced adaptive capacity, provision of good institutional frameworks for natural resource systems, and mitigation of risks due to redundant governance actors and institutions.⁵¹

Good governance goes beyond the government; it includes civil society and the private sector, with clear roles and mandates for action (figure 5). A key role of the state is to create a favourable political,

legal and economic environment for adaptation and risk reduction. Civil society can mobilize people's participation in policy making and governance, including via media, or interest groups such as NGOs, community organizations or indigenous peoples' associations. Academia provides scientific knowledge as the basis for policy and informed decision-making. The private sector is a key actor for the governance of EbA and Eco-DRR measures due to its flexibility of action and innovation, importance for public awareness, financial powers and potential to enhance policy implementation. Financing institutions, insurance companies, investors, producers, retailers, and sector-specific actors bring cost-benefit and efficiency thinking to the table. They can provide the financial means for innovations to emerge, or use pressure or incentives for new policies to be developed, implemented or enhanced.

⁵¹ Carlisle and Gruby 2017

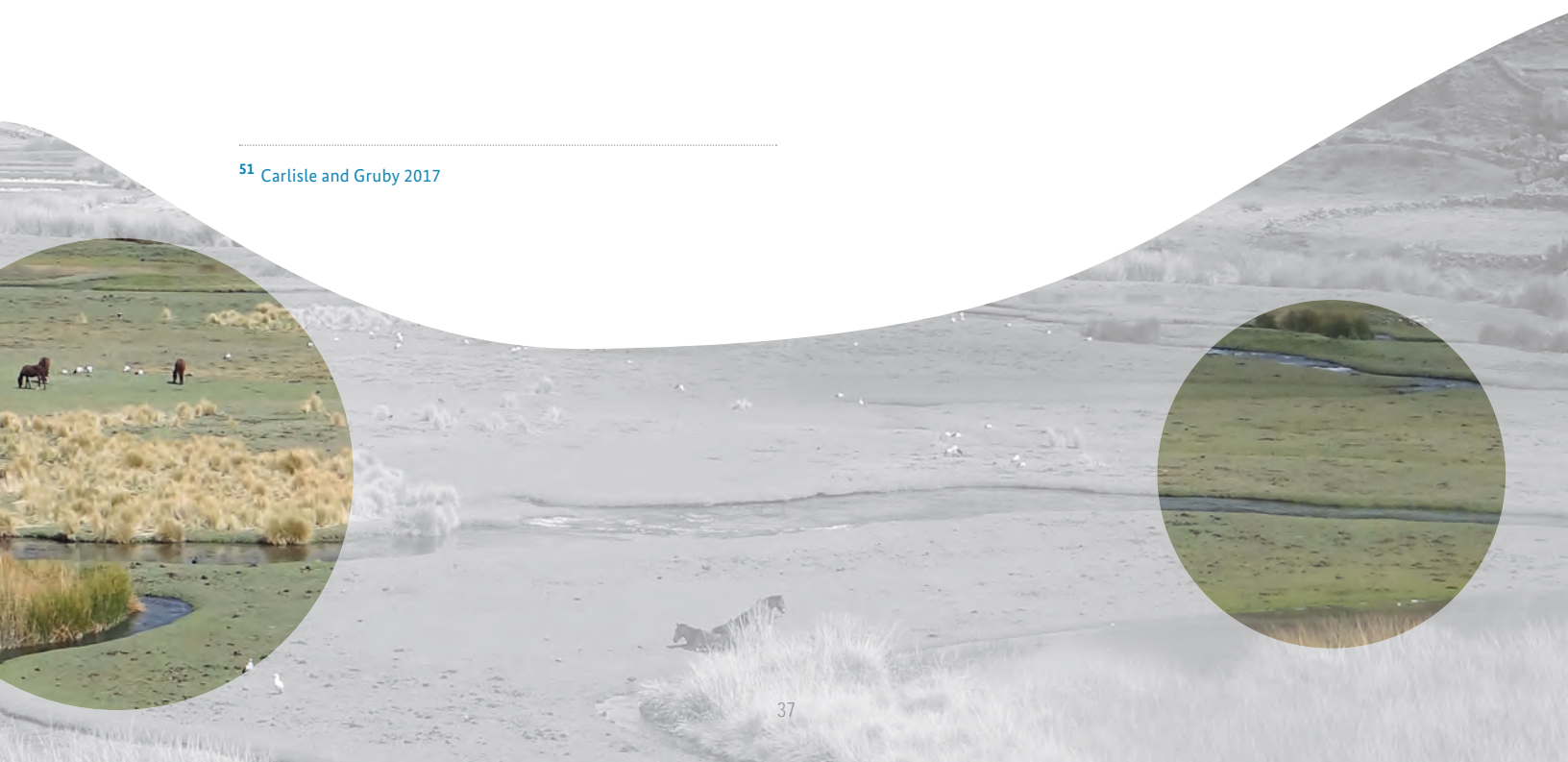
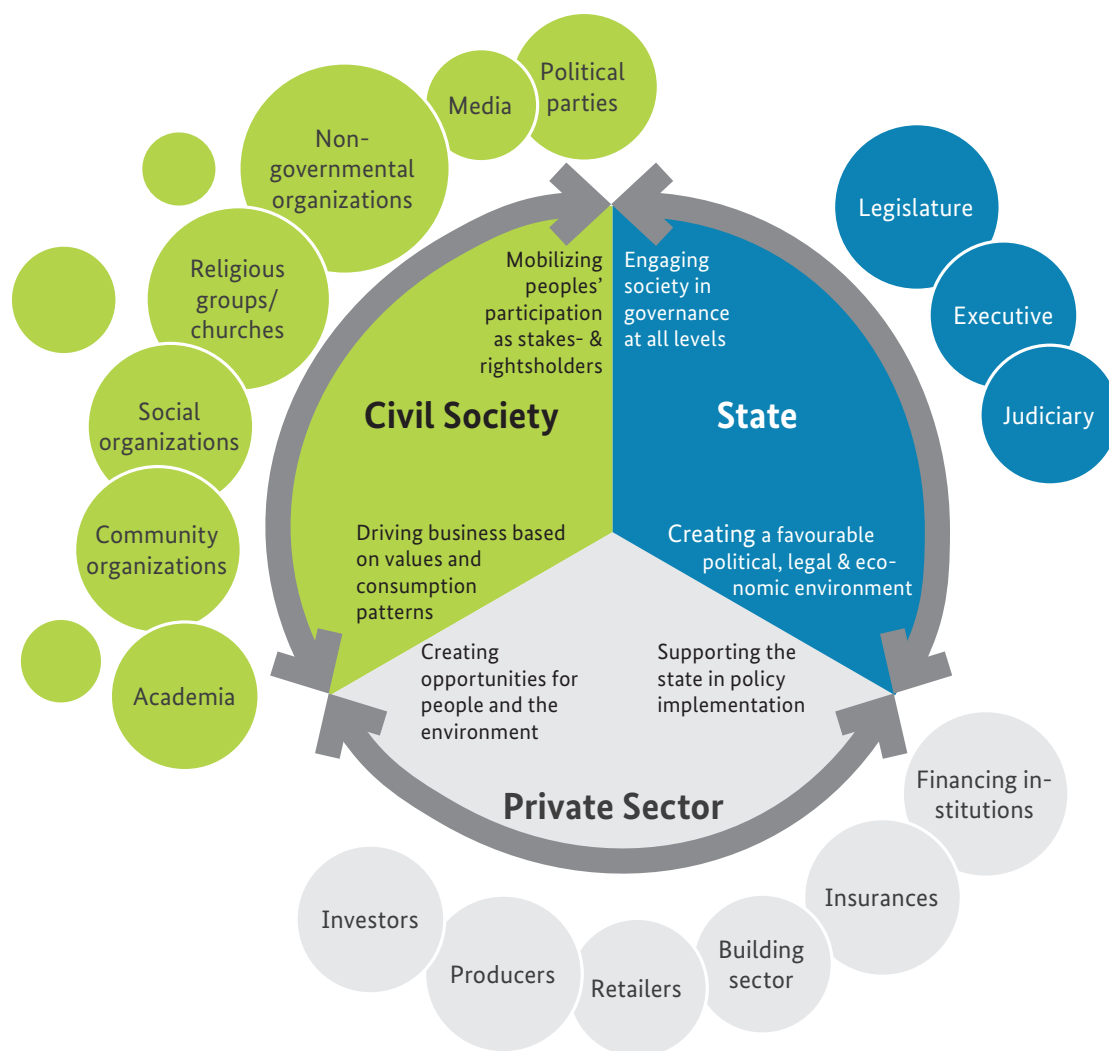


Figure 5 Interactions between the state, civil society and the private sector in governance for effective adaptation and risk reduction



Source: GIZ, 2018



2



Voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction



2.1 Introduction

Ecosystem-based approaches to climate change adaptation and disaster risk reduction are holistic approaches that use biodiversity, and ecosystem functions and services to manage the risks of climate-related impacts and disasters. Ecosystem-based adaptation (EbA) is the use of biodiversity and ecosystem functions and services, as part of an overall adaptation strategy, contributing to the well-being of societies, including indigenous peoples and local communities, and helping people adapt to the adverse effects of climate change. EbA aims to maintain and increase the resilience and reduce the vulnerability of ecosystems and people in the face of the adverse effects of climate change.⁵² Ecosystem-based disaster risk reduction (Eco-DRR) is the holistic, sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim of achieving sustainable and resilient development.⁵³

These voluntary guidelines for the design and effective implementation of ecosystem-based approaches to climate change adaptation and disaster risk reduction have been prepared pursuant to paragraph 10 of [decision XIII/4](#)⁵⁴. The voluntary guidelines are intended to be used by Parties, other Governments, relevant organizations, and indig-

enous peoples and local communities, the private sector and civil society as a flexible framework for planning and implementing EbA and Eco-DRR. The voluntary guidelines may also contribute to an objective of the national adaptation plan guidelines, under the United Nations Framework Convention on Climate Change, to reduce vulnerability to the impacts of climate change by building resilience and adaptive capacity.

The draft voluntary guidelines were considered by the Subsidiary Body on Scientific, Technical and Technological Advice of the CBD at its twenty-second meeting (Montreal, Canada, 2 – 7 July 2018)⁵⁵, and subsequently were adopted by the Conference of the Parties to the CBD at its fourteenth meeting (Sharm El-Sheikh, Egypt, 17 – 29 November 2018)⁵⁶. The core elements of the guidelines were presented in the annex of the draft decision. A longer information document⁵⁷ presented these core elements accompanied by additional information and tools. The information that was not included in the annex of the draft decision are the following: tables 3 to 12, figure 8, boxes 5, 9, 10, 11 and 12, as well as the lists of key actions under sections 2.3.2 and 2.3.3. The present report contains the version of the guidelines as adopted by the Conference of the Parties at its fourteenth meeting, with the addition of the above listed boxes, figures, tables and lists of key actions.

⁵² Derived from CBD Technical Series 41. 2009. Connecting Biodiversity and Climate Change Mitigation and Adaptation: Report of the Second Ad Hoc Technical Expert Group on Biodiversity and Climate Change (SCBD 2009).

⁵³ Estrella and Saalismaa. 2013.






⁵⁴ www.cbd.int/doc/decisions/cop-13/cop-13-dec-04-en.pdf

⁵⁵ The voluntary guidelines were presented in the annex of document CBD/SBSTTA/22/8 and supplementary information including a primer for policymakers, a list of relevant tools, and sectoral briefs on the use of EbA and Eco-DRR, was presented in an information document (CBD/SBSTTA/22/INF/1).

⁵⁶ The voluntary guidelines as adopted by the Conference of the Parties at its fourteenth meeting are available in the annex of Decision 14/5.

⁵⁷ CBD/SBSTTA/22/INF/1.

Table 2 Examples of EbA and Eco-DRR interventions and outcomes⁵⁶

Hazard/climate change impact	Ecosystem type	EbA or Eco-DRR intervention options	Outcome
	Mountains and forests	Sustainable mountain wetland management	Improved water regulation
		Forest and pasture restoration	Erosion prevention
		Restoration of pastures with deep-rooting native species	Improved water storage capacity
	Inland waters	Conservation of wetlands and peatlands	Improved water storage capacity
		River basin restoration	Flood risk reduction
		Transboundary water governance and ecosystem restoration	Improved water provisioning
	Agriculture and drylands	Ecosystem restoration and agroforestry	Improved water storage capacity
		Intercropping of adapted species	Adaptation to higher temperatures
		Using trees to adapt to changing dry seasons	Adaptation to shifting seasons
		Sustainable livestock management and pasture restoration	Improved water provisioning
		Drought resilience by sustainable dryland management	
	Urban	Green aeration corridors for cities	Heat wave buffering
		Storm water management by green spaces	Adaptation to higher temperatures
		River restoration in urban areas	Flood risk reduction
		Green facades for buildings	Improved water regulation
	Marine and coastal	Mangrove restoration and coastal protection	Storm and cyclone risk reduction
		Coastal realignment	Flood risk reduction
		Sustainable fishing and mangrove rehabilitation	Improved water quality
		Coral reef restoration	Adaptation to higher temperatures

2.1.1 Overview of the voluntary guidelines

The guidelines begin with an overall introduction to the mandate and basic terminology of EbA and Eco-DRR. Section 2.2 presents principles and safeguards that provide standards and measures to bear in mind during all of the steps of planning and implementation presented in section 2.4. Section 2.3 presents other important overarching considerations on: integrating knowledge,

technologies, practices and efforts of indigenous peoples and local communities, mainstreaming, and raising awareness and building capacity. The overarching considerations should also be borne in mind when undertaking the steps of planning and implementation. Section 2.4 presents a step-wise approach intended to work iteratively for EbA and Eco-DRR planning and implementation along with suggested practical actions.

⁵⁸ Examples provided by GIZ from the PANORAMA database panorama.solutions/en

2.1.2 What are ecosystem-based approaches to climate change adaptation and disaster risk reduction?

The Convention on Biological Diversity published Technical Series 85⁵⁹ which presents a synthesis report on experiences with the implementation of EbA and Eco-DRR. It provides detailed information on experiences with policy and legal frameworks, mainstreaming, integrating gender and the contribution of indigenous peoples and local communities. Additional examples of EbA and Eco-DRR activities are presented in table 2.

EbA and Eco-DRR have the following characteristics:

- a. Enhance resilience and adaptive capacity and reduce social and environmental vulnerabilities in the face of the risks associated with the impacts of climate change, contributing to incremental and transformative adaptation and disaster risk reduction;
- b. Generate societal benefits, contributing to sustainable and resilient development using equitable, transparent and participatory approaches;
- c. Make use of biodiversity and ecosystem functions and services through sustainably managing, conserving and restoring ecosystems;
- d. Form part of overall strategies for adaptation and risk reduction that are supported by policies at multiple levels, and encourage equitable governance while enhancing capacity.

2.2 Principles and safeguards

The voluntary guidelines are underpinned by principles and safeguards that were developed by reviewing existing literature and guidelines on EbA and Eco-DRR⁶⁰ and complement other principles and guidelines⁶¹ adopted under the Convention or under other bodies. The safeguards are social and environmental measures to avoid unintended consequences of EbA and Eco-DRR to people, ecosystems and biodiversity; they also facilitate transparency throughout all stages of planning and implementation, and promote the realization of benefits.

The principles integrate elements of EbA and Eco-DRR practice and serve as high-level standards to guide planning and implementation. They are clustered into themes: building resilience and enhancing adaptive capacity, inclusivity and equity, consideration of multiple scales, and effectiveness and efficiency. The guidelines in section 2.3 provide suggested steps, methodologies and associated tools to implement actions on EbA and Eco-DRR according to the principles and safeguards.

⁵⁹ Lo 2016 (www.cbd.int/doc/publications/cbd-ts-85-en.pdf)

⁶⁰ Including "Guidance on Enhancing Positive and Minimizing Negative Impacts on Biodiversity of Climate Change Adaptation Activities" (UNEP/CBD/SBSTTA/20/INF/1).

⁶¹ See Ecosystem restoration: short term action plan (decision XIII/5); the United Nations Declaration on the Rights of Indigenous Peoples; and Principles, Guidelines and Other Tools Developed under the Convention, available at www.cbd.int/guidelines

2.2.1 Principles

Principles for building resilience and enhancing adaptive capacity through EbA and Eco-DRR

- 1 Consider a full range of ecosystem-based approaches to enhance resilience of socio-ecological systems as a part of overall adaptation and disaster risk reduction strategies.
- 2 Use disaster response as an opportunity to build back better for enhancing adaptive capacity and resilience⁶⁰ and integrate climate-resilient ecosystem considerations throughout all stages of disaster management.
- 3 Apply a precautionary approach⁶¹ in planning and implementing EbA and Eco-DRR interventions.

Principles for ensuring inclusivity and equity in planning and implementation

- 4 Plan and implement EbA and Eco-DRR interventions to prevent and avoid the disproportionate impacts of climate change and disaster risk on ecosystems as well as vulnerable groups, indigenous peoples and local communities, women and girls.

Principles for achieving EbA and Eco-DRR on multiple scales

- 5 Design EbA and Eco-DRR interventions at the appropriate scales, recognising that some EbA and Eco-DRR benefits are only apparent at larger temporal and spatial scales.
- 6 Ensure that EbA and Eco-DRR are sectorally cross-cutting and involve collaboration, coordination, and co-operation of stakeholders and rights holders.

Principles for EbA and Eco-DRR effectiveness and efficiency

- 7 Ensure that EbA and Eco-DRR interventions are evidence-based, integrate indigenous and traditional knowledge, where available, and are supported by the best available science, research, data, practical experience, and diverse knowledge systems.
- 8 Incorporate mechanisms that facilitate adaptive management and active learning into EbA and Eco-DRR, including continuous monitoring and evaluation at all stages of planning and implementation.
- 9 Identify and assess limitations and minimize potential trade-offs of EbA and Eco-DRR interventions.
- 10 Maximise synergies in achieving multiple benefits, including for biodiversity, conservation, sustainable development, gender equality, health, adaptation, and risk reduction.

⁶² The use of the recovery, rehabilitation and reconstruction phases after a disaster to increase the resilience of nations and communities through integrating DRR measures into the restoration of physical infrastructure and societal systems, and into the revitalization of livelihoods, economies and the environment. (UNISDR 2017)

⁶³ The precautionary approach is stated in the preamble of the Convention on Biological Diversity: "Where there is a threat of significant reduction or loss of biological diversity, lack of full scientific certainty should not be used as a reason for postponing measures to avoid or minimize such a threat."

2.2.2 Safeguards

Safeguards for effective planning and implementation of EbA and Eco-DRR

Applying environmental impact assessments and robust monitoring and evaluation	1. EbA and Eco-DRR should be subject, as appropriate, to environmental impact assessments including social and cultural assessments (referring to the Akwé: Kon guidelines) at the earliest stage of project design, and subject to robust monitoring and evaluation systems.
Prevention of transfer of risks and impacts	2. EbA and Eco-DRR should avoid adverse impacts on biodiversity or people, and should not result in the displacement of risks or impacts from one area or group to another.
Prevention of harm to biodiversity, ecosystems and ecosystem services	3. EbA and Eco-DRR, including disaster response, recovery and reconstruction measures, should not result in the degradation of natural habitat, loss of biodiversity or the introduction of invasive species, nor create or exacerbate vulnerabilities to future disasters. 4. EbA and Eco-DRR should promote and enhance biodiversity and ecosystem functions and services, including through rehabilitation/restoration and conservation measures as part of post-disaster needs assessment and recovery and reconstruction plans.
Sustainable resource use	5. EbA and Eco-DRR should neither result in unsustainable resource use nor enhance the drivers of climate change and disaster risks, and should strive to maximize energy efficiency and minimize material resource use.
Promotion of full, effective and inclusive participation	6. EbA and Eco-DRR should ensure full and effective participation of the people concerned, including indigenous peoples and local communities, women, minorities and the most vulnerable, including the provisioning of adequate opportunities for informed involvement.
Fair and equitable access to benefits	7. EbA and Eco-DRR should promote fair and equitable access to benefits and should not exacerbate existing inequities, particularly with respect to marginalized or vulnerable groups. EbA and Eco-DRR interventions should meet national labour standards, protecting participants against exploitative practices, discrimination and work that is hazardous to their well-being.
Transparent governance and access to information	8. EbA and Eco-DRR should promote transparent governance by supporting rights to access to information, providing all stakeholders and rights holders, particularly indigenous peoples and local communities, with information in a timely manner, and supporting the further collection and dissemination of knowledge.
Respecting rights of women and men from indigenous peoples and local communities	9. EbA and Eco-DRR measures should respect the rights of women and men from indigenous peoples and local communities, including access to and use of physical and cultural heritage.

2.3 Overarching considerations for EbA and Eco-DRR design and implementation

When undertaking the stepwise process for planning and implementing EbA and Eco-DRR provided in Section 2.4, there are three main overarching considerations to bear in mind at each step: integrating knowledge, technologies, practices and efforts of indigenous peoples and local communities; mainstreaming of EbA and Eco-DRR; and raising awareness and building capacity. Taking these actions into account can enhance uptake of EbA and Eco-DRR approaches, and improve effectiveness and efficiencies, enabling more and better outcomes from the interventions.

2.3.1 Integrating knowledge, technologies, practices and efforts of indigenous peoples and local communities

Indigenous peoples and local communities have managed variability, uncertainty and change through multigenerational histories of interaction with the environment. Indigenous and traditional knowledge and coping strategies can thus form an important basis for climate change and disaster risk reduction responses, complementing established evidence, and bridging gaps in information. Indigenous, traditional and local knowledge systems – and forms of analysis and documentation, such as community mapping – can play a significant role, similarly to early warning systems, in

identifying and monitoring climatic, weather and biodiversity changes and impending natural hazards. Ecosystem-based approaches can also serve to bring back abandoned practices, such as indigenous and traditional agricultural practices. Integrating the knowledge of indigenous peoples and local communities also involves an appreciation of their *cosmovisión*⁶⁴, and an acknowledgement of their role as knowledge holders and rights holders. Tools for integrating knowledge, technologies, practices and efforts of indigenous peoples and local communities are presented in table 3. Ways to incorporate indigenous and traditional knowledge and practices in EbA and Eco-DRR planning and implementation throughout all stages of planning and implementation include the following:

Key actions

- a. Discover and document linkages between local, indigenous and traditional knowledge and practices and the goals and objectives of climate change adaptation and disaster risk reduction;
- b. Consult multi-stakeholder working groups, especially indigenous peoples and local communities, to facilitate knowledge-sharing across sectors on the role of ecosystems in adaptation and disaster risk reduction;
- c. Put in place effective participatory and transparent mechanisms to obtain the best available evidence;
- d. Integrate the knowledge of indigenous peoples and local communities into assessments after obtaining free prior and informed consent.

⁶⁴ A worldview that has evolved over time that integrates physical and spiritual aspects (adapted from the Indigenous Peoples' Restoration Network).

Table 3 **Toolbox for integrating knowledge, technologies, practices and efforts of indigenous peoples and local communities**

Tool/Organization	Description
Traditional Knowledge and Climate Science Toolkit (UNU)	Provides articles, videos and various other resources that will assist indigenous peoples, local communities, policymakers and other stakeholders in accessing research on climate change adaptation and mitigation collections.unu.edu/view/UNU:1500
Weathering Uncertainty: Traditional Knowledge for Climate Change Assessment and Adaptation (UNESCO and UNU)	Provides an overview of the literature relating to the contribution of traditional/indigenous knowledge to our understanding of global climate change: observations, impacts and opportunities for adaptation unesdoc.unesco.org/images/0021/002166/216613e.pdf
Examples of the application of traditional knowledge to adaptation (IPCC Fifth Assessment Report, Chapter 15)	Summary of approaches and strategies for applying local knowledge to climate change adaptation across different sectors www.ipcc.ch/pdf/assessment-report/ar5/wg2/WGIIAR5-Chap15_FINAL.pdf
Indigenous people and climate change: from victims to change agents through decent work (ILO)	Report demonstrating how indigenous peoples are essential to the success of policies and measures directed towards mitigating and adapting to climate change, especially their sustainable economic model and traditional knowledge www.ilo.org/global/topics/indigenous-tribal/WCMS_551189/lang--en/index.htm
Handbook for ILO Tripartite Constituents (ILO)	Outlines requirements regarding consultations in accordance with the Indigenous and Tribal Peoples Convention, 1989 www.ilo.org/wcmsp5/groups/public/@ed_norm/@normes/documents/publication/wcms_205225.pdf
Indigenous and traditional knowledge and practices for adaptation: overview, available tools, good practices and lessons learned (UNFCCC)	Highlights the best practices, lessons learned and available tools for the use of indigenous and traditional knowledge and practices (ITKP) for adaptation unfccc.int/files/adaptation/application/pdf/4_synopsis_itkp.pdf

2.3.2 Mainstreaming EbA and Eco-DRR

Mainstreaming EbA and Eco-DRR is the integration of ecosystem-based approaches into climate- and disaster-risk planning and decision-making processes at all levels. Mainstreaming may start with integrating ecosystem considerations into adaptation and disaster risk reduction objectives, strategies, policies, measures or operations so that they become part of national and regional development policies, processes and budgets at all levels and stages. Mainstreaming enhances the effectiveness, efficiency, and longevity of EbA and Eco-DRR initiatives by embedding their principles into local, municipal and national policies, planning, assessments, financing, training, and awareness campaigns, among other policy tools. The overall

goal is enhanced support and implementation of EbA and Eco-DRR where it proves effective.

Mainstreaming occurs continuously throughout EbA and Eco-DRR planning and implementation. The process begins in Step A with the achievement of a broad understanding of the political and institutional set-up of the target system, which enables the identification of potential entry points for mainstreaming. Other key components of mainstreaming include enhancing sectoral outreach, raising awareness, and capacity building.

When mainstreaming EbA and Eco-DRR, it is important to align with national and subnational development frameworks and mainstream into relevant plans, policies and practice at multiple

scales, including with international frameworks and conventions, such as the Sustainable Development Goals and the Strategic Plan for Biodiversity 2011 – 2020 (figure 6). Mainstreaming helps to enhance long-term sustainability and possibilities for funding (box 6). It is also important to incorporate a disaster and climate risk reduction lens when implementing environmental impact assessments and strategic environmental assessments to prevent unintended impacts that may exacerbate risk and to promote EbA and Eco-DRR measures.

When mainstreaming EbA and Eco-DRR, it is important to align with national and subnational development frameworks and mainstream into relevant plans, policies and practice at multiple scales, in order to enhance long-term sustainability and possibilities for funding (figure 6 and box 6). It is also important to align with international frameworks and conventions, such as the Sustainable Development Goals and the [Strategic Plan for Biodiversity 2011-2020](#)⁶⁵. It is also important to incorporate a climate and disaster risk reduction lens, when implementing environmental impact assessments and strategic environmental assessments, to prevent unintended impacts that may exacerbate risk and promote EbA and Eco-DRR measures.

A sample framework for mainstreaming is shown in figure 6. Key actions for mainstreaming EbA and Eco-DRR include:

Key Actions

a. Underscore the value of healthy ecosystems in adaptation and disaster risk reduction policies and frameworks, supporting the maintenance of functioning and provisioning of essential services under current and future climate change scenarios.

b. Assess existing national adaptation and disaster risk reduction policies, plans and investments, in addition to broader (non-adaptation- and DRR-related) environmental, land use and development policies and plans to identify entry points for promoting Eco-DRR/CCA implementation. These include, but are not limited to:

- i. National Biodiversity Strategies and Action Plans (NBSAPs)
- ii. (National Adaptation Plans (NAPs) and linkages to Nationally Determined Contributions (NDCs) and national legislation (see box 5)
- iii. National Plans for Land Degradation Neutrality
- iv. Disaster risk management plans, including national drought strategies
- v. Land-use planning, including urban planning
- vi. Agricultural, fisheries, water, infrastructure, and other sectors (see Part 3)
- vii. Development policies
- viii. Budget plans

c. Align EbA and Eco-DRR with national and sub-national development frameworks and mainstream into relevant plans, policies and practice at multiple scales to enhance long-term sustainability and possibilities for funding (figure 7).

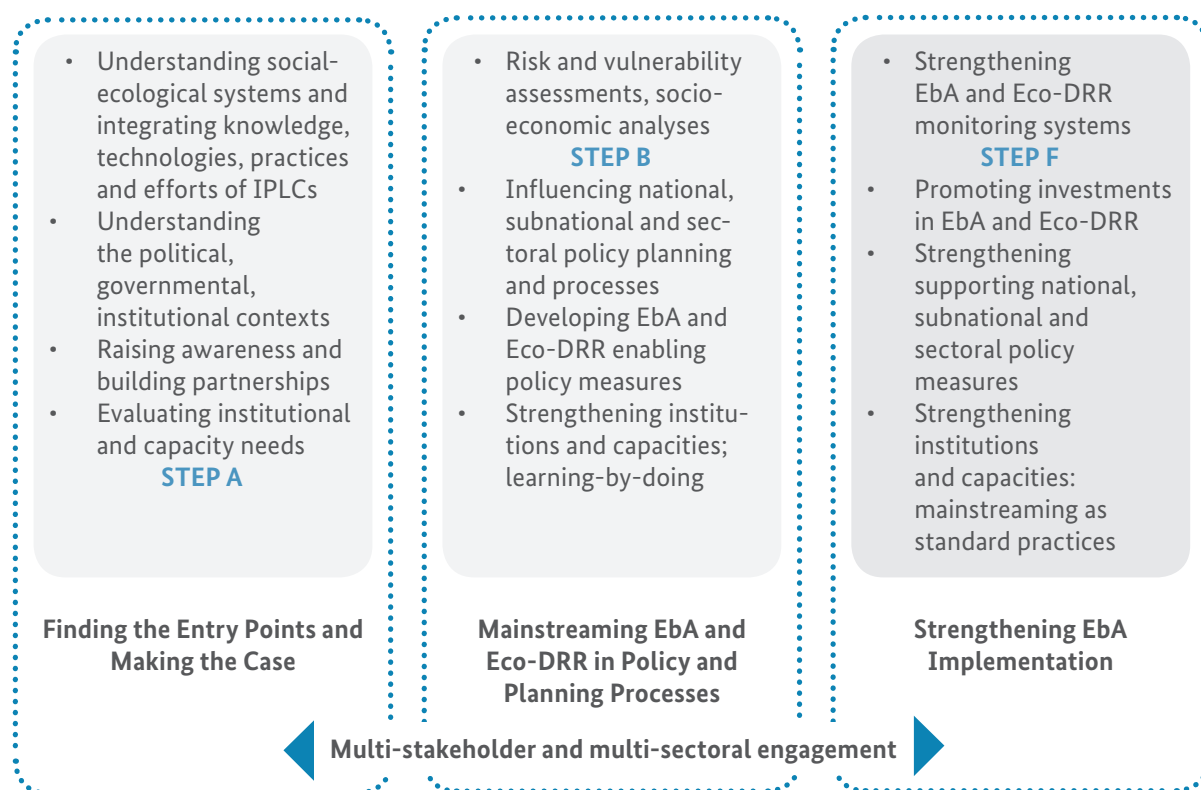
d. Align with international frameworks and conventions, such as the SDGs, CBD Strategic Plan for Biodiversity, and others, and incorporate EbA and Eco-DRR measures into reporting schemes.

e. Improve convergence in the design and implementation of EbA and Eco-DRR into existing programmes of work (including adaptation, environment, development, humanitarian), including climate-proofing existing interventions.

⁶⁵ www.cbd.int/sp

- f. Incorporate a disaster and climate risk reduction lens when implementing Environmental Impact Assessments (EIAs) and Strategic Environmental Assessments (SEAs) to prevent unintended environmental impacts that may exacerbate risk and to promote EbA and Eco-DRR measures.
- g. Invest in risk-informed development by protecting existing healthy natural/green infrastructure from new development (e.g. water-infrastructure or coastal) and by creating boundary conditions for the design of such large-scale developments.
- h. Create entry points for ecosystem-based solutions in ministerial guidelines for tenders by
 - i. developing boundary conditions, including considering green or hybrid solutions before grey when more effective.
 - j. Create incentive structures for the promotion of eco-friendly infrastructure development and incentives for private sector to include EbA and Eco-DRR (e.g. tax reduction); and
 - k. Screen national tax systems and public funding to avoid/eliminate perverse incentives, ecosystem degradation, or maladaptation.
 - l. Review technical standards, e.g. procurement documents, guidance and M&E project cycle needs to allow flexibility of ecosystem solutions.

Figure 6 Example framework for mainstreaming EbA and Eco-DRR in development planning⁶⁴



⁶⁶ Adapted from WWF 2013 and UNDP-UNEP 2011

Box 5 How do EbA & Eco-DRR fit into the UNFCCC (I)NDCs and NAPs?

(Intended) Nationally Determined Contributions ((I)NDCs) set out high-level objectives and a vision for addressing adaptation goals. 86 per cent of countries who submitted (I)NDCs include an adaptation component in their plans which outline goals, activities and needs for adaptation (World Resources Institute 2017). Another analysis of (I)NDCs revealed that, although only 23 countries mention EbA explicitly, many more have ecosystem-orientated visions for adaptation and propose a range of conservation, restoration, agroforestry and community-led approaches to achieve these visions (Seddon et al. 2016). The most commonly cited needs for adaptation among sectors are in the water, agriculture and human health sectors (Mogelgaard and McGray 2015).

National Adaptation Plans (NAPs) aim to reduce vulnerability to the impacts of climate change by building adaptive capacity and resilience; and integrate climate change adaptation into policies, programmes and activities within all relevant sectors and at different levels. The main elements in developing a NAP are laying the groundwork and addressing gaps, preparatory elements including identifying and appraising adaptation options, implementation strategies; and reporting, monitoring and review. The NAP process is a key tool for coherent implementation of an (I)NDC adaptation component (GIZ 2016b). Entry-points for integrating EbA and Eco-DRR include:

- An ecosystem and risk reduction lens should be applied to the NAP process. For example, in assessing vulnerabilities and risk, using a landscape or systems approach will help to identify ecosystems that provide critical climate regulation services. EbA is explicitly listed as one of several approaches in the NAP Technical Guidelines for conducting vulnerability and risk assessments, which can aid in prioritizing measures such as conservation or restoration actions to maintain ecosystem health and functioning.
- In reviewing and appraising adaptation options, it is recommended to consider economic, ecosystem and social costs and benefits. Using appraisal methods that consider costs and benefits in the short and long-term and within appropriate geographical scales can aid in making the case for ecosystem-based approaches.
- In implementing adaptation activities, the NAP process also notes that implementation approaches could include a resilience approach, through climate-proofing development or ecosystem-based approaches. The NAP planning process is iterative and adaptive, and can involve the use of several different approaches in each of its main elements (see NAP Technical Guidelines, Least Developed Countries Expert Group 2012).

A key aspect of mainstreaming is finding appropriate entry points for integrating EbA and Eco-DRR into concrete but often also complex policy and planning frameworks and decision-making processes. Entry points can be dynamic, depending on three key aspects:

- a. The awareness of stakeholders about an existing problem, challenge or risk;
- b. Available solutions, proposals, tools and knowledge;
- c. Political will to act, mandates and roles.

If all three aspects come together in favourable ways, there is a “momentum” for policy change. In cases of disaster and states of emergency, there is generally openness towards stakeholders’ needs, innovative tools and approaches, joint searches for

best available solutions, and a willingness to invest and (re)build better. These are important opportunities to include EbA or Eco-DRR aspects. Entry points may occur at all levels of government, and can imply different levels of governance, or collaboration with the private sector.

In general, entry points for mainstreaming may be found in:

- a. The development or revision of policies and plans, e.g. development or sectoral plans, nationally determined contributions, as appropriate, national adaptation plans, national biodiversity strategies and action plans, strategic environmental assessments, land-use plans;

- | | |
|---|--|
| <p>b. Command and control instruments, e.g. climate change and environmental laws, standards, and environmental impact assessments, and disaster risk management;</p> | <p>g. Partnerships that enable the full and effective participation of civil society organizations, indigenous peoples and local communities, women and youth.</p> |
| <p>c. Economic and fiscal instruments, e.g. investment programmes, funds, subsidies, taxes, fees;</p> | <p>As emphasized throughout the EbA and Eco-DRR planning and implementation process, reaching out to sectors is key to raising awareness of and integrating EbA and Eco-DRR into sectoral plans and national-level planning, and encouraging cross-sectoral collaboration for joint implementation.</p> |
| <p>d. Educational and awareness-raising measures, e.g. environmental education, extension programmes, technical careers and university curricula;</p> | |
| <p>e. Voluntary measures, e.g. environmental agreements with private landowners, or the definition of standards;</p> | <p>A key action in this respect is to consider integrating EbA and Eco-DRR in sectoral development plans at local, national and regional scales, such as in land use and water management, in both rural and urban contexts. Briefs for supporting EbA and Eco-DRR practitioners to undertake outreach into sectors are available in Part 3.</p> |
| <p>f. Measures that guarantee the free prior informed consent, of indigenous peoples, where appropriate;</p> | |

Box 6 Opportunities for mainstreaming EbA and Eco-DRR into funding priorities

EbA and Eco-DRR contribute to multiple objectives, including development, disaster risk, adaptation, mitigation, food and water security, and to ensure risk-informed investments. The cross-sectoral and transdisciplinary approaches of EbA and Eco-DRR, and the potential realization of multiple benefits offer several opportunities to attract/enhance funding.

- Encourage new financial incentives for investments in sustainable ecosystem management that emphasise ecosystems as part of adaptation and disaster risk planning. Examples include developing incentive programmes for farmers to implement practices that contribute to maintaining resilient ecosystems, such as agroforestry and conservation tillage.
- Unlock new investments for EbA and Eco-DRR through the climate-proofing of existing investment portfolios.
- Work with the private sector (including insurance, tourism, agriculture and water sectors) to harness their expertise, resources and networks. This helps in encouraging and scaling up investments in EbA and Eco-DRR, and identifying public-private partnerships.
- Engage government regulatory bodies to support and endorse private sector investments in natural infrastructure and EbA and Eco-DRR.
- Identify partnerships with industry associations that can aid in the identification of climate risks, impacts and adaptation strategies. Examples include the development of climate risk assessment tools for use by private sector investors and insurance companies, adoption of hydro-meteorological and climate information services, and working with developers to improve land-use planning, including such EbA and Eco-DRR activities as ecosystem restoration.
- Create national-level incentive structures for EbA and Eco-DRR, especially for private landowners and companies.

The mainstreaming of EbA and Eco-DRR into funding priorities should ensure that initiatives adhere to the EbA and Eco-DRR principles and safeguards with clear intentions to achieve enhanced social-ecological resilience to climate change impacts and disasters.

Considering the information provided above, a simple framework for mainstreaming EbA and Eco-DRR into development and sectoral plans is presented in figure 7.

Figure 7 Entry points for mainstreaming EbA and Eco-DRR within key development and sectoral strategies



Entry points for mainstreaming EbA and Eco-DRR within key development and sectoral strategies by embedding ecosystem-based approaches into existing instruments and methods, selecting appropriate indicators for monitoring and evaluation, ensuring successful impact by developing a theory of change.

Source: adapted from figure 2 CBD COP Decision 14/5, based on GIZ, 2018

2.3.3 Raising awareness and building capacity

Communicating the multiple benefits of EbA and Eco-DRR across sectors, communities of practice, and disciplines is crucial to enhancing uptake and sustainability of initiatives, in addition to opening avenues for funding. National and international policy agreements provide an opportunity to bridge the gap between different communities of practice. Interlinkages between ecosystem management, climate change and disaster risk reduction are all reflected in various targets under the Sustainable Development Goals, the Sendai Framework for Disaster Risk Reduction, the Paris Agreement on Climate Change, decisions of the Parties to the Rio conventions, and resolutions of Parties to the Ramsar Convention.⁶⁷

Key Actions

- a. Identify targets of international frameworks to raise awareness;
- b. Conduct baseline assessments of:
 - i. the existing skills and capacity of policymakers to address gaps and needs; and
 - ii. institutional capacities and existing coordination mechanisms to identify needs for sustainably mainstreaming and implementing EbA and Eco-DRR;
- c. Consider the different information and communication needs of different stakeholder groups in order to develop effective outreach;
- d. Build a common knowledge base and seek to identify a common language among stakeholders to support their cooperation. There are many networks available to support these efforts and which offer platforms for sharing information and experience.⁶⁸

⁶⁷ See also [CBD Technical Series No. 85](#) (Lo 2016), annexes II and III.

⁶⁸ Such as the Partnership for Environment and Disaster Risk Reduction (PEDRR), Friends of EbA (FEBA), PANORAMA, BES-Net (Biodiversity and Ecosystem Services Network), Ecoshape, Ecosystem Services Partnership's Thematic Working Group on Ecosystem Services and Disaster Risk Reduction, IUCN Thematic Groups, and CAP-Net (UNDP).

Table 4 **Toolbox for mainstreaming adaptation and DRR and raising awareness**

Tool/Organization	Description
Using NDCs and NAPs to Advance Climate-Resilient Development: Framework for linking NAPs and NDCs	Guidelines on streamlining and leveraging Nationally Determined Contributions (NDCs) and National Adaptation Plans (NAPs) to improve adaptation planning and action. (IISD). napglobalnetwork.org/2016/11/using-ndcs-naps-advance-climate-resilient-development
NAP Align: Aligning NAP processes to development and budget planning	Provides practical recommendations on how to integrate adaptation to climate change into a country's planning and budgeting system. (GIZ) (English and French). www.adaptationcommunity.net/?wpfb_dl=235
Opportunities and options for enhancing adaptation actions and supporting their implementation: reducing vulnerability and mainstreaming adaptation (UNFCCC)	Outlines opportunities and options for reducing vulnerability and mainstreaming climate change adaptation, including through the process to formulate and implement national adaptation plans, including a section on opportunities for financing and implementing EbA and Eco-DRR. unfccc.int/files/adaptation/groups_committees/adaptation_committee/application/pdf/tp_adaptation_2016.pdf
Mainstreaming Ecosystem-based Adaptation into development planning (GIZ)	A practice-oriented training course developed by GIZ (2016), which contains several flexible modules and complementary sessions to guide addressing the main steps of the EbA mainstreaming cycle and includes a session on Eco-DRR (also relevant to Eco-DRR) (English and Spanish). ⁶⁹
Biodiversity Mainstreaming Toolbox for land-use planning and development (ICLEI)	Tools developed to aid the wise use of natural resources and sustainable development, and to help mainstream biodiversity objectives into land-use planning and development decision-making. biodiversityadvisor.sanbi.org/wp-content/uploads/2015/02/Biodiversity-Mainstreaming-Toolbox_Senior-Managers-Summary.pdf
Mainstreaming Environment and Climate for Poverty Reduction and Sustainable Development: The Interactive Handbook to Strengthen Planning and Budgeting Processes (UNDP)	This handbook draws on successful experiences from countries around the world in effectively mainstreaming poverty-environment issues into development agendas. www.unpei.org/about-the-interactive-handbook
Integrated Strategic Environmental Assessment in Sri Lanka (UNEP and UNDP)	Provides guidance on undertaking Integrated Strategic Environmental Assessments that includes considerations for enhancing resilience. www.unep.org/disastersandconflicts/Introduction/DisasterRiskReduction/Capacitydevelopmentandtechnicalassistance/ISEAinSriLanka/tabid/105928/Default.aspx
CBD Technical Series No. 85	Contains several examples of mainstreaming EbA and Eco-DRR into national plans, strategies and targets (Lo 2016)
Helping nature help us (IUCN)	Provides information on harmonizing Eco-DRR with biodiversity conservation. The regional lessons include case studies that could be useful for mainstreaming Eco-DRR into biodiversity conservation. portals.iucn.org/library/sites/library/files/documents/2016-070.pdf
Entry points for mainstreaming EbA (GIZ)	Experiences from practitioners on how to successfully integrate EbA and Eco-DRR in national and subnational processes and harness synergies. www.adaptationcommunity.net/wp-content/uploads/2018/01/giz2017-en-learning-brief-entry-points-eba-low-res.pdf

⁶⁹ For more information on the mainstreaming training course (available by request), please see www.adaptationcommunity.net/trainings/training-course-mainstreaming-ecosystem-based-adaptation-development-planning-updated-2016

2.4 Stepwise approach to design and implementation of effective EbA and Eco-DRR

In developing a conceptual framework for these guidelines, various climate change adaptation and disaster risk reduction processes were considered, in addition to broader problem-solving approaches such as the landscape and systems approach frameworks. The main approaches and processes considered are briefly reviewed in table 5 as they form the basis of the framework developed for these guidelines. These guidelines employ a broad

perspective on all ecosystems and include considerations for mainstreaming EbA and Eco-DRR. The guidelines integrate these approaches within a series of iterative steps (figure 8). The process is intended to be flexible and adaptable to the needs of a project, programme or country, region, or landscape/seascape. The principles and safeguards for EbA and Eco-DRR are central to the planning and implementation process, and the overarching considerations are provided to improve effectiveness and efficiencies. All steps are linked to a toolbox providing a non-exhaustive selection of further guidance and tools (Tables 6, 7, 8, 10, 11 and 12). Stakeholder engagement, mainstreaming, capacity-building, and monitoring should be conducted throughout the process.



Table 5 **Main frameworks considered for the development of the EbA and Eco-DRR Guidelines**
 CCA: Climate change adaptation, DRR: Disaster risk reduction

Framework	Issue	Scale	Key Features
National Adaptation Plans (NAPs) under the UNFCCC	CCA	National	Main framework under the UNFCCC for adaptation planning on a national level. Key stages of (i) assessments of impacts, vulnerability and risk; (ii) adaptation planning; (iii) implementation of adaptation actions; and (iv) monitoring and evaluation. Strengthening of technical and institutional capacity, learning and sharing of good practices and experiences, and adaptive management, are integral to each stage. ⁶⁸
Operational Framework for EbA (WWF)	CCA	Sub-national	Begins with a vulnerability assessment of social-ecological systems. Other steps include the identification and prioritization of EbA responses, implementation and monitoring, and mainstreaming EbA in national and local climate change planning. ⁶⁹
Adaptation mainstreaming cycle (GIZ)	CCA	National/sub-national	Focuses on maintaining functionality of ecosystems, and begins with using a climate and ecosystem lens to define the problem (e.g. lack of water), and identifying the system of interest (e.g. a watershed, sector or policy). ⁷⁰
Disaster risk management cycle	DRR	National/sub-national	Key stages of risk assessment (including risk identification, analysis and evaluation), risk prevention (through planning and policy), preparedness (early warning, emergency planning and education), and, following a disaster, response and recovery (rescue, recovery and rehabilitation, risk transfer). ⁷¹
Eco-DRR cycle	DRR	National/sub-national	Integrate ecosystem considerations into the traditional disaster risk management cycle. With improved development planning, on-going risk reduction and sustainable development, hazard events may be prevented from becoming disasters. Eco-DRR should be considered throughout early post-disaster recovery, reconstruction, risk and vulnerability assessments, and on-going disaster prevention through sustainable development. ⁷²
Ecosystems protecting infrastructure & communities (EPIC) (IUCN)	CCA/DRR	Sub-national	Promotes the use of EbA to protect communities from disasters and climate change impacts. Step-by-step guidance is proposed for implementing EbA and Eco-DRR, based on existing EbA guidelines. ⁷³
Landscape Approach	Multiple	Multiple	Encourages problem and solution analysis by considering landscapes and systems and integrating different spatial and temporal scales as an iterative process. Emphasizes the importance of conducting an initial landscape assessment and continuous involvement of stakeholders. ⁷⁴

⁷⁰ UNFCCC 2016

⁷¹ WWF 2013

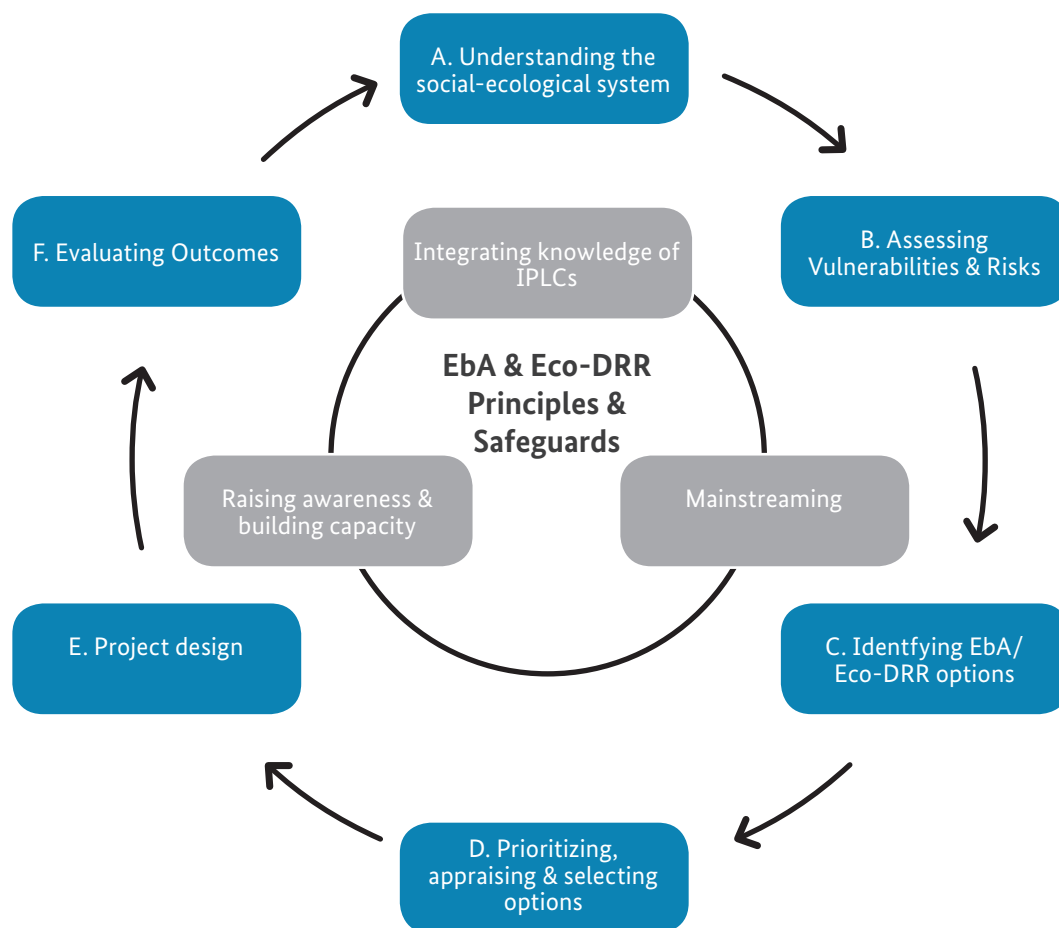
⁷² GIZ 2016a

⁷³ European Environment Agency 2017

⁷⁴ Sudmeier-Rieux 2013

⁷⁵ Monty et al. 2017

⁷⁶ CARE Netherlands and Wetland International 2017

Figure 8 Iterative process for planning and implementing EbA and Eco-DRR

Iterative process for planning and implementing EbA and Eco-DRR as part of overall climate change adaptation and disaster risk reduction strategies. The process is centred on the principles and safeguards presented in these guidelines. The outer circle outlines discrete steps to take, and the inner circle outlines overarching considerations throughout the process.

Step A Understanding the social-ecological system

Purpose

This exploratory step is aimed at enhancing the understanding of the social-ecological system targeted for climate change adaptation and disaster risk management interventions. This includes identifying key features of the ecosystem/landscape, including biodiversity and ecosystem functions and services, and interlinkages with people. Step A enables addressing root causes of risk in coping with current and future climate change impacts. Additionally, it generates baseline information to ensure that EbA and Eco-DRR measures reconcile conservation and development needs and do not harm biodiversity, cultural diversity or ecosystem functions and services, or the people and livelihoods that depend on such functions and services, in line with the principles and safeguards. Moreover, Step A includes in-depth stakeholder analysis and multi-stakeholder and participatory processes that feed into subsequent steps, and, therefore, more detailed actions are presented to undertake these analyses (box 7).

Outcomes

- a. A defined social-ecological system of interest (biodiversity, ecosystems and services, socio-economic characteristics and dependencies) and related goals and objectives for adaptation and disaster risk reduction;
- b. Defined stakeholders and rights holders;
- c. Defined political and institutional entry points for EbA and Eco-DRR within the system.

Key Actions

- a. Undertake an organizational self-assessment to understand strengths, weaknesses, capacity (including technical and financial) and opportunities for partnership on EbA and Eco-DRR. Based on this, a multi-disciplinary team (including but not limited to indigenous peoples and local communities, other experts, representatives from relevant sectors and government bodies) is organized for planning and implementing EbA and Eco-DRR;
- b. Identify and define the social-ecological system of interest (for example, a watershed, sector or policy);
- c. Conduct analyses and consultations, making use of the multidisciplinary team, in order to understand the drivers of risk, capacities and assets of communities, societies and economies, and the wider social and natural environment;
- d. Analyse the problem, determining its scope (geographical and temporal) by defining the boundaries of the system (see supporting guidance in associated toolbox), and set goals and objectives for adaptation and disaster risk reduction without harm to biodiversity or ecosystem functions and services. The spatial scale for risk management, associated with the impacts of climate change, should be broad enough to address the root causes of risk and deliver multiple functions to stakeholders with different interests, and sufficiently small to make implementation feasible;

- e. Identify and map key provisioning, regulating, supporting and cultural services in the system that contribute to resilience. As 90 per cent of disasters are water-related, including drought or floods⁷⁷, understanding the hydrology of the landscape is crucial for scoping and designing EbA or Eco-DRR interventions;
- f. Determine initial entry points for EbA and Eco-DRR interventions;
- g. Screen relevant entry points for EbA and Eco-DRR particularly in a policy, planning or budgeting cycle at different scales and levels where considerations of climate change risk and adaptation could be incorporated;
- h. Map out the institutional responsibilities for intersections of development, conservation, disaster risk reduction and climate change adaptation, including relevant sectors;
- i. Conduct an in-depth stakeholder analysis (box 7).

Box 7 Stakeholder and rights-holder analysis and establishment of participatory mechanisms

An assessment of the system or landscape helps to analyse the problem, define the boundaries for climate change adaptation and disaster risk reduction interventions, and screen for entry points for EbA and Eco-DRR. This information should feed into an in-depth stakeholder analysis before engaging stakeholders throughout the adaptation/DRR process, and also iteratively benefits from information from stakeholders. Prior and informed engagement of stakeholders and rights holders will increase ownership and likely success of any adaptation/DRR intervention. In-depth stakeholder analyses and development of multi-stakeholder processes and participatory mechanisms are key to meeting principles on equity and inclusivity and related safeguards. The Akwé: Kon Voluntary Guidelines (www.cbd.int/traditional/guidelines.shtml) outline procedural considerations for the conduct of cultural, environmental and social impact assessments, which are widely applicable to EbA and Eco-DRR.

Key Actions

- Identify indigenous peoples and local communities, stakeholders and rights holders likely to be affected by EbA and Eco-DRR interventions, and identify people, organizations and sectors that have influence over planning and implementation, using transparent participatory processes.
- Ensure full and effective participation of all relevant stakeholders and rights holders, including the poor, women, youth and the elderly, ensuring they have the capacity and sufficient human, technical, financial and legal resources to do so (in line with the safeguards).
- Engage with civil society organizations and/or community-based organizations to enable their effective participation.
- Where appropriate, identify and protect the ownership and access rights to areas for the use of biological resources.

⁷⁷ United Nations 2015

Table 6 Step A Toolbox: Understanding the social-ecological system/landscape and stakeholder analysis and engagement

Tool/Organization	Description
The Toolkit for Ecosystem Service Site-based Assessment (TESSA)	Piloted in protected areas, TESSA guides non-specialists through methods for identifying which ecosystem services may be important at a site, and for evaluating the magnitude of benefits that people obtain from them currently, compared with those expected under alternative land-use. www.birdlife.org/datazone/info/estoolkit
Integrated Valuation of Environmental Services and Tradeoffs (InVEST)	InVEST is a suite of software models used to map and value the goods and services from nature that sustain and fulfil human life. This tool enables decision makers to assess quantified trade-offs associated with alternative management choices and to identify areas where investment in natural capital can enhance human development and conservation. www.naturalcapitalproject.org/InVEST.html
Exploring Nature-Based Solutions: The role of green infrastructure in mitigating the impacts of weather- and climate change-related natural hazards	This report proposes a simple, practical methodology for screening (rather than assessing) ecosystem services in areas where green infrastructure may contribute to reducing current (or future) weather- and climate-related natural hazards. The hazards addressed include landslides, avalanches, floods, soil erosion, storm surges and carbon stabilization by ecosystems. Several case studies at the European level outline the screening process and also summarise recent estimates of the economic value of green infrastructure. www.eea.europa.eu/publications/exploring-nature-based-solutions-2014
Stocktaking for National Adaptation Planning (SNAP) Tool (GIZ)	Helps assess a country's current national adaptation planning capacities and in identifying strategic goals for NAP that feed into the preparation of a country-specific NAP Roadmap. The publication 'Stocktaking for National Adaptation Planning – Assessing Capacity for Implementing NDCs' highlights results from applying SNAP in various geographical terrains on national and subnational scales. www.adaptationcommunity.net/?wpfb_dl=362
CLiF Reflect Tool to (GIZ)	This tool supports planners and policymakers in reflecting on the current level of capacities within a country to mobilize and effectively manage climate finance. www.adaptationcommunity.net/ndc_adaption_toolbox/clif-reflect
Tool for Assessing Adaptation in Nationally Determined Contributions ((I)NDCs) (TAAN)	TAAN allows users to compare several (I)NDCs' adaptation components, access a singular country's (I)NDC adaptation factsheet and visualize statistics of adaptation-related content mentioned in the (I)NDCs. The tool is a means of improving a comprehensive understanding of the adaptation-related content in the (I)NDCs. www.adaptationcommunity.net/nap-ndc/tool-assessing-adaptation-ndcs-taan
Multi-stakeholder management: Tools for Stakeholder Analysis (GTZ, 2007)	10 building blocks for designing participatory systems of cooperation. Sector Project: Mainstreaming Participation. Report series: Promoting participatory development in German development cooperation. Eschborn: GTZ. www.fsnnetwork.org/sites/default/files/en-svmp-instrumente-akteursanalyse.pdf
Gender Analysis	Tool to help analyse gender roles, activities, assets, needs and available opportunities for men and women. E.g., CARE Rapid Gender Analysis Toolkit. gender.care2share.wikispaces.net/CARE+Rapid+Gender+Analysis+Toolkit
Tools to support EbA (in development) (UN-EP-WCMC and IIED)	Inventory of available tools to support EbA planning and implementation. www.iied.org/call-for-feedback-inventory-tools-support-ecosystem-based-adaptation
Gender and Vulnerable Groups and National Adaptation Plan Processes/ NDCs – Guidance (GIZ 2017)	A guidance synthesizing and presenting information and tools for the integration of gender and vulnerable groups' considerations into adaptation planning. www.adaptationcommunity.net/ndc_adaption_toolbox/gender-vulnerable-groups-gvg-national-adaptation-plan-nap-processes-ndcs-guidance
Guide on Designing and Facilitating Multi-Stakeholder-Partnerships	The guide links the underlying rationale for multi-stakeholder partnerships, with a clear four phase process model and set of core principles. (Centre of Development Innovation (CDI), of Wageningen University). www.mspguide.org/msp-guide

Step B Assessing vulnerabilities and risks

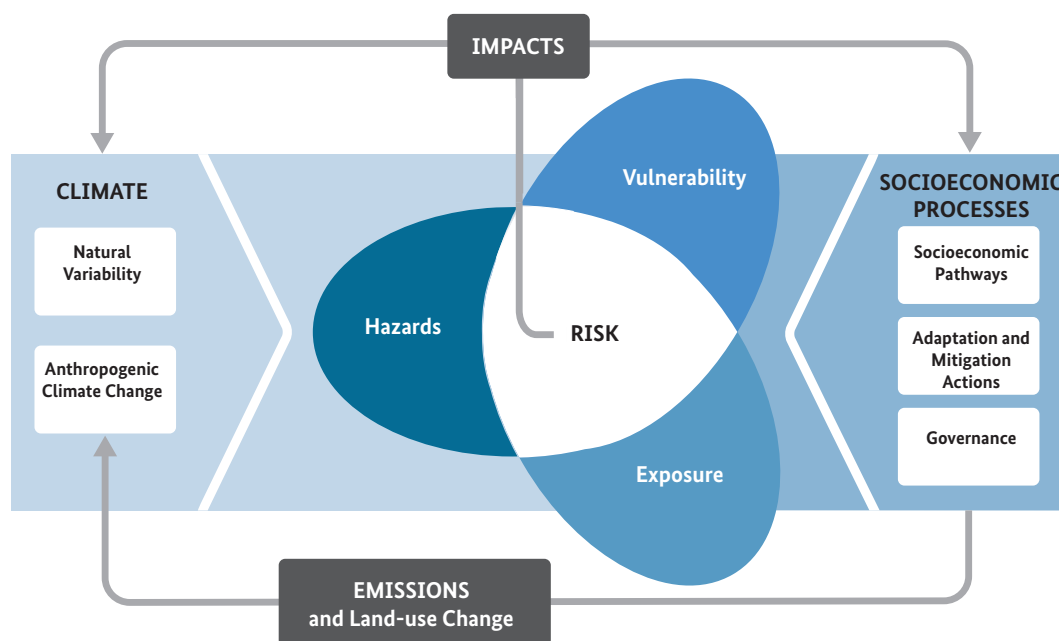
Purpose

Vulnerability and risk assessments are undertaken to identify the main climate change and disaster risks and impacts on the social-ecological system of interest, for example, taking stock of biodiversity and ecosystem service information to identify species or ecosystems that are particularly vulnerable to the negative impacts of climate change. The assessments are then used to identify, appraise and select targeted adaptation and disaster risk reduction interventions in planning and design. Risk and vulnerability assessments also aid in allocating resources to where they are most needed,

and in establishing baselines for monitoring the success of interventions.

Vulnerability is defined as the propensity or pre-disposition to be adversely affected. Vulnerability encompasses a variety of concepts and elements, including sensitivity or susceptibility to harm and lack of capacity to cope and adapt.⁷⁸ Vulnerability, exposure and hazards together determine the risks of climate-related impacts (figure 9). While they have different definitions and underlying assumptions, both risk and vulnerability assessments follow a similar logic.⁷⁹

Figure 9 Illustration of the core concepts of the contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change



Note: Risk of climate-related impacts results from the interaction of climate-related hazards (including hazardous events and trends) with the vulnerability and exposure of human and natural systems. Changes in both the climate system (left) and socioeconomic processes including adaptation and mitigation (right) are drivers of hazards, exposure and vulnerability.

Source: Intergovernmental Panel on Climate Change, *Climate Change 2014: Impacts, Adaptation and Vulnerability*, 2014

⁷⁸ Intergovernmental Panel on Climate Change, *Fifth Assessment Report*, 2014.

⁷⁹ IPCC 2007

Risk assessments generally consist of three steps: risk identification (finding, recognizing and describing risk); risk analysis (estimation of the probability of its occurrence and the severity of the potential impacts); and risk evaluation (comparing the level of risk with risk criteria to determine whether the risk and/or its magnitude is tolerable). These steps consider both climate and non-climate factors that generate a climate or disaster risk.

The advantage of an integrated risk and vulnerability assessment approach, as opposed to assessing only vulnerability, is that it addresses the large proportion of impacts that are triggered by hazardous events as well as integrates both climate change adaptation and disaster risk reduction approaches. A relatively new practice is moving from single hazard approaches to multi-hazard/multi-risk assessments. This approach can account for regions or classes of objects exposed to multiple hazards (e.g. storms and floods), and cascading effects, in which one hazard triggers another.

Key considerations and general activities for undertaking risk and vulnerability assessments are discussed below. Tools and examples and more detailed stepwise guidance on conducting risk and vulnerability assessments are provided in table 7.

Outcomes

- a. A risk and vulnerability profile in current and future climate scenarios of the social-ecological system covering hazards, exposure, and vulnerabilities (including sensitivities and adaptive capacities);
- b. Main drivers of risks and underlying causes.

Key Actions

- a. Develop or make use of frameworks and concepts that recognize the linkages between people and ecosystems as integrated social-ecological systems rather than viewing adaptation and risk reduction only through a human lens;
- b. Assess past and current climate and non-climate risks to the social-ecological system with flexible criteria that address the linkages between human and environmental systems:
 - i. Consult previous assessments of climate change impacts on biodiversity and ecosystem functions and services; for example, national impact and vulnerability assessments prepared for UNFCCC, or vulnerability assessments from forest, agriculture, fisheries or other relevant sectors;
 - ii. Conduct socioeconomic and ecological field surveys to identify vulnerabilities in both communities and ecosystems (including ecosystems that provide critical functions and services for climate change adaptation or DRR)⁸⁰;
 - iii. Assess the drivers of current risks and vulnerability and, if possible, future risks based on climate change projections or scenarios that are at the appropriate scale, e.g. down-scaled to the local level, where appropriate;

⁸⁰ European Environment Agency 2017

- c. Integrate quantitative approaches (based on scientific models) and qualitative approaches, which are grounded in expert judgement and indigenous and traditional knowledge (more detail is provided below). For example, use participatory rural appraisals to understand local perceptions and past experiences;
- d. Develop hazard and risk maps such as through the use of participatory 3-D modelling of risks.

Box 8 Identifying the most vulnerable groups, communities & ecosystems

People who are socially, economically, culturally, politically, institutionally, or marginalized in other ways are especially vulnerable to climate change, and also vulnerable to some adaptation and mitigation responses (IPCC 2014). Their vulnerability may be a result of several factors, such as socioeconomic disparity, exposure, or discrimination due to gender, class, ethnicity, age, or disability (IPCC 2014).

Identifying the vulnerable groups and communities who are disproportionately affected by the impacts of climate change and disaster risks is essential to targeting adaptation and risk reduction measures effectively and equitably (CARE 2011). This should include indigenous peoples and local communities, and historically or politically marginalized groups such as women, youth, the elderly, the rural poor, and the disabled. Additionally, it is important to assess the ecological integrity of ecosystems, and the key ecological features that are both more impacted or transformed by climate change, and how this affects the capacity to provide critical ecosystem services. The use of disaggregated geospatial data is critical for identifying the most vulnerable groups, communities and ecosystems. In addition, important steps include:

- Conducting gender analyses to determine gender considerations influencing vulnerability to climate change and disaster risk;
- Using geospatial data on poverty and disaster risk to target and prioritize regions for adaptation and disaster risk reduction;
- Consulting the IUCN Red List of Ecosystems Categories and Criteria or the Climate Change Vulnerability Index for Ecosystems and Habitats for assessing the status of ecosystems at local, national, regional and global levels. Assessments determine whether an ecosystem is vulnerable, endangered, or critically endangered;
- Bringing the academic community to the process by promoting consultations with universities, research centres, and researchers; and
- Identifying vulnerable communities, groups and ecosystems on an ongoing basis and in a participatory and inclusive manner to ensure EbA and Eco-DRR interventions are appropriately targeted to the people and ecosystems most in need.

Table 7 Step B Toolbox: Assessing vulnerabilities and risks

Tool/Organization	Description
Risk/Vulnerability Assessments	
Vulnerability Sourcebook (GIZ)	The Vulnerability Sourcebook offers a conceptual framework and step-by-step guidelines for standardised assessments of vulnerability to climate change. www.adaptationcommunity.net/?wpfb_dl=203
Risk Supplement to the Vulnerability Sourcebook & Climate Risk Assessment for EbA - A guidebook for policy-makers and practitioners (GIZ)	The risk supplement is a practical guidance on how to apply the Vulnerability Sourcebook's approach using the IPCC AR5 risk concept. The guidebook applies a standardised approach to climate risk assessments in the context of EbA-planning by following the modular sourcebook and risk supplement methodology and using an illustrative application example. www.adaptationcommunity.net/vulnerability-assessment/vulnerability-sourcebook
Operational Framework for EbA (WWF)	Step-by-step guidance for implementing EbA including a chapter on the first step of conducting risk and vulnerability assessments. awsassets.panda.org/downloads/wwf_wb_eba_project_2014_gms_ecosystem_based_adaptation_general_framework.pdf
Adaptation Wizard (UK)	Risk and systems' vulnerability framework for adaptation developed in the UK. www.ukcip.org.uk/wizard
Scenario Planning for Climate Change Adaptation: A Guidance for Resource Managers	Step-by-step guide to using scenarios to plan for climate change adaptation at a local or regional scale, helping to develop resource management approaches that take future possible climate change impacts and other important uncertainties into account. scc.ca.gov/files/2013/04/Scenario-Planning.pdf
Risk Assessment and Mapping for Disaster Management (European Commission)	Multi-hazard and multi-risk perspective approach taking into account regions or classes of objects exposed to multiple hazards (e.g. storms and floods), and considering 'cascading effects'. ec.europa.eu/echo/files/about/COMM_PDF_SEC_2010_1626_F_staff_working_document_en.pdf
World Overview of Conservation Approaches and Technologies (WOCAT)	Database of practices and technologies, including some based on indigenous and traditional knowledge. www.wocat.net/projects-and-countries
Integrating Landscape Dimensions in Disaster Risk Reduction: A Cluster Planning Approach (Partners for Resilience)	Description of a cluster planning approach for disaster risk reduction planning, building on the understanding of the relationship between landscape-scale drivers of disaster risk and community vulnerability and capacity. ink.springer.com/chapter/10.1007%2F978-3-319-43633-3_12
Guidance on Integrating Ecosystem Considerations into Climate Change Vulnerability and Impact Assessment (VIA) to Inform Ecosystem-based Adaptation (UNEP-WCMC)	Provides information and advice on how to integrate consideration of ecosystems and their services into a climate change vulnerability and impact assessment. www.adaptation-undp.org/resources/training-tools/guidance-integrating-ecosystem-considerations-climate-change-vulnerability
Risk and Vulnerability Assessment Methodology Development Project (RiVAMP) in Jamaica	Training manual for quantifying the role of ecosystems in DRR and climate change adaptation, based on a pilot project implemented in Jamaica from 2009-2010. www.grid.unep.ch/products/3_Reports/RiVAMP_Training_2012.pdf

Tool/Organization	Description
Local/Community-level tools	
Climate Vulnerability and Capacity Analysis Handbook (CARE)	Handbook assessing hazard impacts on each of the five categories of livelihood resources and providing a framework for community-based adaptation. www.careclimatechange.org/index.php?option=com_content&view=article&id=25&Itemid=30
CEDRA – Climate change and Environmental Degradation Risk and Adaptation assessment (Tearfund)	Analyses risks posed by climate change and environmental degradation and supports NGOs in understanding communities' experiences of environmental change. tilz.tearfund.org/en/themes/environment_and_climate/cedra
CRiSTAL – Community-based Risk Screening Tool – Adaptation and Livelihoods (IISD, Stockholm Environment Institute and IUCN)	Tool to help project planners and managers integrate climate change adaptation and risk reduction into community-level projects. www.iisd.org/cristaltool
Tools considering vulnerable groups, communities and ecosystems	
Red List of Ecosystems (IUCN)	Tool to evaluate the status of the ecosystems as well as a repeatable method to measure drivers and trends that contribute to ecosystem risks. Helpful to ensure long term functioning of ecosystems. www.iucn.org/theme/ecosystem-management/our-work/red-list-ecosystems
Climate Resilience Evaluation for Adaptation Through Empowerment (CREATE) – Integrated Vulnerability and Capacity Assessment Method	Tool to integrate existing methods such as CRiSTAL, CARE's CVCA, etc. and provides a broad framework together with general guidelines and suggestions, allowing people to assess and analyse their vulnerability and capacity, identify adaptation options and begin the planning process. cmsdata.iucn.org/downloads/create_factsheet_final.pdf
Database on the application of gender-sensitive approaches and tools (UNFCCC)	Case studies on the application of gender-sensitive approaches and tools for understanding and assessing impacts, vulnerability and adaptation to climate change as inputs for the technical paper mandated in paragraph 17 of FCCC/SBSTA/2013/3. www4.unfccc.int/sites/nwp/pages/Search.aspx
Gender-sensitive Climate Vulnerability and Capacity Analysis (GVCA): Practitioners Guide (Care)	Provides a framework for analysing vulnerability and capacity to adapt to climate change and build resilience to disasters at the community level, with a particular focus on social and in particular gender dynamics, based on experiences of using the approach in Mozambique. careclimatechange.org/wp-content/uploads/2016/02/GCVCA_Practitioners-Guide-FINAL-July-2014.pdf
Making Disaster Risk Gender-Sensitive: Policy & Practical Guidelines (UNISDR, UNDP and IUCN)	Increases understanding of gender concerns and needs in DRR; develop capacity to address gender issues, contains gender mainstreaming policy guidelines including gender-sensitive risk assessments, early warning systems, and gender-sensitive indicators to monitor mainstreaming progress.

Step C Identifying EbA and Eco-DRR options

Purpose

Having defined the boundaries of the social-ecological system/landscape and identified initial entry points for EbA and Eco-DRR, as well as vulnerabilities and risks (Step A), potential options are identified by the multi-stakeholder group within an overall strategy of climate change adaptation and disaster risk reduction. A list of relevant tools linked to this step is provided in table 8.

Outcome

A list of available strategies and options for reducing the exposure and sensitivity of social-ecological systems to climate hazards and enhancing adaptive capacity.

Key Actions

- a. Identify existing coping strategies and responses to address the risks of climate change impacts and disasters, and/or those used to address current climate variability and socio-economic pressures on ecosystems and societies, and analyse viability for future climate impacts and risks;
- b. Refine the initial entry points identified for EbA and Eco-DRR. Criteria for selecting entry points can include:
 - i. High probability of effectiveness from previous experiences in a similar social-ecological setting;
 - ii. Strong support from stakeholders.
- c. In collaboration with multi-stakeholder groups, inclusive of stakeholders, rights holders and experts, formulate appropriate strategies, within an overall adaptation strategy, to address the risks and vulnerabilities identified in Step B;
- d. Assess specific issues and priorities of the vulnerable groups, sectors, and ecosystems;
- e. Ensure that EbA and Eco-DRR are planned at the local, community and household levels and at the landscape or catchment level, as appropriate;
- f. Identify the EbA and Eco-DRR strategies that meet the objectives defined in Step A, and that adhere to its main elements;
- g. Consider the qualification criteria and standards for EbA.⁸¹

Table 8 Step C Toolbox: Identifying EbA and Eco-DRR Strategies

Tool/Organization	Description
Ecosystems Restoration Opportunity Mapping for DRR and CCA (UNEP/GRID-Geneva and UNEP/PCDMB)	New methodology and global interactive tool for mapping areas where ecosystems can reduce disaster risk, crossing human exposure to natural hazards with presence/absence of ecosystems, which enables the prioritization of areas where ecosystems should be protected and/or restored. www.grid.unep.ch/index.php?option=com_content&view=article&id=47&Itemid=253&lang=en&project_id=235CE705
PANORAMA – Solutions for a healthy planet (GIZ, IUCN, UN Environment, GRID Arendal, Rare)	An interactive platform and database of specific, applied examples of successful NBS, EbA and Eco-DRR processes or approaches structured according to regions, ecosystems, specific thematic areas, governance and hazards addressed. The practical examples (solutions) are consisting of specific success factors (building blocks). Useful for identifying practical EbA & Eco-DRR examples that address different targets (Aichi, Sendai Framework, SDGs, NDC). panorama.solutions/en/explorer/grid/1042

⁸¹ FEBA 2017

Tool/Organization	Description
Selection of nature-based solutions: Good practices in the Basque Autonomous Community (Spain)	Inventory of nature-based projects implemented in the Autonomous Community of the Basque Country (BAC). They are organized into three sections – rivers, coasts and cities – dedicated to iconic measures in each of the provinces of the Basque Country. growgreenproject.eu/wp-content/uploads/2018/05/NBS-Climate-Adaptation-Basque-Country.pdf
Addressing Slow-Onset Events (UNFCCC)	Database that maps 151 organizations working on slow onset events – rising temperatures, desertification, loss of biodiversity, land and forest degradation, glacial retreat and related impacts, ocean acidification, sea level rise and salinisation, and the scope of their current efforts. www.unfccc.int/sites/NWP/Pages/soe.aspx
Options for ecosystem-based adaptation in coastal environments: A guide for environmental managers and planners and decision-support tool (UNEP)	Supports environmental decision-makers in choosing, implementing, monitoring, evaluating and, over time, adaptively managing coastal EBA. Online guide, website and decision-support tool available at: www.unep-wcmc.org/news/coastal-eba
Database on ecosystem-based approaches to Adaptation (UNFCCC)	An initiative under the Nairobi work programme to provide examples of ecosystem-based approaches to adaptation. www4.unfccc.int/sites/NWP/Pages/soe.aspx
EU Natural Water Retention Measures (NWRM) catalogue	Contains sector-specific NWRMs which encourage the retention of water within a catchment, thus enhancing its natural functioning. It contains a comprehensive but non-prescriptive range of measures. nwrms.eu/measures-catalogue
Implementing nature-based-flood protection: Principles and implementation guidance (World Bank)	Presents five principles and implementation guidance for planning, such as evaluation, design, and implementation of nature-based solutions for flood risk management as an alternative to or complementary to conventional engineering measures. documents.worldbank.org/curated/en/739421509427698706/Implementing-nature-based-flood-protection-principles-and-implementation-guidance
Local investments for climate change adaptation: Green jobs through green works – A guide for identifying, designing and implementing interventions in support of climate change adaptation at the local level (ILO)	Provides options for types of adaptation activities that use employment intensive approaches, focusing on inclusive local practices for environmental sustainability. www.ilo.org/wcmsp5/groups/public/---asia/---ro-bangkok/documents/publication/wcms_172716.pdf
Greening the Grey: a framework for integrated green grey infrastructure (IGGI)	Highlights innovations from academia and practice designed to green grey infrastructure assets such as bridges, street furniture and coastal engineering structures that need to remain primarily grey for their essential function. eprints.gla.ac.uk/150672
Greater working with natural processes in flood and coastal erosion risk management (Environment Agency, UK)	Explains what natural processes are in flood and coastal risk management and provides practitioners with a high quality basis for achieving greater working with natural processes. webarchive.nationalarchives.gov.uk/20130903132727/http://www.environment-agency.gov.uk/research/planning/136425.aspx
River restoration and biodiversity (Crew, Scotland)	Describes the importance of rivers for nature conservation, summarises the damage that river habitats have sustained over many decades, and discusses ways in which repairing damage and restoring river habitats can bring benefits both to wildlife and to human society. www.crew.ac.uk/publication/river-restoration

Step D **Prioritizing, appraising and selecting EbA and Eco-DRR options**

Purpose

In this step, the EbA and Eco-DRR options identified in Step C are prioritized, appraised and selected to achieve the goals set out in Step A, as part of an overall adaptation and disaster risk reduction strategy for the system of interest. A list of relevant tools for prioritizing, appraising and selecting EbA and Eco-DRR options and identifying trade-offs is available in table 10.

Given the importance of evaluating trade-offs and limitations, more detailed actions are provided (box 9). Methods for appraising the value of EbA and Eco-DRR activities are detailed in table 9. Information on ways to increase scientific and technical knowledge of EbA and Eco-DRR approaches are also elaborated below in box 10.

Outcomes

- a. List of prioritized options based on selected criteria; and
- b. Selection of final options for implementation.

Key Actions

- a. Using participatory approaches (Step A), identify the criteria/indicators to be used to prioritize and appraise the EbA and Eco-DRR options identified in Step C. For example, using multi-criteria analysis or cost-effectiveness to evaluate adaptation options (see table 9 for appraisal methodologies);
- b. Ensure that trade-offs and limitations of options are part of the appraisal process (box 9), and include consideration of green or hybrid solutions, before grey, when more effective;

- c. Consider multiple values and benefits, including non-monetary, to capture the full value of different EbA and Eco-DRR options;
- d. Assign weights to the proposed criteria, and use the criteria to rank the EbA and Eco-DRR options;
- e. Prioritize and short-list EbA and Eco-DRR options based on the agreed-upon criteria;
- f. Make use of the multi-stakeholder group and consult other rights holders to identify the best options and develop a business case;
- g. Analyse the costs, benefits, impacts and trade-offs of different risk management scenarios, and the costs of inaction, to capture gains or losses in ecosystem functions and services provisioning that have an impact on adaptation and disaster risk reduction and resilience (e.g. consideration for wetlands);
- h. Consider the sustainable use of local ecosystems, services and/or materials in EbA and Eco-DRR options that could bring additional local benefits and reduce carbon emissions from transport, rather than outsourced labour and materials;
- i. In appraising options, consider the costs and benefits of interventions over the long term, as the time period in economic comparison of various options is important, and consider both upfront capital and longer-term maintenance costs. For example, engineered structures, such as dykes, can be relatively inexpensive at the investment level but carry high maintenance costs, whereas ecosystem-based approaches, such as wetland restoration, may be less expensive in the long term and provide multiple benefits;

- j. Assess the strength of proposed EbA and Eco-DRR measures by examining how they adhere to the elements, principles and safeguards, considering available qualification criteria and standards;
- k. Before the design and implementation of selected projects (Step E), conduct environmental impact assessments (EIA) of the recommended options, ensuring that: (i) possible social and environmental impacts have been clearly identified and assessed; (ii) appropriate measures have been taken to avoid or, if not possible, mitigate risks; and (iii) the measures taken to avoid/mitigate risks are themselves monitored and reported on throughout project life cycles. The EIA should incorporate a summary of recommendations from past, ongoing and planned projects and programmes within the relevant geographic jurisdiction.

Box 9 Evaluating trade-offs and limitations

Part of the process of prioritizing, appraising and selecting adaptation/DRR options involves the identification and evaluation of potential trade-offs. Trade-offs may arise when an activity protects one group of people at the expense of another, or favours a particular ecosystem service over another. Some trade-offs are the result of deliberate decisions; others occur without knowledge or awareness. For example, the implementation of adaptation actions upstream may have effects on downstream communities, and at different times. Ecosystems are subject to climate change, and, therefore, EbA, Eco-DRR and other practices that use ecosystem-based approaches should be designed to be robust in the face of current and projected impacts of climate change. Trade-offs and limitations should be considered and integrated within overall adaptation and disaster risk reduction planning and aligned with national policies and strategies. They should also be implemented alongside other measures of risk reduction, including avoidance of high-risk zones, improved building codes, early warning and evacuation procedures. A trade-off analysis across scales and considering multiple benefits can help to place EbA and Eco-DRR options on equal footing alongside other options.

Key actions

- Develop indicators of short and long-term changes across various spatial scales to detect potential trade-offs and limitations of EbA and Eco-DRR (see Step F for more detail);
- Use geospatial data and models (such as those available in InVEST (www.naturalcapitalproject.org/invest)) to understand how changes in ecosystem structure and function as a result of adaptation or DRR interventions will affect ecosystem services across a land- or seascape;
- Consider the full range of infrastructure options from “green” to “hybrid” to “hard” and their compatibility, recognizing that different combinations are needed in different situations;
- Ensure that EbA and Eco-DRR are informed by the best available science and indigenous and traditional knowledge to fully account for possible trade-offs and limitations;
- Ensure the integration of EbA and Eco-DRR into overall adaptation or disaster risk reduction strategies, in recognition of potential limitations of ecosystem-based approaches;
- Consider and minimise trade-offs or unintended consequences of EbA and Eco-DRR throughout all stages of planning and implementation, including accounting for uncertainties in climate projections and for different scenarios.

Table 9 Methods for appraising the value of EbA and Eco-DRR activities²⁹
(CBA = cost-benefit analysis, NPV = net present value)

Methodology	Brief Description	Advantages	Disadvantages
Multi-criteria analysis (MCA)	Part or wholly qualitative-based approach, which provides a “ranking” of initiatives based on monetary and non-monetary criteria.	Allows appraisal to be conducted in the absence of/ limited amount of quantitative data	Limited to relative assessments of alternative policy options Outputs are appraisal-specific – i.e. cannot be generalised more widely
Cost-effectiveness analysis (CEA)	Quantitative approach which identifies the policy option providing a specific output/benefit at the lowest cost	Useful when a specific output/objective is needed to be met Can be used when comprehensive quantitative cost data is available for monetising costs but not benefits	Not applicable when a single initiative is being appraised, or when considering multiple initiatives providing different levels of the required benefit. Implicitly ignores potentially significant eco-benefits
Scenario-based cost-benefit analysis (SBCBA)	Quantitative approach which assesses costs and benefits (in monetary form) across different scenarios/states of the world.	Accounts for uncertainty surrounding flood risk without being computationally or data intensive Provides numeric outputs, allowing for cardinal comparisons between initiatives Easily understood for non-technical audiences Allows for the application of risk-based rules	Potentially difficult to gain consensus on the appropriate scenarios to use Risk of not capturing the extent of uncertainty surrounding climate change, especially under ‘deep uncertainty’
Robust decision making (ROM)	Quantitative approach which assesses the proposed initiatives across all plausible states of the world, and identifies the initiative most robust across these.	Captures deep uncertainty – leaves ‘no stone unturned’ Provides numeric outputs Provides a clear picture of which initiatives are optimal in different states of the world	Can be computationally and data intensive Potentially difficult to interpret for non-expert audiences Value function for deriving costs and benefits needs to be well calibrated Ranges of plausible parameter values need to be known
Real options analysis (ROA)	Extension of CBA which estimates the ‘option value’ associated with each initiative i.e. the option to delay or adjust in the future. Calculates the NPV of each initiative given the particular actions that could be taken given different states of the world being realised, and the probabilities of these occurring.	Accounts for learning about the nature or extent of flood risk going forward – captures the value in delaying or adjusting a particular initiative Useful when comparing large irreversible options with smaller-scale flexible options	Can be computationally or data intensive – requires the assignment of probabilities to scenarios at various future time periods

Box 10 Increasing scientific and technical knowledge of EbA and Eco-DRR approaches

The transdisciplinary, multi-sectoral approaches of EbA and Eco-DRR provide new avenues for research and opportunities for enhancing the evidence base. To set the stage for this, linkages between IPLCs, the scientific community, experts and practitioners can be made by planning and implementation through consultations, knowledge platforms, learning networks, communities of practice, and knowledge co-generation. Areas that could benefit from collaborative research regarding EbA and Eco-DRR include:

- Exploring new modelling approaches to understand the linkages between adaptation, disaster risks, and social-ecological systems, and linkages between biodiversity and climate change at different scales;
- Developing comparative assessment procedures of EbA and Eco-DRR vs. traditional hard or grey infrastructure;
- Developing and testing indicators of EbA and Eco-DRR efficacy in the context of social-ecological resilience;
- Understanding the limits and thresholds of EbA and Eco-DRR;
- Understanding the full scope of multiple benefits from implementing EbA and Eco-DRR, and means to upscale them;
- Enhancing the efficacy of participatory processes.

Additionally, The Paris Agreement (Article 8) outlines several areas of cooperation and facilitation to enhance understanding, action and support for adaptation, including adapting to slow onset events, events that may involve irreversible and permanent loss and damage, comprehensive risk assessment and resilience of communities, livelihoods and ecosystems.

Table 10 Step D Toolbox: Prioritizing appraising and selecting adaptation and DRR options and identifying trade-offs

Tool/Organization	Description
Valuing the Benefits, Costs and Impacts of Ecosystem-based Adaptation Measures: A sourcebook of methods for decision-making	Resource to guide the design, delivery and use of EbA valuation studies to inform and influence decision-making, including 40 case studies on EbA-relevant valuations that have been implemented globally, over recent years. (GIZ 2017). www.adaptationcommunity.net/download/sec_guides/EbA-Valuations-Sb_2017-Dec_en_online_1-0.pdf
Supporting decision-making for effective adaptation (National Climate Change Adaptation Facility, Australia)	Policy brief exploring the support of decision-making for adaptation, through provision of frameworks, knowledge and criteria for performance evaluation and comparisons (Decision Support Tools). www.nccarf.edu.au/sites/default/files/attached_files/publications/DECISION_070313_A4.pdf
Integrated Valuation of Environmental Services and Tradeoffs (InVEST)	InVEST enables decision-makers to assess quantified trade-offs associated with alternative management choices, with models to account for both service supply (e.g., living habitats as buffers for storm waves) and the location and activities of people who benefit from services (e.g., location of people and infrastructure potentially affected by coastal storms). www.naturalcapitalproject.org/InVEST.html
Restoration of the sponge function in wetland soils as a measure for integrated river basin management in the Rhine catchment (Wetlands International)	Report on a recent study on the costs and benefits of restoration of the sponge function in wetland soils in the middle mountains of the Rhine basin for flood and drought risk reduction. europe.wetlands.org/publications/sponge-restoration/
ROAM (Restoration Opportunities Assessment Methodology) (IUCN)	Restoration and assessment methodology for land use trade-offs at landscape scale. www.iucn.org/theme/forests/our-work/forest-landscape-restoration/restoration-opportunities-assessment-methodology-roam
OpeNESS	Decision-making tool on Natural Capital and Ecosystem Services. www.open-ness-project.eu
Voluntary guidelines for responsible governance over the tenure of land, forestry and fisheries (FAO)	Provides a forward-looking framework for countries to enhance tenure security and user and access rights over land and natural resources used in agriculture, forestry and fisheries sectors, and provides guidance on how to ensure principles such as transparency, equity, civic engagement, accountability, effectiveness, efficiency and sustainability can be upheld in land administration, management and policy formulation. www.fao.org/docrep/016/i2801e/i2801e.pdf
Cost and Benefits of Ecosystem Based Adaptation: The Case of the Philippines (IUCN)	Highlights case studies using 1) Cost-Benefit Analysis (CBA); 2) Cost-Effective Analysis; and 3) Multi-criteria Analysis for EbA decision-making. www.iucn.org/sites/dev/files/content/documents/philippines_cba_study_final_version.pdf
Making the economic case for Ecosystem-based Adaptation: Learning Brief (UNDP)	Description of application of cost-benefit analyses to EbA and lessons learned based on the the Global Mountain EbA Programme in Nepal, Peru and Uganda. www.adaptation-undp.org/sites/default/files/downloads/undp_mt_eba_learning_brief_3_final_web_vs_05.01.16.pdf

Step E Project design and implementation

Purpose

In this step, the interventions selected in Step D are designed and implemented according to the principles and safeguards. Throughout the design and implementation, it is important to continually revisit the principles and safeguards and ensure ongoing stakeholder engagement, capacity-building, mainstreaming and monitoring (figure 8).

Given the added importance of transboundary and cross-sectoral cooperation, coordination and policies, more detailed actions are provided (see box 11). Tools for project design and implementation are provided in table 11.

Outcome

A project design and implementation plan (including a finance strategy, capacity development strategy, defined actions for institutional and technical support measures).

Key Actions

- a. Consider the EbA and Eco-DRR elements, principles and safeguards throughout design and implementation (See Step B);
- b. Consider the qualification criteria and standards for EbA;
- c. Design interventions at the appropriate scale to address the goals set out in Step A;
- d. Engage relevant experts, and strengthen linkages between the scientific community and project executors to ensure optimal and appropriate use of ecosystems for adaptation and DRR;
- e. Select appropriate tools, and if needed, plan for the development of new methodologies;
- f. Determine technical and financing requirements and develop a budget accordingly;
- g. Establish a workplan, including timelines of activities, milestones to achieve, multi-stakeholder consultations needed, and allocation of tasks and responsibilities;
- h. Develop strategies to reduce identified risks and trade-offs and enhance synergies (see Step D);
- i. Establish linkages between the project and national, subnational, and/or local development plans, strategies, and policies;
- j. Consider principles for building resilience and adaptive capacity in social-ecological systems (see box 12).

Box 11 Transboundary and cross-sectoral cooperation, coordination and policies

Climate change impacts and disaster risks extend beyond political boundaries; therefore, an integrated landscape or systems approach aids in problem-solving across sectors and boundaries. Transboundary cooperation can enable the sharing of costs and benefits and prevent potentially negative impacts of measures taken unilaterally. Transboundary cooperation can also provide opportunities for socioeconomic development and managing issues at appropriate ecosystem scales.

EbA and Eco-DRR interventions increasingly call for cooperation with other sectors, including agriculture, water, urban development and infrastructure.

Transboundary and cross-sectoral considerations can be integrated into EbA and Eco-DRR by:

- Integrating the different scales of critical ecosystem functioning needed for adaptation and disaster risk reduction in EbA and Eco-DRR;
- Greater coherence between regional/transboundary EbA and Eco-DRR-strategies and policies contributes to improved effectiveness of actions;
- Learning from well-established cross-sectoral planning mechanisms, such as integrated water resources management (IWRM), integrated coastal zone management (ICZM) and land-use planning, to strengthen cross-sectoral cooperation and enhance uptake of EbA and Eco-DRR into relevant sectoral frameworks (also applicable to mainstreaming EbA and Eco-DRR);
- Setting up a commission or task group with transboundary partners and sector; representatives to develop a joint vision, goals and objectives for EbA and Eco-DRR;
- Developing a common understanding of vulnerabilities at the transboundary scale and for different sectors through the use of common models and scenarios and agreed-on methodologies and sources of information; and
- Adopting an iterative monitoring and evaluation process (see Step F) to ensure that transboundary and cross-sectoral EbA and Eco-DRR strategies continue to meet national adaptation and disaster risk reduction targets and maximize the potential for multiple benefits.



Box 12 Applying resilience thinking in EbA and Eco-DRR design

A resilience approach to sustainability focuses on building capacity to deal with unexpected change – such as the impacts of climate change and the risk of disaster. Applying a resilience lens to designing EbA and Eco-DRR interventions involves managing interactions between people and nature as social-ecological systems to ensure continued and resilient provisioning of essential ecosystem services that provide adaptation and disaster risk functions. There are seven key principles in applying resilience thinking, distilled from a comprehensive review of social and ecological factors that enhance the resilience of social-ecological systems and the ecosystem services they provide (Stockholm Resilience Centre 2014):

1. Maintain diversity and redundancy, for example, by maintaining biological and ecological diversity. Redundancy is the presence of multiple components that can perform the same function, and can provide ‘insurance’ within a system by allowing some components to compensate for the loss or failure of others.
2. Manage connectivity (the structure and strength with which resources, species or actors disperse, migrate or interact across patches, habitats or social domains in a social-ecological system), e.g. by enhancing landscape connectivity to support biodiversity and ecosystem services that contribute to adaptation and risk reduction.
3. Manage slowly changing variables and feedbacks (two-way ‘connectors’ between variables that can either reinforce (positive feedback) or dampen (negative feedback) change).
4. Foster complex adaptive systems thinking by adopting a systems framework approach (Step A).
5. Encourage learning such as by exploring different and effective modalities for communications.
6. Broaden participation, such as by dedicating resources to enable effective participation.
7. Promote polycentric governance systems, including through multi-institutional cooperation across scales and cultures.



Table 11 Step E Toolbox: Project design and implementation

Tool/Organization	Description
Implementing nature-based flood protection: Principles and implementation guidance (World Bank)	Guidelines including principles and implementation steps for ecosystem-based flood protection. documents.worldbank.org/curated/en/739421509427698706/Implementing-nature-based-flood-protection-principles-and-implementation-guidance
Water in drylands: Adapting to scarcity through integrated management (IUCN)	Guidelines for integrated water resources and management in drylands ecosystems. portals.iucn.org/library/de/46239
Protected Areas as tools for disaster risk reduction: a handbook for practitioners (IUCN)	Guidelines on using protected areas as effective buffers to prevent natural hazards from becoming disasters. www.iucn.org/content/protected-areas-tools-disaster-risk-reduction-handbook-practitioners
Safe Havens: Protected Areas for Disaster Risk Reduction and Climate Change Adaptation (IUCN)	18 case studies to demonstrate how protected areas can be better managed for disaster risk reduction and climate change adaptation. www.iucn.org/sites/dev/files/2014-038.pdf
Restoring River Continuity: methods and challenges (Wetlands International – European Association and the Italian Center for River Restoration)	Webinars explaining methods and challenges of river restoration with a specific focus on improving river connectivity. europe.wetlands.org/event/rivers
Climate Change Adaptation for World Heritage Sites: A Practical Guide (UNESCO)	Guidelines and framework for assessing risk to World Heritage sites and to features that contribute to their Outstanding Universal Value (OUV). Provides information on the identification and selection of options for adaptation and DRR. whc.unesco.org/en/series
Building with Nature and hybrid approaches (Ecoshape)	Guidelines on how to introduce and integrate Building with Nature principles into water infrastructure development. www.ecoshape.org/en/design-guidelines/ and https://publicwiki.deltares.nl/display/BWN1/Guideline
Mainstreaming Climate-Smart Agriculture into a Broader Landscape Approach (FAO)	Guidance on understanding the different options that are available for planning, policies and investments and the practices that are suitable for making different agricultural sectors, landscapes and food systems more climate-smart. www.fao.org/3/a-i3325e.pdf
CBD Decision XIII/5: Ecosystem restoration: short-term action plan	Principles and key activities for short-term action plans on ecosystem restoration. www.cbd.int/doc/decisions/cop-13/cop-13-dec-05-en.pdf
Gender, Climate Change and Community-Based Adaptation (UNDP)	Guidebook for designing and implementing gender-sensitive community-based adaptation programmes and projects. www.undp.org/content/undp/en/home/librarypage/environment-energy/climate_change/gender/gender-climate-change-and-community-based-adaptation-guidebook-.html
Pacific Gender and Climate Change Toolkit: Tools for Practitioners	Toolkit designed to support climate change practitioners working in national governments, non-governmental organizations, regional and international organizations, integrate gender into all aspects of policy, programming and project work. www.pacificclimatechange.net/sites/default/files/documents/Pacific_gender_toolkit_full_version.pdf

Tool/Organization	Description
Making Ecosystem-based Adaptation Effective: A Framework for Defining Qualification Criteria and Quality Standards (FEBA)	<p>Practical assessment framework for designing, implementing and monitoring EbA measures by proposing a set of elements, qualification criteria and quality standards and example indicators.</p> <p>EN: www.adaptationcommunity.net/download/ecosystem-based_adaptation/technical_paper/FEBA_EbA_Qualification_and_Quality_Criteria_EN.pdf</p> <p>SP: www.adaptationcommunity.net/download/ecosystem-based_adaptation/technical_paper/FEBA_EbA_Qualification_and_Quality_Criteria_ES.pdf</p> <p>FR: www.adaptationcommunity.net/wp-content/uploads/2017/07/FEBA_EbA_Qualification_and_Quality_Criteria_FR.pdf</p>
EbA Finance Guidebook (GIZ)	<p>Provides practical information on potential funding sources for EbA measures from public and private actors by a collection of country examples. www.adaptationcommunity.net</p>
Exploring nature-based solutions: The role of green infrastructure in mitigating the impacts of weather- and climate change-related natural hazards (European Environment Agency)	<p>Report focusing on extreme events and natural hazards at the European scale that are projected to increase due to climate change, such as landslides, avalanches, floods and storm surges. In addition, the report also touches upon the green infrastructure and ecosystem services contributing to global climate regulation. The analysis is carried out using spatially explicit data centred on the physical capacity of ecosystems to deliver services that can mitigate natural hazard risks. www.eea.europa.eu/publications/exploring-nature-based-solutions-2014</p>
AdaptationCommunity.net	<p>On-line platform for sharing information on applying approaches, methods and tools that facilitate the planning and implementation of adaptation action. www.adaptationCommunity.net</p>
A Community of Practice for EbA on YouTube (adaptationcommunity.net)	<p>A YouTube channel providing regular information from practitioners, experts, planners and decision makers on EbA related topics, such as broadcasted webinars. www.youtube.com/channel/UCb_x4rPctuGm-FOLjHdSIN8Q</p>
Ecosystem-based disaster risk reduction in Japan	<p>Introduces the basic concepts of Eco-DRR and important points for the design and implementation of EbA and Eco-DRR projects. www.env.go.jp/nature/biodic/eco-drr/pamph04.pdf</p>
Green infrastructure: guide for water management (UNEP)	<p>A guide that provides examples of Green Infrastructure options that address water management challenges while delivering a number of significant co-benefits. web.unep.org/ecosystems/resources/publications/greeninfrastructure-guide-water-management</p>

Step F Monitoring and Evaluation of EbA and Eco-DRR

Purpose

Monitoring and Evaluation (M&E) of EbA and Eco-DRR are critical for assessing progress and efficiency and effectiveness of interventions. Monitoring enables adaptive management and is ideally carried out throughout the lifetime of the intervention. Evaluation assesses an ongoing or completed project, programme or policy, its design, implementation and results. M&E can encourage continual learning to help inform future policy and practice and make corresponding adjustments.

There is a movement towards integrating approaches for M&E from both adaptation and disaster risk reduction fields. A myriad of approaches and frameworks have been developed, including logical frameworks and results-based management. Key actions and considerations related to M&E are outlined below.⁸³ Tools associated with this step are available in the Step E Toolbox: Monitoring and evaluation of EbA and Eco-DRR.

Outcome

A monitoring and evaluation framework that is realistic, operative and iterative, including a protocol for data collection and evaluation, and information generated on outcomes and impacts of interventions.

Key Actions

- a. Set up an M&E framework, establishing its objectives, audience (who uses the information from an M&E assessment), data collection, mode of dissemination of information, and available technical and financial capacity;
- b. Develop a results/outcomes framework within the M&E framework that details the expected

effects of the EbA and Eco-DRR intervention, including short- and medium-term outcomes and long-term results;

- c. Develop indicators at the appropriate temporal and spatial scales to monitor the quantity and quality of change:
 - i. Ensure that monitoring and evaluation include indicators⁸⁴ formulated to the SMART criteria, which are Specific, Measurable, Achievable and Attributable, Relevant and Realistic, Time-bound, Timely, Trackable and Targeted and/or the ADAPT principles (Adaptive, Dynamic, Active, Participatory, Thorough);
 - ii. Ensure that indicators are vulnerability- and risk-oriented and focused, and that they are able to measure high risks versus low risks and how EbA and Eco-DRR interventions reduce risk over time. It is important to define “risk layers” and to prioritize which risks should be measured using indicators;
 - iii. Use targets and indicators under the Sustainable Development Goals, Aichi Biodiversity Targets and other relevant frameworks to track progress in sustainable ecosystem management and biodiversity enhancement, which also deliver towards strengthening resilience to climate change impacts and disasters;
 - iv. Align indicators with existing M&E frameworks where possible;
- d. Determine baselines for assessing effectiveness;
- e. Use appropriate participatory and inclusive tools for monitoring and evaluation of EbA and Eco-DRR, ensuring the engagement of local communities, stakeholders and rights holders. Ensure the relevant experts are engaged, such as specialists on ecosystems/species status, and ecosystem function;
- f. Test EbA and Eco-DRR related indicators for local relevance.

⁸³ Several of the key actions and considerations are based on the M&E Learning Brief (in development), to be published in 2018 by Deutsche Gesellschaft für Internationale Zusammenarbeit.

⁸⁴ More information on indicators is available through the CBD website (www.cbd.int/indicators/default.shtml) and in the IPCC Fifth Assessment Report (see www.ipcc.ch/report/ar5)

Table 12 Step F Toolbox: Monitoring and Evaluation

Tool/Organization	Description
Monitoring and evaluating ecosystem-based adaptation (EbA) – A guidebook (GIZ)	Step-by-step practical guidance on the development and implementation of an M&E system for EbA on multiple scales. The guidebook enables EbA projects operating at a local and community level to connect with EbA policies and programmes generated at regional and national levels and demonstrates the benefits of EbA and how effective M&E can strengthen the case for its inclusion in strategies for responding to the impacts of climate change. www.adaptationcommunity.net/publications
Monitoring and Evaluation Learning Brief: How to measure successes of ecosystem-based adaptation (GIZ)	Experiences from practitioners on how to set up M&E systems and indicators for monitoring and evaluating adaptation results and linking EbA-specific M&E to other monitoring and reporting systems. www.adaptationcommunity.net/wp-content/uploads/2018/01/giz2017-en-learning-brief-measuring-success-eba-low-res.pdf
Climate Change Policy Brief: Adaptation metrics and the Paris Agreement (GIZ)	Policy brief examining the feasibility and practicability of a set of common global adaptation indicators and their use in the context of the Paris Agreement, looking at the different purposes of applying adaptation metrics and providing recommendations for their targeted use. www.adaptationcommunity.net/wp-content/uploads/2017/11/giz2017-en-policy-brief-adaptation-metrics.pdf
AdaptMe: Adaptation Monitoring and Evaluation Toolkit (European Climate Adaptation Platform)	Enables users to think through some of the factors that can make an evaluation of adaptation activities inherently challenging, and guide the design of a robust evaluation. www.ukcip.org.uk/wp-content/PDFs/UKCIP-AdaptME.pdf
Summary of tools for monitoring and evaluating adaptation activities (DEA and SANBI)	Table of tools and approaches for conducting monitoring and evaluation of adaptation activities, including compatibilities with EbA. www.sanbi.org/wp-content/uploads/2018/03/final-guidelines-ecosystem-based-adaptation-eba-south-africa.pdf
Toolkit for the Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes (UNU, Biodiversity International, UNDP, IGES)	Provides practical guidance for making use of Indicators of Resilience in Socio-ecological Production Landscapes and Seascapes in the field, for engaging local communities in adaptive management of the landscapes and seascapes in which they live. collections.unu.edu/eserv/UNU:5435/Toolkit for the Indicators of Resilience.pdf
Integrating ecosystems in resilience practice: Criteria for Ecosystem-Smart Disaster Risk Reduction and Climate Change Adaptation (Wetlands International)	Introduces a set of criteria and steps to develop an ‘ecosystem-smart’ approach in the design, implementation and evaluation of risk reduction programmes, and guidance on the required capacities, partnerships, institutional set-up and planning needs. www.wetlands.org/publications/integrating-ecosystems-in-resilience-practice-criteria-for-ecosystem-smart-disaster-risk-reduction-and-climate-change-adaptation

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Annexes

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Annex I Glossary⁸⁵

Term	Definition/description and source
Adaptation	In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate. (IPCC).
Adaptive capacity	<p>The combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities. (IPCC).</p> <p>Builds the capacity of people to adapt to climate change impacts through maintaining and enhancing their asset/capital sets, addressing entitlements, encouraging innovation, giving greater access to information, establishing flexible governance/decision-making, related to biodiversity and ecosystem services. (IUCN).</p>
Agroforestry	The practice of integrating trees into agriculturally productive landscapes. (World Agroforestry Centre).
Biological diversity	The variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems. (CBD).
Building with Nature	A new approach to hydraulic engineering that uses the forces of nature to benefit environment, economy and society. (Ecoshape).
Capacity	The combination of all the strengths, attributes, and resources available to an individual, community, society, or organization, which can be used to achieve established goals. (IPCC).
Climate change	A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or in land use. (IPCC).
Climate change adaptation	The process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects. (IPCC AR5).
Climate extreme	The occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. For simplicity, both extreme weather events and extreme climate events are referred to collectively as “climate extremes”. (IPCC).
Climate risk management	An integrated approach that advances climate-sensitive decision-making. It focuses on development outcomes that are dependent on climatic conditions, such as in agriculture, water resources, food security, health, the environment, urbanism and livelihoods. (UNDP).
Climate-smart agriculture	CSA contributes to the achievement of sustainable development goals. It integrates the three dimensions of sustainable development (economic, social and environmental) by jointly addressing food security and climate challenges. It is composed of three main pillars: <ol style="list-style-type: none"> 1) sustainably increasing agricultural productivity and incomes; 2) adapting and building resilience to climate change; 3) reducing and/or removing greenhouse gases emissions, where possible. (FAO).
Community-based adaptation	A community-led process, based on communities’ priorities, needs, knowledge and capacities, which should empower people to plan for and cope with the impacts of climate change. (IIED).
Community-based natural resource and risk management	An approach that combines the sustainable management of natural resources and risks in a given area. It combines the concept of “co-management” of natural resources with community-based disaster risk reduction.

⁸⁵ Updated from CBD Technical Series No. 85 (Lo 2016)

Desertification	Defined as land degradation in drylands, leading to a condition of significantly reduced fertility and water holding capacity. Desertification is a reversible condition of the earth's surface, as opposed to aridity, which is a climatic condition. (UNCCD).
Disaster	<p>A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources. (UNISDR)</p> <p>Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery. (IPCC).</p>
Disaster risk	The likelihood over a specified time period of severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery. (IPCC).
Disaster risk management	Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development. (IPCC).
Disaster risk reduction	<p>Denotes both a policy goal or objective, and the strategic and instrumental measures employed for anticipating future disaster risk; reducing existing exposure, hazard, or vulnerability; and improving resilience. (IPCC).</p> <p>The concept and practice of reducing disaster risks through systematic efforts to analyse and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events. (UNISDR 2009, p. 10-11).</p>
Drought	A period of abnormally dry weather long enough to cause a serious hydrological imbalance. Drought is a relative term, therefore any discussion in terms of precipitation deficit must refer to the particular precipitation-related activity that is under discussion. For example, shortage of precipitation during the growing season impinges on crop production or ecosystem function in general (also termed agricultural drought), and during the runoff and percolation season primarily affects water supplies (hydrological drought). A megadrought is a very lengthy and pervasive drought, lasting much longer than normal, usually a decade or more. (IPCC).
Ecosystem approach	Strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. (CBD).
Ecosystem-based adaptation	<p>Incorporates biodiversity and ecosystem services into an overall adaptation strategy to help people to adapt to the adverse effects of climate change. (CBD).</p> <p>Uses biodiversity and ecosystem services as part of an overall adaptation strategy to help people and communities adapt to the negative effects of climate change at local, national, regional and global levels. (UNEP).</p> <p>Any initiative that reduces human vulnerabilities and enhances adaptive capacity in the context of existing or projected climate variability and changes through sustainable management, conservation and restoration of ecosystems. (IUCN).</p>
Ecosystem-based disaster risk reduction	<p>Sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development. (Estrella and Saalismaa 2013).</p> <p>Decision-making activities that take into consideration current and future human livelihood needs and bio-physical requirements of ecosystems, and recognize the role of ecosystems in supporting communities to prepare for, cope with and recover from disaster situations. Sustainable ecosystem management for disaster risk reduction is based on equitable stakeholder involvement in land management decisions, land-use-trade-offs and long-term goal setting. (IUCN).</p>

Ecosystem function	The flow of energy and materials through the biotic and abiotic components of an ecosystem. It includes many processes such as biomass production, trophic transfer through plants and animals, nutrient cycling, water dynamics and heat transfer. (IPBES, adapted from www.ecosystemserviceseq.com.au/ecosystem-functions.html).
Ecosystem health	Ecosystem health is a metaphor used to describe the condition of an ecosystem, by analogy with human health. Note that there is no universally accepted benchmark for a healthy ecosystem. Rather, the apparent health status of an ecosystem can vary, depending upon which metrics are employed in judging it, and which societal aspirations are driving the assessment. (IPBES).
Ecosystem services	The benefits people obtain from ecosystems, which have been classified by the Millennium Ecosystem Assessment as: <i>Provisioning</i> services, such as supply of food, fibre, timber and water; regulating services, such as carbon sequestration, climate <i>regulation</i> , water regulation and filtration, and pest control; <i>cultural</i> services, such as recreational experiences, education and spiritual enrichment and <i>supporting</i> services, such as seed dispersal and soil formation. (Millennium Ecosystem Assessment 2005).
Exposure	The presence of people; livelihoods; species or ecosystems, environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected. (IPCC).
Extreme weather	See “Climate extreme”
Evaluation	The systematic and objective assessment of an ongoing or completed project, programme or policy, its design, implementation and results. An evaluation should also assess the effects of any positive or negative changes in the developmental and environmental context of an EbA measure. (GIZ).
Flood	The overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas that are not normally submerged. Floods include river (fluvial) floods, flash floods, urban floods, pluvial floods, sewer floods, coastal floods, and glacial lake outburst floods. (IPCC).
Food security	Occurs when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preference for an active and healthy life (FAO). Household level food security is complex, trans-boundary and multifaceted including biophysical, socio-economic, political, demographic, gender and other dimensions. In general, three key indicators are used to measure the level of food insecurity, namely: availability, access and utilization. (UNCCD).
Gender analysis	A gender analysis examines how gender relations affect different problems and proposed solutions. It involves assessing gender norms, roles and relations in order to establish a baseline with regard to gender differences and to expose where there is gender inequality.
Gender equality	Gender equality refers to equal rights, responsibilities and opportunities for women and men. Achieving gender equality means ensuring that individuals’ choices, options and autonomy are not constrained because of their gender. Gender equality implies that women and men, in their differences and similarities, are equally valued and respected by the society they live in.
Gender mainstreaming	Gender mainstreaming is a globally recognized strategy for making women’s as well as men’s concerns and experiences an integral dimension of the design, implementation, monitoring, and evaluation of policies and programmes in all political, economic, and societal spheres. This is to ensure that women and men benefit equally from processes of development, and that inequality is not perpetuated.
Green infrastructure	Green infrastructure a strategically planned network of natural and semi-natural areas with other environmental features designed and managed to deliver a wide range of ecosystem services. It incorporates green spaces (or blue if aquatic ecosystems are concerned) and other physical features in terrestrial (including coastal) and marine areas. On land, green infrastructure is present in rural and urban settings. (European Commission).
Hazard	The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources. (IPCC).

Impacts	Impacts generally refer to effects on lives, livelihoods, health, ecosystems, economies, societies, cultures, services, and infrastructure due to the interaction of climate changes or hazardous climate events occurring within a specific time period and the vulnerability of an exposed society or system. Impacts are also referred to as <i>consequences</i> and <i>outcomes</i> . The impacts of climate change on geophysical systems, including floods, droughts, and sea level rise, are a subset of impacts called physical impacts. (IPCC 2014).
Incremental adaptation	Refers to actions where the central aim is to maintain the essence and integrity of the existing technological, institutional, governance, and value systems, such as through adjustments to cropping systems via new varieties, changing planting times, or using more efficient irrigation.
Integrated Risk Management	Integrating Disaster Risk Reduction (DRR), Ecosystem Management and restoration (EMR) and Climate Change Adaptation (CCA) to strengthen and protect livelihoods of vulnerable communities, as applied by Partners for Resilience.
Integrated water resource management	A process that promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. (GWP 2000).
Landscape	Landscapes are distinct geographical areas or properties uniquely representing the combined work of nature and of man, illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal. (World Heritage Committee).
Landslide	A mass of material that has moved downhill by gravity, often assisted by water when the material is saturated. The movement of soil, rock, or debris down a slope can occur rapidly, or may involve slow, gradual failure. (IPCC).
Land use planning	Land-use planning means the systematic assessment of physical, social and economic factors in such a way as to encourage and assist land users in selecting options that increase their productivity, are sustainable and meet the needs of society. (FAO).
Least developed country	A country that exhibits the lowest indicators of socioeconomic development, with the lowest Human Development Index ratings of all countries in the world.
Low-regrets adaptation options	Low-regrets adaptation options are those actions that could potentially deliver net socio-economic benefits to local communities and ecosystems whatever the extent of future climate change. The low-regrets approach is an important part of EbA and focuses on maximizing positive and minimizing negative aspects of nature-based adaptation strategies and options. (definition adapted from a joint UNEP-UNDP-IUCN working definition of “no-regrets” adaptation).
Maladaptation	An action or process that increases vulnerability to climate change-related hazards. Maladaptive actions and processes often include planned development policies and measures that deliver short-term gains or economic benefits but lead to exacerbated vulnerability in the medium to long-term (UNDP). Maladaptation can also include trade-offs or benefiting one group at the expense of another.
Mitigation (of climate change)	A human intervention to reduce the sources or enhance the sinks of greenhouse gases. (IPCC).
Mitigation (of disaster risk and disaster)	The lessening of the potential adverse impacts of physical hazards (including those that are human-induced) through actions that reduce hazard, exposure, and vulnerability. (IPCC).
Monitoring	Systematically collecting and documenting data on specified indicators with the aim of tracking change. This enables planners and practitioners to improve adaptation efforts by adjusting processes and targets, and can be carried out during implementation throughout the lifetime of the adaptation/risk reduction intervention. (UNFCCC).
Multi-criteria analysis	A structured approach used to determine overall preferences among different alternative options, where the options accomplish several objectives that may not always complement one another. In MCA, desired objectives are specified and corresponding attributes or indicators are identified. The measurement of these indicators is often based on a quantitative analysis (through scoring, ranking, and weighting) of a wide range of qualitative impact categories and criteria.

Nairobi work programme (UNFCCC)	A mechanism under the UNFCCC to facilitate and catalyse the development and dissemination of information and knowledge that would inform and support adaptation policies and practices. Its implementation has been coordinated by the SBSTA, under the guidance of the Chair of the SBSTA and with assistance from the secretariat, and with contributions from Parties and other adaptation stakeholders. Through its diverse range of modalities, the Nairobi work programme provides unique opportunities for linking relevant institutions, processes, resources and expertise outside the Convention to respond to adaptation knowledge needs arising from the implementation of the various workstreams under the Convention and identified by Parties.
National adaptation plan (UNFCCC)	Established under the Cancun Adaptation Framework, the NAP provides Parties to the UNFCCC with the means of identifying medium- and long-term adaptation needs and developing and implementing strategies and programmes to address those needs.
National biodiversity strategy and action plan (CBD)	The principal instruments for implementing the CBD at the national level (Article 6). The Convention requires countries to prepare a national biodiversity strategy and action plan (or equivalent instrument) and to ensure that this strategy is mainstreamed into the planning and activities of all those sectors whose activities can have an impact (positive and negative) on biodiversity.
National report (CBD)	National reports provide information on measures taken for the implementation of the CBD, and their effectiveness. Parties submitted their fifth national reports in response to decision X/10 of the Conference of the Parties (COP) to the CBD.
Nature-based Solutions	Actions to protect, sustainably manage and restore natural or modified ecosystems, which address societal challenges (e.g. climate change, food and water security or natural disasters) effectively and adaptively, while simultaneously providing human well-being and biodiversity benefits. (IUCN).
Precautionary approach	The precautionary approach is Principle 15 of the Rio Declaration on Environment and Development, adopted by the United Nations Conference on Environment and Development in Rio de Janeiro (1992). It states that: “In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.”
Preparedness	The knowledge and capacities developed by governments, professional response and recovery organizations, communities and individuals to effectively anticipate, respond to, and recover from, the impacts of likely, imminent or current hazard events or conditions. (UNISDR).
Recovery	The restoration, and improvement where appropriate, of facilities, livelihoods and living conditions of disaster-affected communities, including efforts to reduce disaster risk factors. (UNISDR).
Resilience	The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions. (IPCC).
Risk	The combination of the probability of an event and its negative consequences (UNISDR). Risk is commonly expressed as a function of exposure, the conditions of vulnerability that are present, and the magnitude and frequency of a hazard event. (Sudmeier-Rieux 2013).
Social-ecological system	A coupled system of humans and nature that constitutes a complex adaptive system with ecological and social components that interact dynamically through various feedbacks. (Stockholm Resilience Centre).
Spatial planning	A method used to influence the future distribution of activities in space (European Commission). Spatial planning is critical for delivering economic, social, and environmental benefits by creating more stable and predictable conditions for investment and development, by securing community benefits from development, and by promoting prudent use of land and natural resources for development. (WWF).

Storm surge	The temporary increase, at a particular locality, in the height of the sea due to extreme meteorological conditions (low atmospheric pressure and/or strong winds). The storm surge is defined as being the excess above the level expected from the tidal variation alone at that time and place. (IPCC).
Sustainable land and water management	The adoption of land use systems that, through appropriate management practices, enables land users to maximize the economic and social benefits from the land while maintaining or enhancing the ecological support functions of the land resources. SLWM includes management of soil, water, vegetation and animal resources. It involves a holistic approach that integrates social, economic, physical and biological assets. SLWM encompass other approaches such as integrated natural resource management, integrated water resource management, eco-agriculture and sustainable forest management (SFM), and many facets of sustainable agriculture. (GEF 2011).
Synergies	Linking processes in a way that increases the effects of the sum of the joint activities beyond the sum of individual activities, and thus making efforts more effective and efficient.
Theory of Change	Process of project planning and evaluation which maps the relationship between a long-term goal of a project and the intermediate and early changes that are required to bring it about. The approach emphasizes the theory and assumptions underlying the pathway of change from the implementation of selected interventions and activities to intended outcomes. (Conservation International).
Transformational adaptation	Seeks to change the fundamental attributes of systems in response to actual or expected climate and its effects, often at a scale and ambition greater than incremental activities. It includes changes in activities, such as changing livelihoods from cropping to livestock or by migrating to take up a livelihood elsewhere, and also changes in our perceptions and paradigms about the nature of climate change, adaptation, and their relationship to other natural and human systems. (IPCC AR5).
Vulnerability	<p>The propensity or predisposition to be adversely affected. Vulnerability encompasses a variety of concepts including sensitivity or susceptibility to harm and lack of capacity to cope and adapt. (IPCC AR5).</p> <p>The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard. (UNISDR).</p>
Women's empowerment	Women's empowerment is the process of supporting women in gaining more control over their own lives: it involves support at the personal level, such as self-esteem and awareness development, in conjunction with measures to help women challenge the broader barriers to their autonomy, such as gender-discriminatory laws and cultural practices.

Annex II Policy instruments and frameworks related to EbA and Eco-DRR

Framework	Policy Instrument	Description
CBD Strategic Plan for Biodiversity 2011-2020	Strategic Goal B <i>Reduce direct pressures on biodiversity and promote sustainable use</i>	Target 5: Rate of loss of all natural habitats halved; Target 7: Areas under agriculture, aquaculture and forestry are managed sustainably including biodiversity conservation; Target 10: Multiple anthropogenic pressures on coral reefs and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized to maintain integrity and functioning.
	Strategic Goal C <i>Improve status of biodiversity by safeguarding ecosystems, species and genetic diversity</i>	Target 11: Protected areas – terrestrial, inland water, coastal and marine water landscapes and seascapes; Target 13: Genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained.
	Strategic Goal D <i>Enhance the benefits to all from biodiversity and ecosystem services</i>	Target 14: Ecosystems that provide essential services including water and that contribute to health livelihoods and well-being are restored and safeguarded; Target 15: Ecosystem resilience and contribution of biodiversity to carbon stocks enhanced, including restoration of degraded ecosystems, mitigation, adaptation, and desertification.
Sustainable Development Goals	SDG 13: Take urgent action to combat climate change and its impacts	<ul style="list-style-type: none"> • Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries; • Integrate climate change measures into national policies, strategies and planning.
	SDG 6: Ensure access to water and sanitation for all	<ul style="list-style-type: none"> • Achieve universal and equitable access to safe and affordable drinking water for all; • Implement integrated water resources management at all levels, including through transboundary cooperation as appropriate; • Protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.
	SDG 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture	<ul style="list-style-type: none"> • Ensure sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to climate change, extreme weather, drought, flooding and other disasters and that progressively improve land and soil quality.
	SDG 1: End poverty in all its forms everywhere	<ul style="list-style-type: none"> • Build the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.
	SDG 3: Ensure healthy lives and well-being for all at all ages	<ul style="list-style-type: none"> • Strengthen the capacity of all countries, in particular developing countries, for early warning, risk reduction and management of national and global health risks.
	SDG 11: Make cities inclusive, safe, resilient, and sustainable	<ul style="list-style-type: none"> • Substantially increase the number of cities and human settlements adopting and implementing integrated policies and plans towards inclusion, resource efficiency, mitigation and adaptation to climate change, resilience to disasters, and develop and implement, in line with the Sendai Framework.

Framework	Policy Instrument	Description
	SDG 14 : Conserve and sustainably use the oceans, seas and marine resources	<ul style="list-style-type: none"> • Sustainably manage and protect marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans.
	SDG 15 : Sustainably manage forests, combat desertification, halt and reverse land degradation, halt biodiversity loss	<ul style="list-style-type: none"> • Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements.
Sendai Framework	Prioritizes ecosystem-based approaches to build resilience and reduce disaster risk	<ul style="list-style-type: none"> • Priority Action 1: The role of ecosystems will need to be taken into account in disaster risk assessments; • Priority Action 2: Strengthening risk governance; • Priority Action 3: Strengthen investments in disaster resilience.
Paris Agreement	Parties established the global goal on adaptation of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change, with a view to contributing to sustainable development (Article 7, paragraph 1)	<p>Preamble:</p> <ul style="list-style-type: none"> • Recognizing the importance of the conservation and enhancement, as appropriate, of sinks and reservoirs of the greenhouse gases referred to in the Convention; • Noting the importance of ensuring the integrity of all ecosystems, including oceans, and the protection of biodiversity, recognized by some cultures as Mother Earth, and noting the importance for some of the concept of “climate justice”, when taking action to address climate change. <p>Article 7, paragraph 2:</p> <ul style="list-style-type: none"> • Parties recognize that adaptation is a global challenge faced by all with local, subnational, national, regional and international dimensions, and that it is a key component of and makes a contribution to the long-term global response to climate change to protect people, livelihoods and ecosystems, taking into account the urgent and immediate needs of those developing country Parties that are particularly vulnerable to the adverse effects of climate change. <p>Article 7, paragraph 5:</p> <ul style="list-style-type: none"> • Parties acknowledge that adaptation action should follow a country-driven, gender-responsive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities and ecosystems, and should be based on and guided by the best available science and, as appropriate, traditional knowledge, knowledge of indigenous peoples and local knowledge systems, with a view to integrating adaptation into relevant socioeconomic and environmental policies and actions, where appropriate.
CBD Decisions	X/33	The Conference of the Parties called for implementation of ecosystem-based approaches for adaptation, including sustainable management, conservation and restoration of ecosystems.
	XII/20	Calls on governments and other relevant organizations to promote EbA and Eco-DRR approaches and integrate these into their respective policies and programmes on Biodiversity and Climate Change and DRR, recognizing that while biodiversity and ecosystems are vulnerable to climate change, the conservation and sustainable use of biodiversity and restoration of ecosystems can play a significant role in climate change mitigation and adaptation, combating desertification and disaster risk reduction.
UNFCCC Cancun Adaptation Framework	National Adaptation Plans (NAPs)	Enables Parties to formulate and implement national adaptation plans as a means of identifying medium- and long-term adaptation needs and developing and implementing strategies and programmes to address those needs.

Framework	Policy Instrument	Description
CBD Article 6	National Biodiversity Strategies and Action Plans (NBSAPs)	Urges Parties and other governments to use revised and updated NBSAPs as instruments for the integration of biodiversity targets into national development and poverty reduction policies and strategies, economic sectors and spatial planning processes (decision X/2). Parties were also invited to integrate ecosystem-based approaches for adaptation into relevant strategies, including adaptation strategies and plans, national action plans to combat desertification, NBSAPs, poverty reduction strategies, disaster risk reduction strategies and sustainable land management strategies (decision X/33).
UNCCD Decisions	Land degradation neutrality (LDN) target	The amount of healthy and productive land should stay stable starting in 2030. Parties also agreed to develop indicators for measuring progress in LDN and for enhancing land resilience to climate change and halting biodiversity loss linked to ecosystem degradation.
Ramsar Convention Resolutions	Resolution XII.13 on Wetlands and Disaster Risk Reduction	Encourages Parties to integrate wetland-based disaster risk management and climate change adaptation into development policies and planning at all levels of government, including in vulnerability analysis, poverty reduction strategies and natural resource management plans (including land-use and water-use plans) and sectors, and in multi-sector policies and plans.
	Resolution VIII.35 The Impact of natural disasters, particularly drought, on ecosystems	Encourages Parties with Ramsar sites affected by drought or other natural disasters to use the mechanisms and benefits of the Montreux Record by placing such sites that are in need of priority conservation action on the Record and, as appropriate, seeking national and international assistance to support their conservation action.
	Draft resolution on cultural values, local communities and climate change mitigation and adaptation in wetlands	Encourages integrating wetland cultural services into all relevant national and regional policies, including in Poverty Reduction Strategies, National Climate Change Strategies, Sustainable Development Goals.
	Draft resolution on the rapid assessment of wetland ecosystem services	Encourages the application of the Rapid Assessment of Wetland Ecosystem Services in order to assess ecosystem services, contribute to the description of the ecological character of Ramsar Sites, and ensure the maintenance of these services in their management processes, acknowledging that the important ecosystem services that wetlands provide have direct relevance to the achievement of the Sustainable Development Goals including those related to the reduction of natural disasters and adaptation to climate change, biodiversity and sustainable use of ecosystems.
Ramsar Convention Policy Brief	Wetlands for disaster risk reduction: Effective choices or resilient communities	<ul style="list-style-type: none"> • Wetlands and the benefits they provide should be considered in disaster risk assessments and their impacts should be considered across entire river basins or coastal zones rather than just political and administrative boundaries; • Development planning and land use changes should be considered when assessing disaster risk patterns and wetland degradation; and • Rapid environmental assessments conducted after a disaster should consider options for wetland restoration as a contribution to wetland recovery.

Annex III Existing guidelines and principles considered for the development of the report

Guidelines	Description/Aims	Target Audience
Principles and Guidelines for Integrating Ecosystem-based Approaches to Adaptation in Project and Policy Design (Andrade et al. 2011)	Set of draft principles and guidelines to act as a foundation for planning and implementing EbA.	Planners/ implementers; Financial institutions
EbA Decision Support Framework: From Principles to Practice (UNEP 2012)	Framework includes setting adaptive context, selecting adaptation options, designing for change, and adaptive implementation.	Mid-level decision-makers and planners at national / local level
Operational Guidelines on EbA (GEF 2012)	Aimed at clarifying criteria for EbA projects and at providing practical, operational advice; guidelines also complement review criteria applied to projects and programmes submitted for funding approval.	EbA implementing agencies, executing agencies and project proponents seeking LDCF and SCCF funding
Operational Framework for Ecosystem-based Adaptation (WWF 2013)	Framework aims to provide robust and detailed guidance for planning, assessment and implementation of EbA measures. Vulnerability-based, begins with vulnerability assessment of social-ecological systems, then identification and prioritization of options, implementation, and mainstreaming EbA into national policies and programmes.	Decision-makers involved in subnational decision making
Advancing Implementation of the Sendai Framework for Disaster Risk Reduction (2015-2030) through Ecosystem Solution (PEDRR 2016)	Highlights opportunities for implementing integrated ecosystem management and risk reduction strategies in countries and communities, and outlines a roadmap for advancing implementation of the SFDRR through Eco-DRR/CCA and reflects on the scope for promoting Eco-DRR/CCA as an integrated strategy that delivers across the 2030 Sustainable Development Agenda.	Policymakers, implementers
A Landscape Approach for Disaster Risk Reduction in 7 steps (CARE Netherlands and Wetlands International 2017)	Synthesises the main characteristics of the landscape approach and suggests seven steps when adopting a landscape approach. Although this paper focuses specifically on disaster risk reduction to help increase community resilience, the landscape approach is applicable to other types of programming.	Policymakers, implementers
Guidelines for EbA in South Africa (Republic of South Africa, in draft 2017)	Outlines actions for identifying, developing and implementing EbA and defines EbA cornerstones, high-level principles, criteria, and safeguards.	Practitioners, funders, researchers, policymakers
EbA: Question-based guidance for assessing effectiveness (Reid et al. 2017)	Describes a process, based around asking a detailed set of questions, that can be used by project managers and researchers to shape project design, assess progress, or draw conclusions effectiveness.	Project managers, researchers

Guidelines	Description/Aims	Target Audience
Ethical Principles on Disaster Risk Reduction and People's Resilience (Prieur 2012)	European and Mediterranean Ethics Charter on resilience to major disasters, approved by the Council of Europe, with the aim to improve preparedness and deal with ethical problems concerning victims of disasters.	Policymakers
Making Ecosystem-based Adaptation Effective: A Framework for Defining Qualification Criteria and Quality Standards (FEBA technical paper developed for UNFCCC-SBSTA 46) (FEBA 2017)	Practical assessment framework for designing, implementing and monitoring EbA measures by proposing a set of elements, qualification criteria and quality standards and example indicators.	Policymakers and practitioners
Implementing nature-based flood protection: Principles and implementation guidance. (World Bank 2017)	Present five principles and implementation guidance for planning, such as evaluation, design, and implementation of nature-based solutions for flood risk management as an alternative to or complementary to conventional engineering measures.	Professionals in risk management and climate adaptation, NGOs, donors, and international organizations.
Nature-based Solutions to address global societal challenges (Cohen-Sham et al. 2017)	Proposes a definitional framework for nature-based solutions (NbS), which includes EbA and Eco-DRR. The report includes a set of general principles for any NbS intervention and considers several potential parameters that can be used to build an operational framework, on the basis of which the efficiency, effectiveness and sustainability of NbS interventions can be systematically assessed.	Conservation and development practitioners, policymakers and researchers, as well as civil society organizations.
Ecoshape Building with Nature design guideline www.ecoshape.org/en/design-guidelines	Aims to give guidance on how to introduce and integrate Building with Nature into water infrastructure developments, including the Building with Nature principles and the five general design steps that are involved.	Contractors, engineering companies, research institutions, governments and NGOs
When not every response to climate change is a good one: Identifying principles for sustainable adaptation (Eriksen et al. 2011)	Proposes normative principles to guide responses to climate change, avoid maladaptation and promote sustainable adaptation: 1. Recognise context for vulnerability, 2. Acknowledge differing values and interests, 3. Integrate local knowledge into adaptation, 4. Consider feedbacks between local and global processes.	Policymakers

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