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DRAFT v2

# Ecosystem-based Adaptation & Disaster Risk Reduction: A compilation of country experiences & synthesis of information



*Wetland rehabilitation in South Africa*

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Biological Diversity

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## GLOSSARY & ACRONYMS

Name	Acronym	Definition/Description
<b>Adaptation</b>		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)
<b>Adaptive Capacity</b>		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) 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)
<b>Capacity</b>		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)
<b>Climate change</b>		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)
<b>Climate extreme</b>		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)
<b>Climate Risk Management</b>	CRM	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)
<b>Climate Smart Agriculture</b>	CSA	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: 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)
<b>Climate Change Adaptation</b>	CCA	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)
<b>Community-based Adaptation</b>	CBA	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)
<b>Community-based Natural Resource and Risk Management</b>	CBDRRM	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.
<b>Desertification</b>		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)

<b>Disaster</b>		<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>
<b>Disaster Risk</b>		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 recover (IPCC)
<b>Disaster Risk Management</b>	DRM	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)
<b>Disaster Risk Reduction</b>	DRR	<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>
<b>Drought</b>		<p>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)</p>
<b>Ecosystem-based Adaptation</b>	EBA	<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>
<b>Ecosystem Approach</b>		Strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way (CBD)
<b>Ecosystem Service</b>		The benefits people derive from ecosystems, e.g. supporting, provisioning, regulating, cultural (Millennium Ecosystem Assessment 2005)

<b>Ecosystem-based Disaster Risk Reduction</b>	Eco-DRR	<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>
<b>Ecosystem Services</b>		The benefits people obtain from ecosystems, which have been classified by the Millennium Ecosystem Assessment as: <i>Supporting</i> services, such as seed dispersal and soil formation; <i>regulating</i> services, such as carbon sequestration, climate regulation, water regulation and filtration, and pest control; <i>provisioning</i> services, such as supply of food, fibre, timber and water; and <i>cultural</i> services, such as recreational experiences, education and spiritual enrichment (MA 2005)
<b>Exposure</b>		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)
<b>Extreme weather</b>		See 'Climate extreme'
<b>Famine</b>		The presence of people; livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected (IPCC)
<b>Flood</b>		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)
<b>Food Security</b>		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)
<b>Gender mainstreaming</b>		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.
<b>Green Infrastructure</b>		An interconnected network of natural areas, including agricultural land, greenways, wetlands, parks, forest reserves, native plant communities and marine areas that naturally regulate storm flows, temperatures, flood risk and water, air and ecosystem quality (European Commission)
<b>Hazard</b>		<p>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)</p> <p>A climate hazard is an event caused by climate change or caused by natural variability in weather with the potential to cause harm, such as heavy rainfall, drought, a storm, or long-term change in climate variables such as temperature and precipitation (WWF)</p> <p>A potentially damaging physical event, phenomenon or human activity that may cause the loss of life or injury, property damage, social and economic disruption or environmental degradation. Hazards can include latent conditions that may represent future threats and can have different origins: natural (geological, hydrometeorological and biological) or induced by human processes (environmental degradation and technological hazards). (Hyogo Framework)</p>

<b>Impacts</b>		Effects on natural and human systems. In this report, the term ‘impacts’ is used to refer to the effects on natural and human systems of physical events, of disasters, and of climate change ( <a href="#">IPCC</a> )
<b>Integrated water resource management</b>	IWRM	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)
<b>Landslide</b>		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. ( <a href="#">IPCC</a> )
<b>Least Developed Country</b>	LDC	A country that exhibits the lowest indicators of socioeconomic development, with the lowest Human Development Index ratings of all countries in the world.
<b>Maladaptation</b>		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 benefitting one group at the expense of another.
<b>Mitigation (of disaster and DR)</b>		The lessening of the potential adverse impacts of physical hazards (including those that are human-induced) through actions that reduce hazard, exposure, and vulnerability ( <a href="#">IPCC</a> )
<b>Mitigation (of climate change)</b>		A human intervention to reduce the sources or enhance the sinks of greenhouse gases ( <a href="#">IPCC</a> )
<b>Multi-Criteria Analysis</b>	MCA	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.
<b>Nairobi Work Programme (UNFCCC)</b>	NWP	A mechanism under the UNFCCC to facilitate and catalyze 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 <a href="#">modalities</a> , 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.
<b>Fifth National Report (CBD)</b>	NR5	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 CBD COP Decision X/10.
<b>National Biodiversity Strategy and Action Plan (CBD)</b>	NBSAP	The principal instruments for implementing the CBD at the national level ( <a href="#">Article 6</a> ). The Convention requires countries to prepare a national biodiversity strategy (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.
<b>Low-regrets adaptation options</b>		Low-regret 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-regret 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 the working definition of “no-regrets” adaptation - UNEP, UNDP and IUCN)

<b>Resilience</b>	<p>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 (<a href="#">IPCC</a>)</p> <p>The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions (UNISDR)</p> <p>Theoretical advances in recent years include a set of principles that have been identified for building resilience and sustaining ecosystem services in social-ecological systems. The principles include: maintaining diversity and redundancy, managing connectivity, managing slow variables and feedbacks, fostering complex adaptive systems thinking, encouraging learning, broadening participation, and promoting polycentric governance systems (Biggs et al. 2012).</p>
<b>Vulnerability</b>	<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>A function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity. In EBA the ecosystems and their vulnerabilities are included in the analysis together with the vulnerability of communities (WWF 2013).</p> <p>The characteristics and circumstances of a community, system or asset that makes it susceptible to the damaging effects of a hazard (UNISDR)</p>
<b>Spatial Planning</b>	<p>A method used to influence the future distribution of activities in space (European Commission 1997). It goes beyond traditional land-use planning to integrate and bring together policies for the development of land-use, along with other policies and responses that influence the use of land (Office of Disaster Preparedness and Management, UK 2005). 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 2013).</p>
<b>Sustainable Land and Water Management</b>	<p>SLWM</p> <p>The adoption of land use systems that, through appropriate management practices, enables land users to maximise the economic and social benefits from the land while maintaining or enhancing the ecological support functions of the land resources (TerrAfrica). 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 INRM, IWRM, IEM, eco-agriculture and sustainable forest management (SFM), and many facets of sustainable agriculture, agriculture (GEF 2011).</p>
<b>Storm Surge</b>	<p>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. (<a href="#">IPCC</a>)</p>
<b>Synergies</b>	<p>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</p>

## KEY MESSAGES

1. In this section, key messages are presented that summarize findings from the full report and from the CBD Technical Workshop on Ecosystem-based Approaches to Adaptation and Disaster Risk Reduction, in Sandton, Johannesburg, South Africa, 28 September – 2 October 2016. The workshop was attended by experts and practitioners from a wide range of countries and organizations (Annex 6). Participants reviewed the report and shared and discussed experiences on national and regional efforts to implement EBA and Eco-DRR measures.

### Key Messages on EBA and Eco-DRR

2. Ecosystem-based adaptation (EBA) is the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help 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. The ecosystem-based approach has been recognized as an important strategy for disaster-risk reduction (Eco-DRR) and is defined as ‘sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development’.
3. EBA and Eco-DRR enable people to adapt to the impacts of climate change by using opportunities created by sustainably managing, conserving and restoring ecosystems to provide ecosystem goods and services. EBA and Eco-DRR further aim to maintain and increase resilience and reduce vulnerability of ecosystems and people to adverse effects of climate change. EBA and Eco-DRR should be integrated into broader adaptation and development strategies.
4. EBA and Eco-DRR overlap in practice, and both build upon and utilize approaches that already exist in the practices of biodiversity and ecosystem conservation, climate change adaptation and livelihood development. Examples include implementing forest and grasslands conservation to protect communities and settlements from erosion and sandstorms, or integrating native vegetation into urban spaces to provide relief from heat waves and improve air quality.
5. EBA and Eco-DRR can deliver multiple benefits beyond adaptation and reducing disaster risk. Examples include the restoration and conservation of coastal vegetated ecosystems such as mangroves for protection from storm surges, which also enhances carbon sequestration and community engagement/livelihood opportunities. Many other examples and case studies are provided in this report.
6. The international policy arena supports and promotes ecosystem-based approaches to adaptation and disaster risk reduction, including the Sustainable Development Goals (SDGs) recently adopted by the UN General Assembly. The SDGs include making cities inclusive, safe, resilient and sustainable (SDG 11), taking urgent action to combat climate change and its impacts (SDG 13), conserve and sustainably use oceans, seas and marine resources for sustainable development (SDG 14), and sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss (SDG 15), in addition to a number of other proposed goals related to sustainable development, poverty reduction, biodiversity conservation and sustainable use.

### Making the Case for EBA and Eco-DRR

7. A rationale for implementing EBA and Eco-DRR as part of overall approaches to climate change and disaster risk reduction is due to the anticipated multiple benefits they may bring. These benefits

include contributing to sustainable livelihoods by maintaining the ecosystem services that provide clean water, food and fiber; supporting poverty reduction; heritage conservation, and preservation of local identities, such as in forest communities.

8. Quantifying the economic benefits of EBA and Eco-DRR may be difficult given the relative youth of programs and activities implemented, and given that non-monetary benefits, such as cultural, spiritual, research or educational benefits, can be difficult to quantify. However, there have been examples where economic valuation has aided in illustrating the benefits of EBA and Eco-DRR measures.
9. Costs and benefits may also not be distributed equally among stakeholders or sectors of society, creating incentives for some to implement EBA, but not for others. Understanding how the benefits and costs of EBA are distributed is therefore essential for evaluating EBA benefits.
10. Valuation is important but is only one way to make the case for policy-makers to invest in nature; and should be part of a suite of measures/ incentives to encourage the implementation of the ecosystem approach when appropriate.
11. Communicating EBA and Eco-DRR requires a planned systematic approach to understand the interests of stakeholders and beneficiaries, and approaches need to be tailor-made to the local context, culture and traditions.

### **Implementing, Monitoring & Evaluation**

12. Project implementation can be hampered by different understandings of concepts and different values regarding ecosystems and biodiversity. In achieving adaptation and DRR objectives, it is important to be tolerant and flexible with different terminologies, and strive for maximum implementation on the ground, working towards wide global implementation of initiatives that contribute towards building resilience of as many local communities as possible.
13. There should be increased engagement between the scientific community and project executors in developing and implementing EBA and Eco-DRR activities, making use of available guidance to ensure optimal and appropriate use of ecosystems for adaptation and DRR.
14. Eco-DRR and EBA are cross-disciplinary and require effective engagement and coordination of multiple stakeholders such as engineers, academics, local and indigenous communities, civil society and private sector. Eco-DRR and EBA would benefit from more effective mechanisms for promoting “co-production” of knowledge between stakeholders and channeling this knowledge into decision-making.
15. Guidelines on implementing EBA and Eco-DRR at a local and sectoral level can aid in the increased use of ecosystem-based approaches and effective implementation of policy.

### ***Assessing Vulnerabilities, Impacts, Hazards & Risks***

16. EBA and Eco-DRR options selected and implemented should be guided by vulnerability assessments taking into consideration underlying drivers of change, existing policies, and community perceptions. For example, drivers of vulnerabilities may include limited access to land or land tenure, poor land-use planning, and unsustainable practices by communities and land users.
17. Even if ecosystems are well managed and healthy now, they are still in themselves vulnerable to climate change; thus it is important to analyze potential vulnerabilities of the EBA option itself to climate change impacts.

18. In promoting adaptation to climate change impacts, it is important to consider unifying frameworks and concepts that recognize the linkages between people and ecosystems as integrated socio-ecological systems, rather than viewing adaptation through only a social or human lens.
19. There is a need to be careful of conflating two strongly and closely related processes 1) the identification of vulnerable ecosystems which need to be protected and managed for biodiversity conservation; and 2) the identification of ecosystems, whether they are vulnerable or not, that can support people to adapt – in this case, it is important to assess people’s vulnerability to climate change.

#### ***Integrating EBA and Eco-DRR into Planning and Policy***

20. EBA and Eco-DRR can be scaled up through effective mainstreaming into policy and practice. This needs to take place at multiple levels of policy making, planning, programming, budgeting, and implementation. Embedding EBA and Eco-DRR in long-term visions and national development plans can provide an enabling framework and direct funding towards implementation.
21. Mainstreaming of EBA/Eco-DRR is most effective when there is a balance between top-down and bottom-up approaches. It is important to engage indigenous peoples and local communities as well as practitioners in policy making processes, and ensure that knowledge, lessons and experience feed into policy-making processes.
22. Many countries have mainstreamed EBA and Eco-DRR into national plans, strategies and targets, including National Biodiversity Strategies and Action Plans (NBSAPs) under the CBD, National Adaptation Programmes of Actions (NAPAs) under the UNFCCC, disaster management plans, development policy, and drought relief policy. Case studies of mainstreaming EBA and Eco-DRR through these national plans, strategies and targets are provided in this report.
23. Institutional arrangements and structures to enhance coordination across sectors are critical. EBA and Eco-DRR are cross-sectoral and therefore can be best led by a government body that has coordinating powers over sectoral ministries
24. Capacity building for Eco-DRR/EBA for different stakeholders at different levels is needed in order to support mainstreaming efforts. Awareness among national and sectoral policymakers and decision makers could be further enhanced, and technical skills need to be developed in many countries to more effectively implement Eco-DRR and EBA approaches

#### ***Synergies and Cooperation***

25. Conserving, restoring and sustainably managing ecosystems can deliver on a number of national and international development priorities and obligations, including enhancing people’s resilience to climate change and disasters, supporting biodiversity, and protecting food, water and livelihood security especially of vulnerable populations.
26. Cooperation among ecosystems/biodiversity, adaptation and disaster reduction communities results in a greater ability to design interventions that deliver multiple dividends.
27. Strong coordination between focal points for multilateral environmental agreements (MEAs) such as Ramsar, UNCCD, UNFCCC, and CBD can help to ensure synergies between MEAs are harnessed.
28. It is important to scale-up knowledge-sharing at local, national, regional and global levels between and across different disciplines, and continue to utilize knowledge-sharing platforms such as the Nairobi Work Programme under the UNFCCC.

29. Designing interventions for multiple benefits can be supported by creating space and incentives for collaboration and dialogue about trade-offs, establishing political commitment to integrated approaches, clarifying roles and responsibilities of various institutions and encouraging financial support to integrated action through looking at the policies of donor partners.

#### ***Monitoring & Evaluation***

30. Monitoring and evaluation are important policy instruments that can enable review of policy and plans based on understanding of progress and challenges in reaching objectives. Risk-informed decision making, including climate-related risk, is at the heart of disaster risk reduction.
31. A variety of innovative tools for monitoring and evaluation have been developed; for example, the CBD and the Biodiversity Indicator Partnership have developed a series of factsheets and potential indicators to assist with national implementation of activities.

#### ***Opportunities and Entry-points for EBA and Eco-DRR Implementation***

32. Coastal vegetation restoration and conservation can also provide carbon sequestration benefits, and initiatives to include 'blue carbon' into REDD+ or payment-for-ecosystem services can provide an important opportunity for implementation of EBA and Eco-DRR.
33. Disasters can provide an opportunity to 'build back better', and incorporate opportunities provided by nature and ecosystems to reduce disaster risk, such as mangrove conservation initiatives.
34. Opportunities to cooperate with the private sector exist and can be enhanced, such as through initiatives to engage the insurance sector in providing support for policy reform, land-use planning, capacity-building and technology transfer.
35. Multidisciplinary collaborations to enhance health and conservation initiatives can provide impetus for implementation of EBA and Eco-DRR measures to contribute to increasing resilience of communities in terms of health and well-being.

### **Policy Issues**

#### ***Contribution of Indigenous Peoples and Local Communities***

36. IPLCs have long coped with variability, uncertainty and change through multi-generational histories of interaction with the environment.
37. Traditional knowledge is an important part of the ecosystem approach, can complement science, and bridge gaps in information. Indigenous, traditional and local knowledge systems - and forms of analysis and documentation such as community mapping - can play a significant role in identifying and monitoring climatic, weather and biodiversity changes and impending natural hazards, similar to early warning systems
38. Effective EBA and Eco-DRR should consider the kind of support that communities need for adaptation and DRR (e.g. through needs assessments). Listening to the differentiated needs of IPLCs is necessary since interventions that do not consider needs, roles, aspirations, etc. can be detrimental to IPLCs livelihoods and cultures. Ensure free prior and informed consent and government and other institutional support, including resource mobilization, promotion for community-led initiatives, and respect for local forms of governance.
39. Further awareness is needed about the importance of processes of consultation and community engagement throughout all steps of the project, including from inception and planning. Creating

involvement of communities can actually create ownership of processes that in turn can ensure the sustainability of the project in the long run.

### ***Gender Mainstreaming***

40. Different genders use and value ecosystems differently, an essential consideration for EBA and Eco-DRR activities, including assessing vulnerabilities and risks to climate change.
41. Gender mainstreaming should thus be a significant aspect of adaptation and disaster risk reduction planning and implementation process to ensure success and sustainability of policies, programmes and project.
42. The inclusion of all segments of society, men, women, children, minorities and ethnic groups are important at all stages of decision making
43. There is a need for capacity-building to understand gender issues for effective implementation of EBA and Eco-DRR initiatives; monitoring and evaluation of the impacts of gender mainstreaming; and associated budgeting/resource mobilization for these activities
44. Successful examples of gender mainstreaming can be seen from grassroots women's organisations in the Americas where women's groups are now training local governments on how to reduce disaster risk and build partnerships with local governments – these models have been successful and are now being considered as policy options including at the regional level.

### ***Trade-offs and Thresholds***

45. The consideration of trade-offs should be present throughout the risk assessment, scenario planning, and adaptive management approaches for EBA and Eco-DRR implementation. In addition to monitoring the short-term provisions of services, managers should also monitor the long-term evolution of slowly changing variables.
46. It is important to recognize the potential limitations of using ecosystem-based approaches for adaptation or DRR. Ecosystems are subject to climate change impacts, and therefore any intervention utilizing the ecosystem approach can be vulnerable to change, which should be accounted for when planning activities. EBA and Eco-DRR should thus be considered within overall integrated adaptation or DRR strategies.

## BACKGROUND AND MANDATE

48. Climate change is a recognized threat to the well-being and livelihoods of humans and ecosystems across the globe. Climate change is also increasing the risk of disasters occurring. Over the past 20 years, the increase in disasters due to natural hazards have mainly been caused by climate challenge.
49. Policymakers are increasingly calling for ecosystem-based approaches to climate change adaptation (EBA), which ‘incorporates biodiversity and ecosystem services into an overall adaptation strategy to help people to adapt to the adverse effects of climate change’.<sup>1</sup>
50. More recently, the ecosystem-based approach has been recognized as an important strategy for disaster-risk reduction (Eco-DRR), defined as ‘sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development’<sup>2</sup>.
51. Ecosystems contribute to adapting to climate change and reducing disaster risk because:
  - a) Wetlands, forests and coastal systems, can reduce the physical exposure to hazards by serving as protective barriers or buffers and so mitigating hazard impacts. Well-managed ecosystems provide a natural means of protection against common hazards (both natural and other), such as landslides, flooding, avalanches, storm surges, wildfires and droughts.
  - b) Ecosystems can reduce disaster risk by reducing socio-economic vulnerability to hazard impacts. In addition to protective and hazard regulatory functions of ecosystems, they also sustain human livelihoods and provide essential goods such as food, fibre, medicines and construction materials, which strengthening peoples’ resilience to disasters.
52. While advocacy for EBA and Eco-DRR is increasing, more information is needed to inform international, regional and national policy-making, including examples of implementation of EBA and of Eco-DRR within broader strategies, examples of their joint implementation, linkages and synergies, and policy issues.
53. In decision XII/20, the Conference of the Parties (COP) to the Convention on Biological Diversity (CBD) requested the Executive Secretary to compile experiences with ecosystem-based approaches to climate change adaptation (EBA) and disaster risk reduction (DRR) and to share them through the clearing-house mechanism (paragraph 7(c)).
54. This report responds to the COP decision and aims to address the knowledge gaps in EBA and Eco-DRR in the following ways:
  - a) Compiling country experiences, activities and targets related to EBA and Eco-DRR through a review of Fifth National Reports, National Biodiversity Strategies and Action Plans (NBSAPs), projects supported by the Global Environment Facility (GEF), other information submitted by Parties and organizations, input received at the CBD Technical Workshop on EBA and Eco-DRR (Sandton, South Africa), as well as relevant academic literature and publications.
  - b) Providing an analysis and synthesis of information on EBA, and on Eco-DRR, bringing together research, theory and practice in the fields of EBA and Eco-DRR. Via case studies from the compilation and a broader literature review, this report presents examples of how both EBA and Eco-DRR are being addressed nationally, regionally and globally, drawing from a wide variety of

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<sup>1</sup> CBD Second Ad-Hoc Technical Expert Group on Biodiversity and Climate Change

<sup>2</sup> Estrella, M. & N. Saalimaa (2013) Ecosystem-based Disaster Risk Reduction (Eco-DRR): An Overview, *In*: Renaud, F., Sudmeier-Rieux, K. and M. Estrella (eds.) The role of ecosystem management in disaster risk reduction. Tokyo: UNU Press

contexts (environment, conservation, humanitarian and rural and urban development). Challenges in implementation and lessons learned, opportunities for synergies, and areas for further research are discussed.

55. Much of this work draws on information from several comprehensive studies, compilations, frameworks and syntheses of EBA and Eco-DRR experiences. These include Birkman and von Teichman 2010, Doswald & Estrella 2014, proceedings of the UNFCCC EBA Technical Workshop in 2012, Dar es Salaam, Tanzania (UNFCCC 2012), an Eco-DRR case study compendium (Nehren et al. 2014) and other sources that are referenced throughout and in the bibliography in the 'References' section.
56. This work seeks to complement these studies, with a focus on experiences on EBA and Eco-DRR, as reported by Parties to the CBD in their Fifth National Reports, submissions, and compiling information from other projects/databases of key organizations.
57. In addition to EBA and Eco-DRR, several related approaches share the same underlying rationale of working with nature for people. These include green infrastructure (GI), nature-based solutions, natural water retention measures, ecological infrastructure, ecosystem infrastructure, natural infrastructure, or building with nature. Usually the terms have evolved in a specific policy fields.
58. This report was developed with the input and guidance of a technical reference group, involving experts and practitioners from the following organizations: the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP), the United Nations Framework Convention on Climate Change (UNFCCC), the Food and Agriculture Organization of the United Nations (FAO), the United Nations Office for Disaster Risk Reduction (UNISDR), the Convention on the Conservation of Migratory Species (CMS), the World Meteorological Organization (WMO), the Ramsar Convention, the International Union for the Conservation of Nature (IUCN), BirdLife International, Conservation International and the World Wildlife Fund (WWF). Annex 3 contains a list of these members.
59. The intended audience for this report are Parties to the CBD and biodiversity-related conventions, UNFCCC, UNCCD, other intergovernmental organizations, and planners, policy-makers and practitioners from environmental conservation and development organizations.

# 1. INTRODUCTION

## 1.1 Responding to Climate Change

60. Climate change is a recognized threat to the well-being and livelihoods of humans and ecosystems across the globe. The impacts of climate change can be subtle or drastic, from the slow shifting of species' habitats to the increased frequency and intensity of extreme events. The latest assessment of the Intergovernmental Panel on Climate Change (IPCC) indicates that observed changes in the climate system are unprecedented over decades to millennia – the atmosphere and ocean have warmed, the amounts of snow and ice have diminished, sea level has risen, and the concentrations of greenhouse gases have increased, also leading to ocean acidification (IPCC 2013).
61. The impacts and risks of climate change pose multiple challenges to the global sustainable development agenda. It impedes progress on the achievement of sustainable development and can disproportionately affect vulnerable sectors of society and communities, particularly in least developed countries (LDCs) and small island developing states (SIDS) (Rio Conventions 2012). Many SIDS depend on healthy coral reefs for their livelihood, which have the additional function of protecting coasts from storm surges and waves. However, ocean warming and ocean acidification exacerbate other pressures on corals such as pollution, overexploitation and invasive species, and if current trends continue coral reefs may become one of the first unique ecosystems to reach an irreversible tipping point (IPCC AR5 and GBO4).
62. The establishment of the Rio Conventions in 1992 at the Earth Summit marked a key milestone to global sustainable development through addressing climate change, biodiversity conservation and its sustainable use, and combating desertification. Roadmaps for action have been carved out by Parties to the Rio Conventions, which have set the stage for the next period of national planning and implementation:
- a) The Strategic Plan for Biodiversity 2011-2020 and Aichi Biodiversity Targets under the Convention on Biological Diversity (CBD), aiming 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 well-being, and poverty eradication
  - b) The Ten-Year Strategy of the UN Convention to Combat Desertification, 2008-2018 (UNCCD), seeking to reverse and prevent desertification/land degradation and to mitigate the effects of drought in affected areas in order to support poverty reduction and environmental sustainability
  - c) The Cancun Adaptation Framework, adopted as part of the Cancun Agreements in 2010, under the UN Framework Convention on Climate Change (UNFCCC), with the objective to enhance action on adaptation, reducing vulnerability and building resilience in developing country Parties, and accounting for the urgent and immediate needs of those developing countries that are particularly vulnerable.
63. The UN Sustainable Development Conference in 2012 (Rio+20), marked the twentieth anniversary of the Rio Conventions. Governments renewed their commitment to sustainable development in the Rio+20 Outcomes document, "The Future We Want," and agreed to launch a process to establish Sustainable

Development Goals to be encompassed within the 2030 Agenda for Sustainable Development, building upon the Millennium Development Goals. The Sustainable Development Goals, adopted by the UN General Assembly in September 2015, include taking urgent action to combat climate change and its impacts (SDG 13), making cities inclusive, safe, resilient and sustainable (SDG 11), conserve and sustainably use oceans, seas and marine resources for sustainable development (SDG 14), and sustainably manage forests, combat desertification, halt and reverse land degradation, and halt biodiversity loss (SDG 15), in addition to a number of other proposed goals related to sustainable development, poverty reduction, biodiversity conservation and sustainable use.

## 1.2 The Context for Ecosystem-based Adaptation

64. While mitigation efforts had generally been the focus of climate change negotiations, the UNFCCC Cancun Agreements promoted discussion on the need for adaptation to climate change impacts that are unavoidable. The Cancun Adaptation Framework defined several principles for prioritizing and implementing adaptation actions, including transparency, stakeholder participation, gender sensitivity, consideration of vulnerable groups, communities and ecosystems, use of indigenous knowledge and best available science, and integration of adaptation into relevant social economic and environmental policies and plans (UNFCCC 2010).

65.

The CBD, in decision VII/15 adopted in 2004, encourages the management of ecosystems for climate change adaptation and mitigation. The term ecosystem-based adaptation was coined later and an agreed definition for EBA is included in CBD X/33, based on the work of the Second *Ad-Hoc* Technical Expert Group on Biodiversity and Climate Change: “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. It 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. Ecosystem-based adaptation is most appropriately integrated into broader adaptation and development strategies.”

66. The concept of Ecosystem-based Adaptation (EBA) was first introduced into the UNFCCC negotiations at the 14th Conference of the Parties (COP) to the UNFCCC in 2008. There are various other interpretations of EBA, but all share the rationale of working with nature, and most converge on the principle of sustainable management, conservation and restoration of ecosystems, as part of an overall adaptation strategy.

67. Conservation practice is often considered as EBA, with the rationale that conservation enhances resilience of ecosystems to climate change impacts. However, typical conservation practice, while providing other values and benefits such as increased biodiversity, differs from EBA. EBA specifically aims to reduce both current and future impacts of climate change, based on the identification or assessment of vulnerabilities of a social-ecological system that includes both people and ecosystems (WWF 2013). As an example, a protected area that is implemented to save the habitat of a particular

species is not EBA. But a protected area that conserves a wetland in order to mitigate flash floods that damage crops or property is an example of EBA.

68. EBA builds upon and utilizes approaches that already exist in the practices of biodiversity and ecosystem conservation, climate change adaptation and livelihood development. EBA draws from the related approaches of community-based natural resource management (CBNRM), community-based adaptation (CBA), and climate change-integrated conservation strategies (CLICS), but is unique in that it combines the achievements of the three outcomes, as conceptualized in Figure 1 (Midgley et al. 2012).

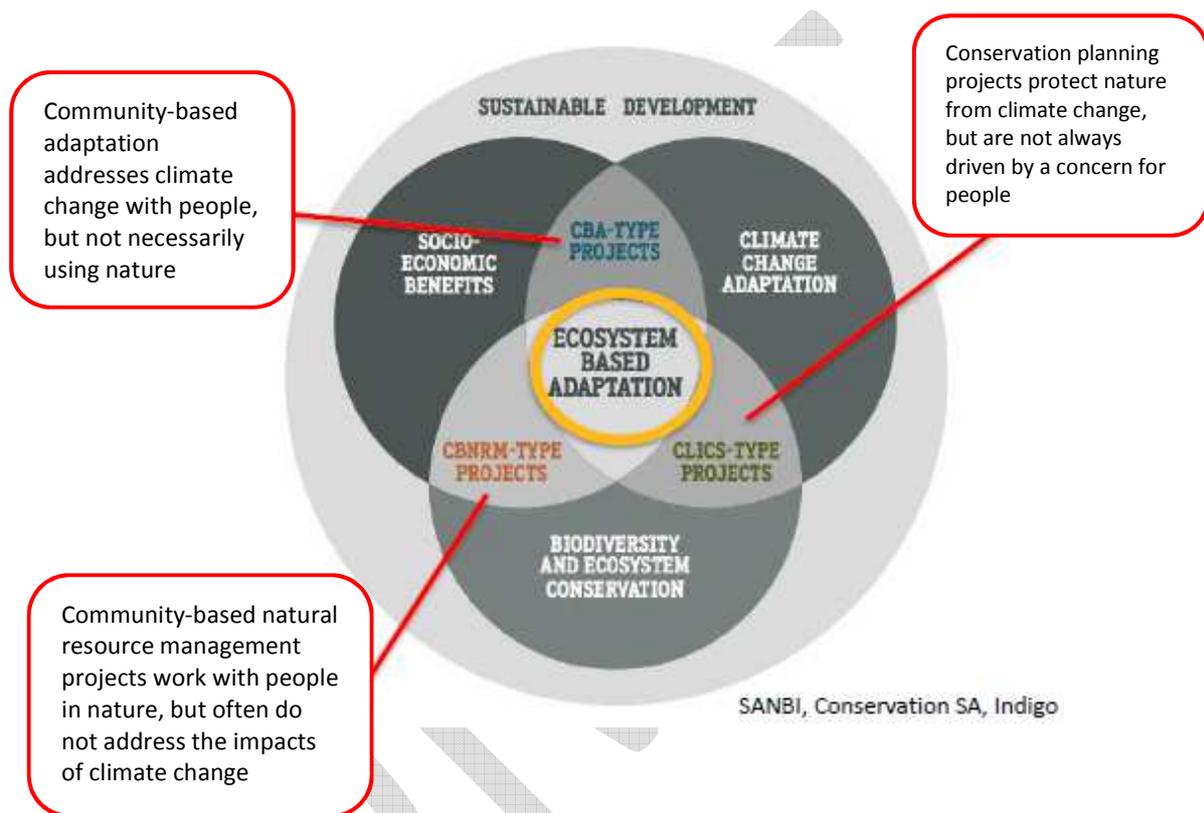


Figure 1: Linkages between EBA and other fields of practice within the overall context of sustainable development. EBA is shown as a three-way synergy between, biodiversity and, ecosystem, conservation, climate change adaptation, and societal resilience (figure adapted from Midgley et al. 2012 and annotated by UNDP)

69. Examples of EBA include, *inter alia*: 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 change; implementing protected areas, for example, in forest ecosystems, to enhance ecosystem resilience and continued provisioning of essential ecosystem services such as erosion control; 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 of utilizing ecosystems to adapt to the impacts of climate change.

### 1.2i) Multiple Benefits

70. EBA is gaining traction worldwide. Case studies and literature have demonstrated that EBA can be a flexible, cost-effective and broadly applicable approach for reducing the impacts of climate change (Munang et al 2012). Some of the multiple benefits include:
- a) EBA can complement more expensive infrastructure investments, such as protecting coastal settlements. It is thus considered to be a critical tool for policymakers and practitioners to address impacts of climate change that threaten lives and livelihoods (Munang et al. 2012).
  - b) EBA can provide adaptation and disaster risk reduction solutions that are consistent with national development and adaptation goals such as coastal protection, conservation of natural resources, sustainable development and social well-being (WWF 2013).
  - c) EBA can also contribute to climate change mitigation via: 1) conservation or restoration of forests, coastal vegetation, or peatlands, which enhance carbon sequestration, and 2) prevention of deforestation and land degradation which aids in limiting further greenhouse gas emissions.
  - d) Active engagement of people and communities, helping to build trust and responsibility while maintaining livelihoods and providing potential business opportunities (EC Discussion Paper 2009).
71. Because EBA has been demonstrated to deliver multiple benefits beyond climate change adaptation, e.g. poverty reduction, sustainable development, climate change mitigation, and disaster risk management, it has also been described as “win-win” or “no-regrets” adaptation strategies (IUCN 2014), or can be described as “multi-functional” in the context of green infrastructure (discussed further below). However, as EBA interventions themselves are subject to climate change variability, and because there is always a possibility that a management intervention may have unintended or unforeseen impacts, the term “low-regrets”, rather than “no-regrets”, is used throughout this report.

72.

Low-regrets EBA interventions include measures which are perceived or projected to have multiple benefits because they aim to build resilience to changing economic, social and environmental conditions and increase adaptive capacities, regardless of climate change impacts.

### 1.3 The Context for Ecosystem-based Disaster Risk Reduction

73. An additional challenge to sustainable development is the increasing risk of disasters resulting from climate change. Over the past 20 years, the increase in disasters due to natural hazards has mainly been caused by climate challenge (Birkmann and von Teichman 2010).
74. Socio-economic factors, in tandem with climate change, also increase disaster risk exposure – for example, risk increases as more people are located in hazard-prone locations such as coastal settlements

(IPCC 2012). Population growth and urbanisation are also factors that can increase vulnerability and exposure.

75. The UN International Strategy for Disaster Reduction (ISDR) was endorsed in 1999, with a vision to enable all communities to become resilient to the effects of natural, technological and environmental hazards, reducing the compound risks they pose to social and economic vulnerabilities within modern societies, and to proceed from protection against hazards to the management of risk through the integration of risk prevention into sustainable development.

76. In the Strategy, disaster risk reduction is defined as the concept and practice of reducing disaster risks through systematic efforts to analyze 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).

77.

The ecosystem-based approach has been recognized as an important strategy for disaster-risk reduction (Eco-DRR) and is defined as ‘sustainable management, conservation and restoration of ecosystems to reduce disaster risk, with the aim to achieve sustainable and resilient development’ (Estrella and Saalismaa 2013).

78. Examples of Eco-DRR include, *inter alia*: restoration of coastal vegetated areas such as mangroves to protect shorelines from storm surges, managing invasive alien species linked to land degradation and that threaten food security and water supplies, or managing ecosystems to complement, protect and extend longevity of investments in hard infrastructure. Eco-DRR can be applied to non-climate hazards as well – coastal vegetation has been demonstrated in some cases to attenuate waves in tsunamis, and protection forests can stabilize slopes to prevent or mitigate landslides that might result from earthquakes. As discussed below, there are limitations to the ability of ecosystems to protect against some disasters.

79. Eco-DRR has been supported in the international policy arena in various ways:

- a) The UNFCCC Cancun Adaptation Framework, adopted as part of the Cancun Agreements in 2010, and the Nairobi work programme on impacts, vulnerability and adaptation to climate change.
- b) The IPCC Special Report on Extreme Events recommends investing in ecosystems, sustainable land management and ecosystem restoration and management (IPCC 2012).
- c) 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’.

• • •  
“Applying ecosystem management for DRR and climate change adaptation is a **no-regret investment**. Sustainable ecosystems management impacts on all three fundamental elements of DRR: regulating hazards, controlling exposure and reducing vulnerability. Moreover, ecosystems provide multiple social, economic and environmental benefits – *regardless of whether a disaster materializes.*”

~UNEP & PEDRR, General Assembly Thematic DEbAte on DRR, 2012

d) Eco-DRR has also been endorsed in the Outcomes of Regional DRR Platforms of Asia, Africa, Latin America and Arab states, and the European Ministerial Meeting on DRR.

80. Further examples of international policies, programmes, strategies and frameworks related to EBA and Eco-DRR are provided in Section 3: The Policy & Institutional Context for EBA and Eco-DRR.

## 1.4 Linkages between EBA and Eco-DRR

81. Are Eco-DRR activities simply the same as EBA activities implemented to reduce disaster risk? Can EBA be considered an example of Eco-DRR, and *vice versa*? In brief: yes, in many cases. A recent review of commonalities and differences between EBA and Eco-DRR found that in practice, it is difficult to distinguish between the two - there are more commonalities than differences due to the basic shared underlying principle of utilizing the ecosystem approach and increasing the resilience of people and communities (Doswald and Estrella 2015).
82. Commonalities shared by both EBA and Eco-DRR include an emphasis on the ecosystem-based approach, often involve implementation with NGOs, encourage participation of local communities, and involve assessment of vulnerabilities and risks. Implementation approaches and activities are also similar (Doswald and Estrella 2015).
83. Participation of indigenous peoples and local communities (IPLCs) is often promoted as a guiding principle of EBA and DRR implementation. The equivalent of CBA in DRR is 'Community-Managed Disaster Risk Reduction' (CMDRR), an approach that can help a community identify the hazards they are exposed to and design effective measures to promote resilience to them (Fitzgibbon and Crosskey 2013). Both EBA and Eco-DRR are relatively new approaches arising from broader adaptation and DRR practice, and are in the early stages of developing assessment, monitoring and evaluation methodologies. In some countries and regions, policy frameworks which support EBA have been developed over the past several years.
84. Differences between EBA and Eco-DRR mirror those of general climate change adaptation (CCA) and disaster risk reduction (DRR) activities. Differences include the following:
- EBA and Eco-DRR operate under different policy fora and are often undertaken by different institutions address different types of hazards (Doswald and Estrella 2015).
  - Eco-DRR addresses the risks of all hazards, whereas EBA usually does not. Eco-DRR addresses both non-climate related natural (e.g. earthquakes, tsunamis), climate-related natural (e.g. hurricanes, heat waves), and others kinds of hazards (see Figure 2).
  - 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 interventions also aim to address long-term adjustments to changes in mean climatic conditions –including changes in rainfall patterns, changes in sea surface temperature, and slow on-set climate impacts such as sea level rise, which has not been the traditional focus of DRR.

- d) Eco-DRR also includes components such as early warning systems, preparedness and contingency planning, response, recovery and reconstruction, which has not often been the focus of EBA (Doswald and Estrella 2015).
- e) DRR has previously been based on historical return rates of weather disaster; and now increased risk of disasters due to climate change is also considered.

85. Because of the differences highlighted above, it is important to emphasize that EBA and Eco-DRR are not a replacement for other DRR measures that, while not ecosystem-based, are critical to reducing disaster risk, such as setting up seismic stations to monitor ground motion for earthquake detection, earthquake and post-disaster preparation drills, updating of building codes and infrastructures, relocation of people and communities out of areas with likely hazards, etc. EBA and Eco-DRR can be seen as cost-effective, low-regrets, complements to DRR and CCA measures while achieving other benefits to societies, including increasing resilience of people and communities.
86. Despite their differences, as mentioned, EBA and Eco-DRR have more shared similarities given their focus on ecosystem management, restoration and conservation to increase resilience of people (or reduce risk or reduce vulnerability). At the project/operational level, they are often indistinguishable, and there is often an overlap in case studies that have been labelled as either EBA or Eco-DRR, depending on the community of practice involved, *i.e.* the conservation vs. disaster communities (UNEP and CUAS 2015).
87. Figure 2 highlights the convergence of EBA and Eco-DRR. Throughout this report, many examples of EBA are highlighted that could also be considered Eco-DRR measures, and vice versa. These examples are referred to as “EBA and Eco-DRR” throughout.

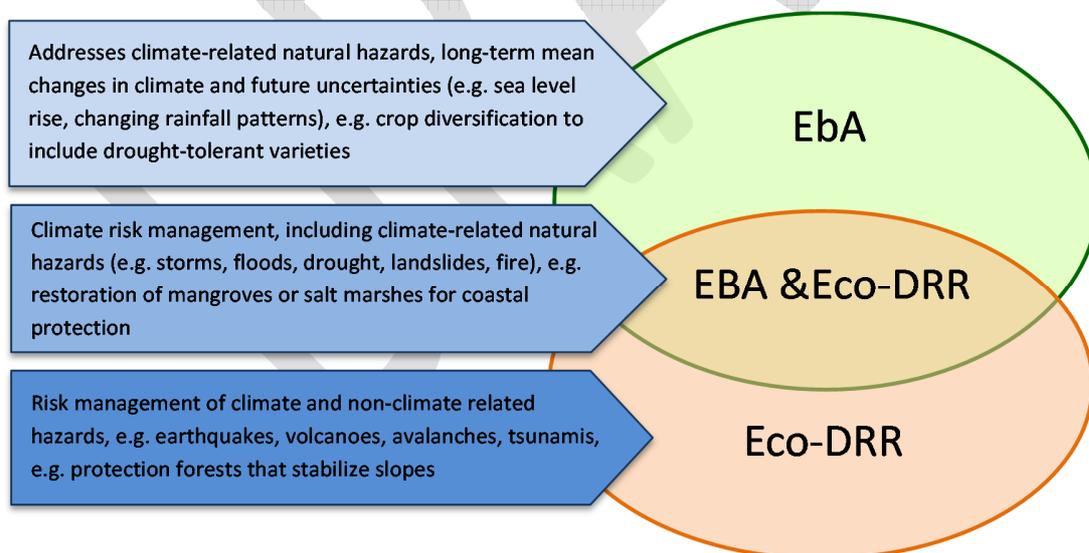


Figure 2: Overlap between ecosystem-based adaptation (EBA) and ecosystem-based disaster risk reduction (Eco-DRR) (adapted from a figure depicting climate change adaptation and disaster risk reduction overlaps in Mitchell and Van Aalst 2008).

88. A signature example of a management activity achieving the goals of adaptation and disaster risk reduction is protecting or restoring coastal vegetation such as mangroves, salt marshes and seagrass. This vegetation has been demonstrated to provide coastal protection properties such as shoreline stabilization through attenuating wave forces. The extensive root systems of mangroves and salt marshes prevent erosion by promoting sediment binding (Beck 2014).
89. Coastal vegetation is also an important carbon sink and can bury organic carbon at a rate that is 30 to 50 times faster than terrestrial forests (McLeod et al. 2013), globally burying a similar amount of organic carbon to terrestrial forests, even though the area of coastal vegetated habitats is only 3% that of forests (Duarte et al. 2013).
90. Maintaining the health and resilience of key ecosystems like mangroves enhances the resilience of people and communities to the impacts of climate change. Case Study 1 discusses the protection and rehabilitation of mangroves in the Sundarbans region of India and Bangladesh as an EBA and Eco-DRR strategy for adaptation and disaster risk reduction.<sup>3</sup>
- 91.

#### Case Study 1: Protection and rehabilitation of degraded mangrove forests of the Sundarbans

The Sundarbans region along the coast of India and Bangladesh has the largest expanse of contiguous mangrove forests in the world, stretching for 10 000 km<sup>2</sup> along the coast.

Aside from coastal protection, the mangroves in the Sundarbans provide nursery habitat for fish and other animals and supports other important ecosystem services. In recognition of this unique, biodiverse wetland ecosystem, the Indian portion is designated as a World Heritage Site, while the Sundarbans Reserved Forest in Bangladesh is a designated Ramsar site.

The Sundarbans are prone to severe cyclones and storm surges. With one of the highest population densities in the world, Cyclone Sidr in 2007 killed 3500 people and affected millions more. IPCC projections show that the severe weather events will increase as temperatures and sea levels rise (IPCC 2012), making the Sundarbans region even more vulnerable in the future.

EBA and Eco-DRR measures in the Sundarbans include protection and management of mangrove ecosystems, reducing their vulnerability to climate change and sea level rise and enabling this highly populated area to benefit from coastal protection. Other EBA measures include community-based afforestation of coastal zones, and mangrove restoration (Rahman 2014). In the Indian and Bangladesh Sundarbans, afforestation and restoration has been undertaken for decades to conserve endangered species and protect from cyclones and storms (MacIntosh et al. 2012).

It would cost comparatively more to build hard infrastructure to protect the coastline. Estimates place costs to build coastal embankments, built to offer the same extent of protection as the mangroves, at USD\$294 million in capital investment, and USD\$6 million each year in maintenance (Colette 2007). In light of the multiple benefits to people from protection of mangroves, EBA in the Sundarbans are an example of a low-regrets climate change and disaster risk reduction strategy.

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<sup>3</sup> Further details on lessons learned on mangrove restoration in the Sundarbans and in other ecosystems are readily available in the literature, for example, MacIntosh et al. 2012, 'Sharing Lessons on Mangrove Restoration', *Mangroves for the Future*, IUCN. [url](#)

92. Other examples of activities that can be considered both EBA and Eco-DRR include the following:

**Case Study 2: Addressing Drought: Assessment of Drought Resilience Frameworks in the Horn of Africa**

Climate change, population pressures and conflict can lead to water shortages or drought, leading to degradation of environment and natural resources. The Horn of Africa is a region that is often impacted by adverse weather effects. Integrated drought management (IDMP) involving preparedness, drought mitigation and early warning vs. emergency / crisis response is being promoted in this region via: demonstrating innovative drought management cases, capacity development of institutions, facilitating partnerships and regional cooperation, mainstreaming drought mitigation and adaptation strategies, and strengthening early warning systems. The initiative is coordinated by the Global Water Partnership, East Africa.

93.

**Case Study 3: Addressing Sand storms - China’s Strategic Ecological Security Layout**

China’s Strategic Ecological Security Layout includes strengthening construction of forest belts, grasslands conservation and sand fixing to prevent sandstorms and to enclose areas where desertified land cannot be controlled. Their forest belt system is shown in Table 1.

Table 1: “Two Barriers and Three Belts”: China’s Forest Belt System (from China’s Fifth National Report)

<b>Regions</b>	<b>Key Priorities for Ecological Conservation</b>
Qinghai-Tibet Plateau	To protect various, unique ecosystems to allow them to play roles in regulating water for big rivers and climate
Loess Plateau/Yunnan-Sichuan	To strengthen control of soil erosion and protection of natural habitats to ensure ecological security in the Yangtse River Basin and the middle and lower reaches of the Yellow River
Northeast China Forest Belt	To protect forest resources and biodiversity to allow northeast China plains to play the role of ecological security barriers.
North China sand control belt	To strengthen construction of forest belts, grassland conservation, sand fixing and prevention of sandstorms; and to enclose for protecting those areas where desertified land cannot be controlled for the time being; and to allow forest belts to play the role of ecological security barriers.
Hilly areas of south China	To strengthen habitat restoration and control soil erosion, so that south China and southwest China can play the role of ecological security barriers.

94. EBA and ECO-DRR can also be implemented in urban areas. Green Infrastructure (GI) can be broadly defined as a strategically planned network of high quality natural and semi-natural areas with other environmental features, which is designed and managed to deliver a wide range of ecosystem services and protect biodiversity in both rural and urban settings (European Union 2013).

95.

#### Case Study 4: EBA & Eco-DRR in Urban Areas – Using Green Infrastructure to Combat the Heat Island Effect

Urban areas are often warmer than surrounding areas due to absence of vegetation (thus lower humidity levels), and presence of asphalt which absorbs energy, creating a heat island effect. Climate change is increasing the frequency of extreme events, exacerbating the heat island effect. An example of a green infrastructure initiative that helps to counteract the heat island effect of urban areas is the implementation of biodiversity-rich parks, green spaces, green roofs and walls, using native vegetation which can offer shade and generate moist air. Multiple benefits of GI, in addition to providing relief from heat waves, are carbon sequestration, improved air quality, reduced rainfall runoff, increased aesthetic appeal, and increased energy efficiency.

- European Union 2013

96. The case studies above demonstrate the multiple climate hazards that are being addressed at country and at regional levels, via national planning and through broad, multi-sectoral partnerships. While often not labelled as EBA or Eco-DRR, the activities above nevertheless utilize ecosystem-based solutions to adapt to climate change and reduce risk of disasters due to climate-related hazards.

## 2. METHODOLOGY

### 2.1 Sources of Information for EBA and Eco-DRR Activities & Targets

97. Information for this compilation and synthesis of information came from a wide variety of sources in order to build a meaningful picture about experiences, activities and targets on EBA and Eco-DRR.

Sources included the following and are discussed briefly below:

- a) Fifth National Reports (5NRs) to the CBD
- b) National Biodiversity Strategies and Action Plans (NBSAPs)
- c) Submissions on activities and targets related to EBA and Eco-DRR, provided to the CBD by countries and organizations in response to a request from the CBD Secretariat
- d) Portfolio review of EBA and Eco-DRR projects funded by the Global Environment Facility, other organizations, and implemented by governments and a wide range of development and environmental organizations
- e) Case studies from a broader literature review
- f) Information from participants at the CBD Technical workshop on ecosystem-based approaches to climate change adaptation and disaster risk reduction

## 2.1 i) Fifth National Reports

98. National reports enable Parties to the CBD to report on measures taken for the implementation of the Convention and their effectiveness, as established in Article 26 of the Convention. Parties to the CBD adopted the Strategic Plan for Biodiversity 2011 – 2020 (the Strategic Plan) at CBD COP10 in Nagoya, Japan, with a vision of “By 2050, biodiversity is valued, conserved, restored and wisely used, maintaining ecosystem services, sustaining a healthy planet and delivering benefits essential for all people” (CBD 2010).
99. The mission of the Strategic Plan is to “take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet’s variety of life, and contributing to human well-being, and poverty eradication.” Five strategic goals underpin twenty Aichi Biodiversity Targets to be achieved by 2015 or 2020.
100. Aichi Targets 14 and 15, under the strategic goal of enhancing the benefits to all from biodiversity and ecosystem services, have been identified as particularly relevant to EBA and Eco-DRR. Aichi Target 14 aims for the safeguarding and restoration of ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable. Indicators for the Aichi Biodiversity Targets have been developed, and “trends in human and economic losses due to water or natural resource related disasters” has been adopted as an indicator for Aichi Target 14.
101. Aichi Target 15 aims for the enhancement of 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. The restoration of mangrove forests, implemented with careful planning such as planting appropriate species, is an example of a widely recognized ecosystem-based approach to reduce the risk of storm surges.
102. In decision X/10, the CBD COP decided that the fifth national reports should focus on the implementation of the Strategic Plan 2011 - 2020 and progress achieved towards the Aichi Biodiversity Targets. Guidelines proposed that the 5NR contain: 1) An update on biodiversity status, trends and threats, and implications for human well-being; 2) information on the National Biodiversity Strategy and Action Plan (NBSAP), its implementation, and the mainstreaming of biodiversity into national planning; and 3) Progress towards the 2015 and 2020 Aichi Biodiversity Targets and contributions to the relevant 2015 Targets of the Millennium Development Goals (MDGs). To date, 155 5NRs have been submitted.
103. The 5NRs helped inform a mid-term review of progress towards the implementation of the Strategic Plan, and provided key information for the *Global Biodiversity Outlook (GBO 4)*. In this report, NR5s are assessed to compile country experiences, activities and targets related to EBA and Eco-DRR.
104. Fifth national reports and the information on NBSAPs contained within them, as submitted by Parties, have been made publicly available on the CBD website<sup>4</sup>. By reviewing reports, details on EBA and Eco-DRR experiences were obtained from the perspective of the countries involved, in addition to progress on related Aichi Targets, and the types of climate-induced hazards that countries are facing.
105. Sixty-one reports were selected as a representative sample for comprehensive analysis (see Table 2: List of Fifth National Reports analyzed, by region), taking into consideration as much as possible a balance

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<sup>4</sup> CBD National Reports Database: <https://www.cbd.int/reports/nr5/>

between regions and development status. This represented approximately one-third of the reports submitted by parties. While multiple examples of EBA and Eco-DRR activities are drawn from the selected reports, information from other countries not listed below are also included in this report, that come from the broader literature or other case studies.

106.

**Table 2: List of Fifth National Reports analyzed, by region**

<p><b>Africa (19)</b></p> <p>Algeria Benin Botswana Burkina Faso Burundi Cameroon Comores Congo Côte d'Ivoire Djibouti Equatorial Guinea Egypt Eritrea Ethiopia Gambia Liberia Madagascar South Africa Uganda</p> <p><b>Asia (7)</b></p> <p>Cambodia China India Mongolia Phillipines Tajikistan Thailand</p>	<p><b>Caribbean (3)</b></p> <p>Antigua &amp; Barbuda Cuba Dominican Republic</p> <p><b>Central America (7)</b></p> <p>Costa Rica Ecuador El Salvador Guatemala Honduras Nicaragua Panama</p> <p><b>Europe (9)</b></p> <p>Austria Estonia European Union France Monaco Norway Serbia Spain Sweden</p>	<p><b>Middle East (3)</b></p> <p>Azerbaijan Oman Yemen</p> <p><b>North America (2)</b></p> <p>Canada Mexico</p> <p><b>Oceania (5)</b></p> <p>Niue Palau Samoa Solomon Islands Vanuatu</p> <p><b>South America (6)</b></p> <p>Bolivia Brazil Chile Colombia Peru Uruguay</p>
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### 2.1ii) National Biodiversity Strategies and Action Plans

107. National Biodiversity Strategies and Action Plans (NBSAPs) are the principal instruments for implementing the Convention at the national level (Article 6 of the Convention). The Convention requires countries to prepare a national biodiversity strategy (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.
108. To date, 184 of 196 (94%) Parties have developed NBSAPs in line with Article 6. Decision X/2 urged Parties to revise and update their NBSAPs to incorporate the Strategic Plan within two years of its adoption. While not all NBSAPs analyzed for this report had been updated and submitted, updated information on NBSAPs were reviewed in the Fifth National Reports when available.

### **2.1iii) Submissions from Parties and Organizations**

109. The CBD Secretariat invited Parties and organizations to submit experiences, activities and targets related to EBA and Eco-DRR (Notification 2015-018). There were 20 submissions from the following parties and organizations: India, Japan, Australia, Belgium, Canada, Columbia, Germany, Italy, Mexico, and from the following organizations: Indian Council of Forestry Research and Education, Blue Solutions Initiative of the German Environment Ministry, Jagruti Gramin Vikas Sanstha, Eklari, Royal Society, UNEP, IUCN, Tebtebba, WWF and FAO.

### **2.1iv) Portfolio review of EBA and Eco-DRR projects funded by the Global Environment Facility, other organizations, and implemented by governments and a wide range of development and environmental organizations**

110. The Global Environment Facility is a partnership for international cooperation to address global environmental issues, including biodiversity, climate change, international waters, and land degradation. The GEF serves as the financial mechanism for UNFCCC, CBD UNCCD and other conventions. The GEF has financed concrete adaptation actions on the ground, through three trust funds: The Strategic Priority on Adaptation (SPA), the Least Developed Countries Fund (LDCF), and The Special Climate Change Fund (SCCF).
111. The SPA was established in 2003, with USD\$50 million, to help countries reduce vulnerability and increase adaptive capacity. The fund financed pilot adaptation projects, testing the success of adaptation planning and assessment before operationalizing the LDCF and SCCF funds.
112. The LDCF addresses urgent and immediate adaptation needs of least developed countries (LDCs) under the UNFCCC, with a focus on reducing vulnerabilities of essential ecosystem services, including the provisioning of water, agriculture and food security, health, disaster risk management and prevention, and infrastructure.
113. The SCCF targets mainly adaptation, although technology transfer and economic diversification are also promoted. It is open to all vulnerable developing countries (not just LDCs), and finances urgent and longer-term adaptation measures, including response strategies, policies, and measures. Activities address reducing climate impacts on health, integrated coastal management, water resource management in response to glacial retreat, and improved water resources management in response to droughts, floods, and warming.
114. EBA and Eco-DRR activities are also covered under the biodiversity and climate change focal areas, in addition to other cross-cutting issue and programs. To gain further detail on country and regional experiences on EBA and Eco-DRR, completed project reports were accessed from the GEF project database for the LDCF and SCCF funds, and additionally by searching for “adaptation” or “resilience” as key words to identify potentially qualifying activities. Projects with terminal evaluations included perspective of experiences and lessons learned in EBA and Eco-DRR implementation.
115. In addition to the GEF portfolio, information was included from a wide range of inter-governmental organizations and non-governmental organizations (NGOs) involved in implementation or funding, such as UNEP, UNDP, IUCN and WWF. Other examples of funding for EBA and Eco-DRR activities include the Pilot Program on Climate Resilience of the World Bank, the UNFCCC Adaptation Fund, the German International Climate Initiative (IKI), a fund of the German Federal Ministry for the Environment, Nature

Conservation, Building and Nuclear Safety (BMUB), as well as funding from national development agencies such as the Swedish International Development Cooperation, and private funds.

116. Case studies were extracted from project portfolio databases, such as CBD<sup>5</sup>, and UNFCCC<sup>6</sup> project databases, and Panorama and Blue Solutions (IUCN initiatives), and academic literature. Another source of information was the Ramsar Knowledge Information System.
117. In addition to multiple national projects, there are many multi-agency and regional EBA programmes. One example is the EBA in Mountain Ecosystems Programme, a collaborative initiative UNEP, IUCN and UNDP, and funded by BMUB through the IKI programme. The Mountain Ecosystem-based Adaptation Program is implemented in the Nor Yauyos Cochis Landscape Reserve in Peru, the Himalayas in Nepal (Kaski, Parbat and Syanja Districts) and Mount Elgon in Uganda.
118. As mentioned above, case studies were reviewed keeping in mind a balance in region, activity, and partner and implementing organizations. As much as possible, projects were included that identified challenges and lessons learned, or that had been evaluated at some stage (independently or otherwise).

### **2.1v) CBD Technical Workshop on EBA and Eco-DRR**

119. A technical workshop was convened by the CBD from 28 September to 2 October 2015 to review the report<sup>7</sup> and to share experiences on national and regional efforts to implement EBA and Eco-DRR measures. The workshop was attended by experts and practitioners from a wide range of countries and organizations (a list of participants is available in Annex 6). The experiences and key conclusions from this workshop are incorporated throughout this report.

### **2.1vi) Analysis of Information and Scope of Review**

120. The fifth national reports, and NBSAPs contained within, enabled the extraction of national-level information on EBA and Eco-DRR experiences and targets. The submissions, portfolio review, broader literature, and technical workshop provided further details and nuances on aspects of implementing, monitoring, and evaluation and policy issues.
121. Case studies were included from as wide a variety of contexts as possible (environment, conservation, humanitarian, development) on national, regional and local scales. EBA activities that primarily aimed to increase the resilience of people/communities to climate change were distinguished from conservation projects that did not focus on enhancing peoples' resilience.
122. For example, there were many examples of conservation projects that aimed to preserve biodiversity or habitat without consideration of climate change impacts. Other projects considered climate change impacts, but the interventions were aimed at increasing the resilience of particular species or ecosystems, rather than people, such as implementing natural corridors to facilitate species migrations. While these conservation measures are an integral component of national strategies for biodiversity conservation, they were not considered EBA as they did not primarily target reducing the vulnerability of people/communities to the impacts of climate change, and were thus not within the scope of this report.

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<sup>5</sup> CBD Climate Change Adaptation Database: [adaptation.cbd.int/default.shtml](http://adaptation.cbd.int/default.shtml)

<sup>6</sup> UNFCCC EbA Database:

[unfccc.int/adaptation/nairobi\\_work\\_programme/knowledge\\_resources\\_and\\_publications/items/6227.php](http://unfccc.int/adaptation/nairobi_work_programme/knowledge_resources_and_publications/items/6227.php)

<sup>7</sup> The CBD Technical Workshop on Ecosystem-based Approaches to Adaptation and Disaster Risk Reduction will be available at [www.cbd.int](http://www.cbd.int)

123. On the other hand, several projects that were not explicitly labelled as EBA or Eco-DRR were included in the analysis, as they utilized the principle of healthy, resilient ecosystems for adaptation of people and communities to climate change. Examples of such activities include the development of approaches by pastoralists to adapt to climate variability, such as mixed species grazing, and restoration of vegetated coastlines to prevent storm surges and flooding.
124. It should thus be noted that while many biodiversity and ecosystem conservation activities were not included in this present analysis because they are not targeted towards EBA objectives, this does not denigrate their value in achieving conservation objectives. At the same time, conservation should not be conflated with adaptation activities, and caution must be exercised in ensuring that the objectives of an intervention are clear before they are categorized as conservation, adaptation, or both.
125. Ecosystems provide multiple benefits to people, and can be utilized to adapt to climate change and reduce disaster risk. Thus, conservation and EBA/Eco-DRR are both important approaches to sustainable development and human well-being, but the latter is the focus of this report.

## 2.2 Framework for the Compilation Review

126. The Fifth National Reports were written to assess implementation of the Strategic Plan 2011 – 2020 and progress achieved towards the Aichi Biodiversity Targets. As such, a vast amount of information was available to inform on Parties' experiences, activities, and targets on EBA and Eco-DRR.
127. The Fifth national reports were not standardized, and had varying levels of detail and structure. In order to consistently review and extract information from the reports, a framework was developed to interpret the data (as described below).

### 2.2.i) Framework Part A: Identification of EBA Activities and Targets

- i. Whether the report, activity, or programme includes measures of EBA (whether or not EBA is explicitly listed)
- ii. Whether EBA action was focused on adaptive capacity of people and communities (primary target) or of ecosystems (secondary target)
- iii. The general category of activity, according to a typology that was developed to strike a balance between detail, inclusiveness and timeliness. The general categories and examples are adapted from the IUCN EBA Mapping Exercise (IUCN 2014)<sup>8</sup>, supplemented with examples and information from the CBD Technical Series 41<sup>9</sup> and the UNFCCC EBA Technical Workshop report.<sup>10</sup> The complete list of EBA and Eco-DRR activities are contained in Annex 6 as a filter-able Excel table.
- iv. Progress on Aichi Targets: The review of Fifth National Reports focused on progress on the Aichi Targets related to EBA and Eco-DRR. While Target 14 and 15 are particularly relevant for EBA and Eco-DRR, the achievement of other targets, including (but not limited to) Targets 5, 7, 9, 10, 11,

<sup>8</sup> IUCN 2014. Nature-Based Solutions for Human Resilience: A Mapping Analysis of IUCN's Ecosystem-based Adaptation Projects.

<sup>9</sup> CBD. 2009. Connecting biodiversity and climate change mitigation and adaptation: Report of the second ad hoc technical expert group on biodiversity and climate change. Montreal, Canada: Technical Series No. 41

<sup>10</sup> UNFCCC 2013. Report on the technical workshop on ecosystem-based approaches for adaptation to climate change. Note by the secretariat- FCCC/SBSTA/2013/2

and 13, are also important to the achievement of EBA and Eco-DRR goals to reduce vulnerability of people to the impacts of climate change. The rationale for selecting these targets for analysis is presented in Annex 2.

128. Countries have described progress using a range of terms such as low-high, poor-good, or % implementation. At times simple descriptive adjectives are used by Parties, such as “good progress was made on Target X...” A consistent descriptor was used to standardize the information from the reports, as in Table 3 below.

**Table 3: Descriptors of progress on the Aichi Biodiversity Targets**

Progress descriptor for Aichi Target utilized in this report	Corresponding country descriptor
<b>Low</b>	Poor, 0-25% implementation, limited progress
<b>Fair</b>	25-50% implementation
<b>Good</b>	50-75% implementation
<b>Very good</b>	75-100% implementation
<b>No data available, or not assessed</b>	

**2.2ii) Framework Part B: Identification of Eco-DRR Activities & Targets**

- i. Whether there is mention of disaster or hazard risk reduction in the report
- ii. Whether there are targets related to DRR, and where they are found (e.g. NBSAP, NAPA, development strategy)
- iii. The hazard addressed if DRR is referred to

**2.2iii) Framework Part C: Experiences: Challenges & Lessons Learned**

- i. Major challenges related to implementation of EBA and Eco-DRR
- ii. Synergies with Rio Conventions (UNFCCC OR UNCCD), or other Conventions
- iii. Lessons learned

### **3. THE POLICY & INSTITUTIONAL CONTEXT FOR EBA AND ECO-DRR**

129. While the evolution of the concepts of EBA and Eco-DRR have been briefly discussed in the introduction, this section provides a more detailed overview of relevant decisions, policies and programmes related to both EBA and Eco-DRR, and country experiences with EBA and Eco-DRR policies and their integration into NBSAP, adaptation and other strategies.
130. International policies, strategies and frameworks often do not explicitly mention Eco-DRR or EBA, but include these concepts indirectly. For example, many agreements and conservation frameworks address natural hazards, which can be reduced by conservation, wise management, restoration and climate-informed management of ecosystems. In these cases, the linkages of policies, strategies and frameworks to EBA and Eco-DRR are illustrated.

### **3.1 Adaptation-related frameworks, decisions and resolutions at international level**

131. The following is a summary of policies, strategies and frameworks related to adaptation (in addition to those already mentioned above). There are some direct and indirect references to EBA, and by extension, also linkages to Eco-DRR, given similarities in practice of both EBA and Eco-DRR. Annex 2 summarizes the policies, strategies and frameworks discussed thus far in a table for quick reference, including linkages to EBA and Eco-DRR.
- a) The Nairobi Work Programme (NWP) on Impacts, Vulnerability and Adaptation to Climate Change was established at UNFCCC COP 11 as a mechanism under the Convention to facilitate and catalyze the development and dissemination of information and knowledge that would inform and support adaptation policies and practices. At COP 17, acknowledging the need to consider ecosystems for enhanced action on adaptation, requested that a technical workshop on EBA be held.
  - b) The UNFCCC Cancun Agreements, discussed above, introduced principles for adaptation action, including the integration of adaptation into relevant social, economic and environmental policies and plans.
  - c) The National Adaptation Plan (NAP) process was established under the Cancun Adaptation Framework. It enables Parties to formulate and implement NAPs as a means of identifying medium- and long-term adaptation needs and developing and implementing strategies and programmes to address those needs.
  - d) National Adaptation Plans of Action (NAPAs) under the UNFCCC provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent and immediate needs to adapt to climate change
  - e) The Convention on Migratory Species (CMS) Resolution 11.26, "Programme of Work on Climate Change and Migratory Species," references the impacts of climate change on migratory species, including the impact on habitats and on local communities dependent on the ecosystem services provided by these species
  - f) The Hyderabad Call for a Concerted Effort on Ecosystem Restoration was launched at CBD COP11 at the Rio Conventions Pavilion, calling for "concerted and coordinated long-term efforts to mobilize resources and facilitate the implementation of ecosystem restoration activities on the ground for sustaining and Improving the health and well-being of humans and all other species with whom we share the planet."

### **3.2 DRR-related frameworks, decisions and resolutions at international level**

132. The following are policies related, either explicitly or indirectly, to disaster risk reduction. There are some direct and indirect references to Eco-DRR, and by extension, also linkages to EBA, given similarities in practice of both EBA and Eco-DRR. Annex 2 contains further details.
- a) The UN International Strategy for Disaster Reduction (ISDR), with a vision to enable all communities to become resilient to the effects of natural, technological and environmental

hazards, and to proceed from protection against hazards to the management of risk through the integration of risk prevention into sustainable development

- b) The UNCCD Advocacy Policy Framework on drought, adopted at UNCCD COP 11 in Windhoek, Namibia, urges Parties to develop and implement national drought management policies. Drought risk is closely linked to ecosystem degradation, and conservation and restoration of ecosystems can mitigate this risk.
- c) Parties to the CBD, at COP 12 in Pyeongchang, Republic of Korea, promoted EBA and Eco-DRR in decision XII/20.
- d) Parties to the Ramsar Convention on Wetlands adopted Resolution XII.13 on Wetlands and Disaster Risk Reduction at COP12 (Punta del Este), which emphasizes the ‘importance of conserving, restoring and wise use of wetlands for disaster risk reduction’
- e) The UN General Assembly recently adopted the Sustainable Development Goals (SDGs). The proposed SDG 11 aims for “Inclusive, safe, resilient and sustainable cities and human settlements targets,” with proposed sub-targets of reduced deaths and economic losses due to disasters, and adoption of policies towards climate change adaptation, resilience to disasters, and holistic disaster risk management at all levels.

133. The Sendai Framework for Disaster Risk Reduction 2015 – 2030 was adopted at the Third UN World Conference on Disaster Risk Reduction in 2015, Sendai, Japan, and endorsed by the UN General Assembly. Building on its predecessor, the Hyogo Framework for Action adopted in 2005, the Sendai Framework outlines seven global targets to be achieved over the next 15 years.
134. Several key elements in the Sendai Framework have direct or indirect linkages to EBA and Eco-DRR measures. The Sendai Framework places emphasis on tackling underlying disaster risk drivers, including climate change and unsustainable use of natural resources. It also calls for DRR and building of resilience to be addressed in the context of sustainable development and poverty eradication.
135. Moreover, the Sendai Framework addresses all types of hazards: “small-scale and large-scale, frequent and infrequent, sudden and slow-onset disasters caused by natural or man-made hazards, as well as related environmental, technological and biological hazards and risks.” This multi-hazard approach includes climate-related natural hazards, highlighting that there is a role for inclusion of adaptation, EBA and Eco-DRR within DRR strategies.
136. The Framework additionally calls for national targets and indicators to assess progress. A set of principles was also established, calling for coherence across sustainable development and growth, food security, health and safety, climate change and variability, environmental management and DRR.
137. Priorities for action have also been established, among them, investing in DRR for resilience, and to “strengthen the sustainable use and management of ecosystems and implement integrated environmental and natural resource management approaches that incorporate disaster risk reduction.”
138. At regional level, several policies relevant to EBA and Eco-DRR have been established within the EU, with several examples provided below:
  - The EU Strategy on Adaptation to Climate Change (EC, 2013b) aims to make Europe more climate resilient by ensuring the full mobilisation of Green Infrastructure (GI) or ecosystem-based approaches to adaptation.

- The 2013 European Commission Strategy on Green Infrastructure (COM/2013/0249final) (EC, 2013a) underlines that GI can make a significant contribution to the effective implementation of all policies where some or all of the desired objectives can be achieved in whole or in part through nature-based solutions.
- The Seventh Environment Action Programme (7EAP) (Decision No 1386/2013/EU) aims to enhance ecological and climate resilience, such as ecosystem restoration and GI, can have important socioeconomic benefits, including for public health.
- The EU Biodiversity Strategy (COM(2011) 244 final) calls for a restoration of at least 15% of degraded ecosystems in the EU and aims to expand the use of GI. In addition, the European Commission will continue mapping and assessment work of GI in the context of the Biodiversity Strategy.
- The Regional Policy 2014–2020 foresees support for ecosystem-based approaches to adaptation and GI through financial instruments such as the European Regional Development Fund and the Cohesion Fund, which contribute to several policy objectives and deliver multiple benefits, in particular socio-economic development.
- The Water Framework Directive (2000/60/EC), Nitrates Directive (91/676/EEC) and the Floods Directive (COM(2006)15) offer GI-related opportunities (for instance, by supporting actions to put in place GI to improve soil retention, act as buffer strips between agricultural production and water sources, and provide water storage during flood events) (EEA, 2015).

## **4. MAKING THE CASE FOR EBA AND ECO-DRR**

### **4.1 Selecting EBA and Eco-DRR within adaptation and DRR strategies**

139. There has been growing recognition that approaches to adaptation that utilize healthy or functional ecosystems can contribute to climate change mitigation and adaptation. The international policy framework for EBA is gaining traction and strengthening, as discussed above. However, making the case for ecosystem-based approaches has been challenging. Part of this difficulty is due to the lack of systematic analyses of EBA vs. other kinds of adaptation approaches.
140. So what's in the adaptation and disaster risk reduction toolbox? Adaptation solutions include "hard" or "grey" engineered solutions, such as the construction of sea walls; and "soft" strategies that focus on institutions, behavioral change, and policy (WWF 2013). "Green" approaches, which include EBA, focus on ecosystems and ecosystem services to help people adapt to impacts of climate change; and "community-based" adaptation (CBA) measures are led by communities, including indigenous peoples and local communities, based on their priorities, needs, knowledge and capacities (Reid 2015).
141. While differing in theory, EBA and CBA, like Eco-DRR, are often identical in practice. Good EBA practices involve community participation and ownership, while good CBA practices involves the consideration of ecosystems and ecosystem services – often both approaches are used in local adaptation efforts and are indistinguishable in the field (Reid 2015). Community ecosystem-based adaptation (CEBA) brings both CBA and EBA together.

142. Hard solutions are often promoted due to the delivery of immediate benefits and the perceived feeling of security, such as building a sea wall, dike, or installing irrigation systems. However, as learned from earlier disaster risk reduction efforts, engineering solutions can be costly to maintain, require large capital investment, and may even result in maladaptation in the long run by disrupting ecological processes (CBD 2009).

143. For example, the displacement of coastal vegetation such as salt marshes to make way for hard infrastructure removes the natural ability of marsh vegetation to buffer against the impacts of storm surges. Existing salt marshes have unique ecosystem-engineering capabilities that enable them to build elevation and move land-ward, keeping pace with sea level rise – however, the ability of salt marshes to respond to sea level rise is threatened by hard infrastructure, known as the “coastal squeeze” problem (Duarte et al. 2013). In addition, a seawall which breaks (due to lack of maintenance or inability to withstand wave forces) increases the risk of disaster as well.

144. Grey and green solutions have been combined, such as in managed realignment/retreat, practiced in the UK and the Netherlands, in which old sea walls at risk from sea level rise are breached in order to restore or create mudflats and salt marsh habitat. The establishment of salt marsh vegetation then provides additional coastal protection while protecting new seawalls that are constructed landward (Roman and Burdick 2012).

145. Green, soft and community approaches to adaptation tend to be robust, low-regrets strategies, yielding multiple benefits even in the absence of impacts from climate change or disasters. They also provide flexibility in the face of uncertainty in climate forecasts.

146. In some cases, a combination of green, soft and grey/hard approaches is most appropriate to meet adaptation needs. In addition to these adaptation approaches, there are several management practices that have already been utilized and that can (but do not always) contribute to climate change adaptation and DRR.

147. CBNRM, CLICs and CBA have been mentioned above; other approaches include, but are not limited to, the following (definitions are provided in the section ‘Glossary & Acronyms’):

- Climate Smart Agriculture (CSA)
- Integrated water resource management (IWRM)
- Protected Area Management (PAs)
- Integrated Coastal Zone Management (ICZM)
- Sustainable Land and Water Management (SLWM)
- Sustainable forest management (SFM)
- Community-based Natural Resource and Risk Management (CBDRRM)
- Green Infrastructure
- Nature-based solutions
- Agroforestry
- Natural water retention measures

• • •  
Since ecosystems provide different types of services that increase human wellbeing, EbA serves the dual purpose of satisfying immediate needs and building safety nets and resilience for the future. Moreover, healthy ecosystems provide important services for DRR and can help reduce the gaps between DRR and adaptation efforts; for example, by serving as protective barriers against disasters and building local resilience by sustaining livelihoods and improving capacity to adapt to climate change.”

~ WWF 2013

• • •

148. These approaches may differ in purpose and theory, but can in some cases overlap in practice with EBA and Eco-DRR, if the goal of the approach is to reduce identified vulnerabilities of people and ecosystems to the impacts of climate change.
149. Given the multiple approaches mentioned above, how does EBA and Eco-DRR fit in among the different options? One way in which to inform the selection of a strategy is measuring and evaluating effectiveness, described in more detail below. But when the approaches are relatively new, as is the case for EBA and Eco-DRR, assessing benefits can be hampered by lack of data and standard methodologies for cost-benefit analyses and monitoring and evaluation.
150. There are indications that when countries have chosen EBA and Eco-DRR as adaptation options over, or in addition, to grey and grey/green solutions, it has been partly because of anticipated multiple benefits – but other prerequisites for the choice are existence of some evidence for effectiveness, coupled with sufficient resources for implementation. This is clear in the case of protection forests which stabilize slopes and has been proven to guard against climate-related natural hazards, such as landslides resulting from heavy precipitation events.

151.

The government of Japan's submission to CBD included several examples of large scale efforts to implement protection forests and increase research on the most effective mix of tree species to utilize, and restoring river bank vegetation to reduce the risk of floods. In the devastating wake of the Great East Japan Earthquake, The Study Group for the Restoration of Coastal Disaster Prevention Forests Related to the Great East Japan Earthquake was established, providing guidance on the creation of multi-functional coastal disaster prevention forests that incorporate the ecosystem approach, in order to reduce damage from future tsunamis.

152. Similarly, maintaining and improving the functionality of protection forests is a key activity within the Bavarian Climate Protection Program, Klimaschutzprogramm Bayer. Because of the important role of forests in mitigating the risks posed by natural hazards, the program aims to improve the stability and functionality of mountain forests, including improving forest stand structures, fostering adapted species mixtures, promoting natural regeneration, preventing forest fires or controlling pests and diseases.

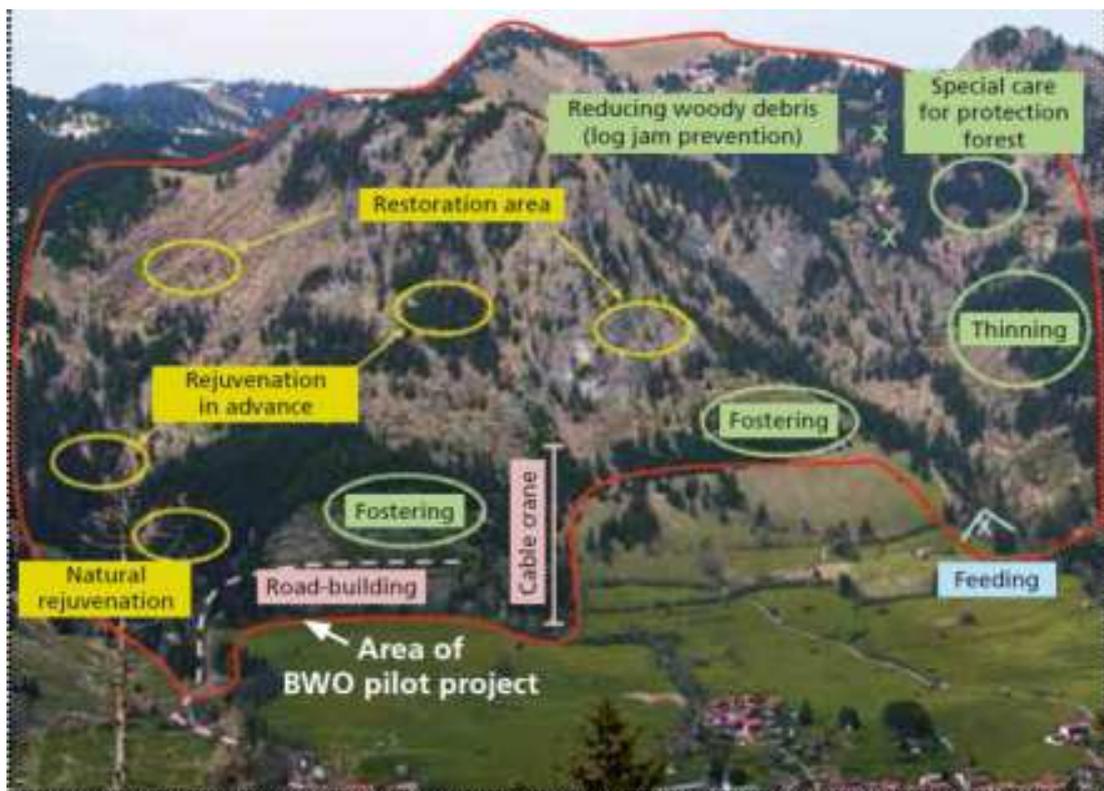


Figure 3: Example of maintaining and improving the functionality of protection forests in Bavaria, Germany (Bavarian State Institute of Forestry)

DRAFT

153. In some cases, public preference can be a strong component for selecting EBA and Eco-DRR options, in addition to evidence of benefits, as illustrated in the case study in Switzerland presented below, where community preference for the recreational and aesthetic aspects of implementing protection forests to guard against avalanches and landslides played a role in the selection process.
- 154.

#### Case Study 5: Protection Forests in Switzerland to Combat Avalanches and Landslides

In Switzerland, protection forests are a main component of its disaster risk reduction program in the Alps to protect critical infrastructure from frequent disasters including rock fall, avalanches or landslides.

The Swiss government spends over \$120 million annually on the management of its protective forests to achieve a balance between young and old trees and a mix of species to keep forests healthy and strong. The government forest office manages the protection forests even if they are owned privately. In some cases, the local government will even financially compensate private land owners in the case that they have lost income from logging.

Local people prefer to have forests for protection as they also provide places for recreation, are more aesthetic and seem less threatening than avalanche barriers or rock nets. Protection forest planning takes a time span of 50-100 years and is based on public willingness to maintain their forests as well as a number of scientific studies, forest management guidelines and cost-benefit analyses that demonstrate that protection forests cost 5-10 times less than structurally engineered structures over time (Wehrli and Dorren, 2013).

*~ Excerpted from UNEP and CUAS 2015*

155. Despite the limited availability of hard evidence thus far on EBA and Eco-DRR effectiveness, there should be a clear rationale for implementing EBA and Eco-DRR as 'low-regrets' strategies, based on the anticipated multiple benefits they may bring in addition to the goals of climate change adaptation and disaster-risk reduction.
156. These benefits include the contribution to sustainable livelihoods by maintaining the provisioning ecosystem services that provide clean water, food and fiber. Poverty reduction is thus supported, particularly in developing countries where populations are strongly dependent on natural resources for livelihoods. The ecosystem approach also supports heritage conservation and preservation of local identities, such as in forest communities (UNEP and CUAS 2015). Figure 4 demonstrates some additional benefits of EBA and Eco-DRR approaches.

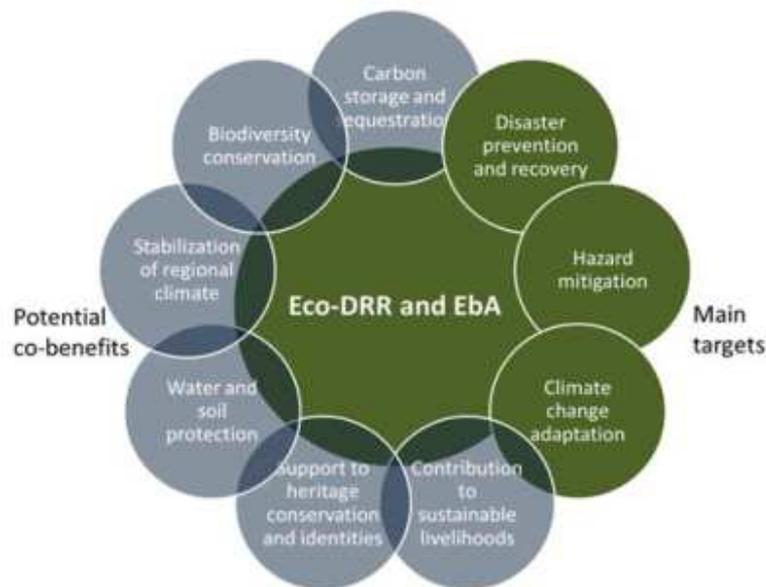


Figure 4: Multiple benefits of Eco-DRR and EBA (Nehren 2014, modified from Estrella and Saalisamaa 2013)

#### 4.1i) Challenges and Gaps

157. While adopted in principle, there can be difficulty in translating knowledge and recognition of the benefits of EBA and Eco-DRR into implementation and action on the ground. Anecdotal examples are common, as seen in the Fifth National Reports submitted to the CBD and reviews of case studies. Goals of EBA activities were often described broadly, such as increasing resilience, reducing flooding, ensuring food security, or building capacity. Results were often communicated qualitatively, such as “stakeholder participation increased,” or “communities are more informed.”
158. Making the case for EBA and Eco-DRR requires reviewing the evidence base already existing in the literature, including evidence from areas where EBA is implemented without being labelled as such – including the areas of disaster risk management, sustainable land management, ecosystem restoration, and soil and water conservation (WWF 2014).
159. To date, there has been little attempt to systematically assemble and analyse evidence for EBA effectiveness across a range of related fields, such as natural resource management, disaster risk reduction and agro-ecology (Munroe et al. 2012). There is a need for further scientific studies on EBA effectiveness, particularly those evaluating “before and after” effects of EBA implementation in two comparable sites (Reid 2011).

#### 4.1ii) Lessons Learned

160. Participants at the CBD technical workshop on EBA and Eco-DRR noted that many existing approaches share the same rationale with EBA. In making the case for EBA and Eco-DRR, a rationale for implementing EBA and Eco-DRR as part of overall approaches to climate change and disaster risk reduction is due to the anticipated multiple benefits they may bring. These benefits include contributing

to sustainable livelihoods by maintaining the ecosystem services that provide clean water, food and fiber; supporting poverty reduction; heritage conservation, and preservation of local identities, such as in forest communities.

- 161. Additionally, it is important to seek for convergence in implementation of the different policies and multilateral agreements such as the Sustainable Development Goals (SDGs), the Sendai Framework, Biodiversity goals and the Aichi targets, including the upcoming Climate Change Agreement at COP 21 in Paris.
- 162. Overall, there should be divestment from measures that are harmful and have negative impacts on ecosystems, and investment in measures that support restoration and maintenance of biodiversity and ecosystem services.

**4.1iii) Opportunities**

- 163. Choosing adaptation options, whether grey, green, soft, and community-based or a combination of approaches, is a complex, multi-thematic, cross-sectoral process involving all levels of governments, stakeholders, the private sector, scientists, citizens and NGOs. It is important to use a decision-making process that reflects this complexity. However, there is a lack of instruments and tools for prioritizing EBA and Eco-DRR at various scales. The tools that are available need to be piloted, evaluated and refined for further use.
- 164. One example of a decision support tool was developed by the European Environment Agency, and includes a set of guiding principles for good practices in adaptation to support planning and decision-making. The principles were based on an extensive literature review and expert opinion (ETC/ACC 2010), shown in Figure 5 below.

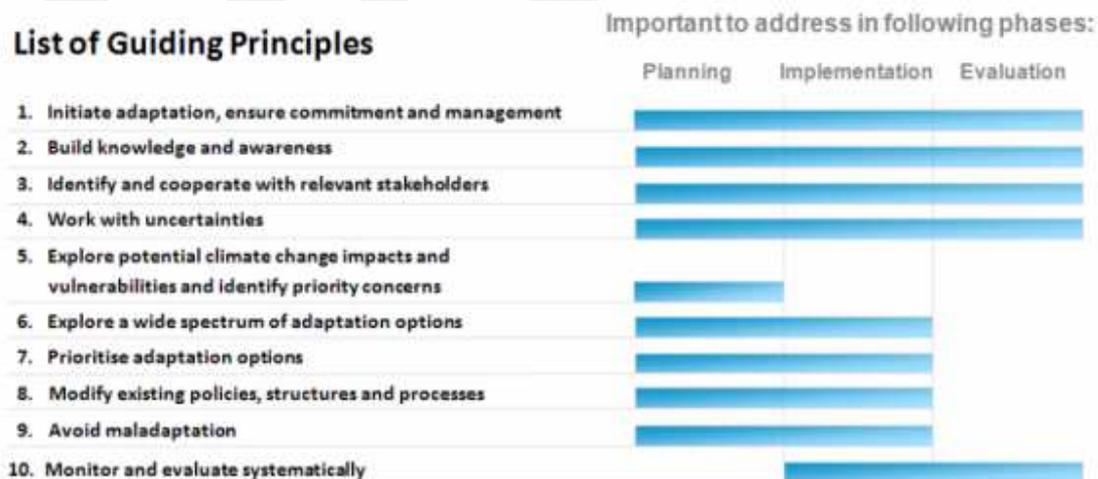


Figure 5: List of Guiding Principles for Good Practices in Adaptation, for planning and decision-making, developed by the European Environment Agency (ETC/ACC 2010)

165. From this example, principles 6 and 7 elaborate the decision-making process for adaptation options, considering first a broad spectrum of options, determining which are best interconnected with structures and processes (ETC/ACC 2010). Priorities can then be identified with tools such as multi-criteria analysis (MCA), cost-benefit analysis (CBA) or cost-effectiveness analysis (CEA), which are discussed further below.

## **4.2 The Economic Case for EBA and Eco-DRR**

166. An essential component of making the case for EBA is demonstrating its economic benefits, particularly in the long term. However, it is often difficult to express the multiple benefits in exact numbers, and examples of cost effectiveness have been limited thus far, with few case studies providing quantified economic assessments (Reid et al. 2011, Rizvi et al. 2014). As EBA is a relatively new field of practice, data on benefits are lacking, and there are no standard methodologies for tracking benefits, nor many comparisons between existing methods.
167. One of the most common methods of appraising adaptation options is cost-benefit analysis (CBA), also referred to as benefit-cost analysis. CBA is a systematic process of identifying, valuing, and comparing costs and benefits of a project in order to make concrete recommendations. Specifically, CBA is used to determine the extent to which the benefits of a given project outweigh the costs and to compare the relative merits of alternative projects in order to identify a preferred approach (Brown et al. 2014). Other methodologies include cost-effectiveness analysis (CEA), robust decision making (RDM) and real options analysis (ROA), each with differing approaches, levels of uncertainties, and level of effort needed in conducting the analyses. Table 4 below provides a brief outline of the advantages and disadvantages of each appraisal method.

Table 4: Methods for appraising the value of EBA and Eco-DRR activities (excerpted from Frontier Economics 2013)

Methodology	Brief Description	Advantages	Disadvantages
<b>Multi-criteria analysis (MCA)</b>	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
<b>Cost-effectiveness analysis (CEA)</b>	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 co-benefits
<b>Scenario-based cost-benefit analysis (SBCBA)</b>	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'
<b>Robust decision making (RDM)</b>	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
<b>Real options analysis (ROA)</b>	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

168. At CBD COP 10, Parties and other Governments were invited to “take into account the values of biodiversity and ecosystem services when planning and undertaking climate change related activities by using a range of valuation techniques.”<sup>11</sup>
169. Several recent initiatives that utilize valuation of biodiversity and ecosystem services, or appraisal of EBA and Eco-DRR interventions, are outlined below:
- a) The Economics of Ecosystems and Biodiversity (TEEB) project provided data and understanding of the contribution of nature to the economies of the world; TEEB and other economic valuation studies have provided evidence that nature provides services that contribute economically to human well-being, and have recommended investment in ecosystems for climate change (TEEB 2010)
  - b) The Economics of Land Degradation (ELD) Initiative provides a platform for discussion between stakeholders from the policy, science, and private sectors, focused on developing globally relevant data on the economic benefits of land and land based ecosystems. It highlights the potential benefits derived from adopting sustainable land management practices, which include EBA and Eco-DRR practices, and seeks to establish a universal approach for economic analysis of land management.
  - c) The Global Mechanism of the UNCCD, OSLO consortium and CBD published a report in 2013 on “Valuing the Biodiversity of Dry and Sub-Humid Lands,” explaining how valuation techniques can generate economic data in drylands, and how that may be applied in policymaking (CBD et al. 2013). This can provide further evidence for EBA and Eco-DRR activities aimed at increasing resilience of drylands communities to drought, land degradation and desertification induced by climate change.
  - d) The ADAPTCost Project, funded by UNEP under the Climate Change-Norway Partnership, investigated and built evidence on the potential costs of adaptation in Africa through a detailed review of estimated costs, models, and sector analysis, discussed at the Tunis Roundtable on the Economics of Adaptation in 2010 (Watkiss et al. 2010). A preliminary analysis of costs of EBA actions were included in the analysis. The economics of EBA for Africa was identified as a future priority of the ADAPTCost project.
  - e) Wealth Accounting and the Valuation of Ecosystem Services (WAVES) is a global partnership that aims to promote sustainable development by ensuring that natural resources are mainstreamed in development planning and national economic accounts. The partnership brings together a broad coalition of governments, NGOs, and inter-governmental organizations to implement Natural Capital Accounting (NCA) where there are internationally agreed standards, and develop approaches for other ecosystem service accounts.
170. The example below highlights the steps taken to conduct an economic analysis of ecosystem-based adaptation and engineering options for climate change adaptation in Lami Town, Republic of the Fiji Islands, from an initial assessment of vulnerabilities to the development of scenarios with full participation of stakeholders, using a range of economic analyses including CBA, least-cost analyses, and calculating costs of inaction.

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<sup>11</sup> CBD COP 10, decision X/33, paragraph 8(y)

### Case Study 6: An economic analysis of ecosystem-based adaptation and engineering options for climate change adaptation in Lami Town, Republic of the Fiji Islands.

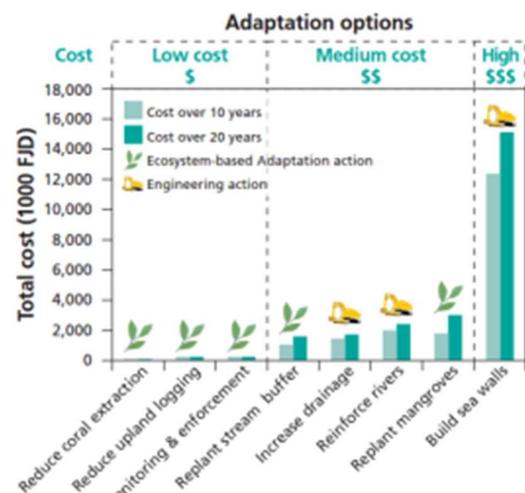
A vulnerability and adaptation assessment of Lami Town, Fiji, demonstrated vulnerabilities to shoreline, riverbank and inland erosion, and potential solutions. To further analyse adaptation options, a cost-benefit assessment of four adaptation scenarios was conducted. These scenarios represent the spectrum of ecosystem-based and engineering adaptation options to reduce vulnerability to storms, which was identified by the Lami Town Council as the principal vulnerability concern.

Key activities included:

- Identifying key areas of vulnerability and possible adaptation options through a vulnerability assessment process with community involvement.
- Classifying potential adaptation activities, including EbA, social/policy and engineering options
- Determining costs for the potential adaptation activities, and performing a least-cost analysis
- Calculating the cost of inaction, or “status quo”, including health, business, and household costs, resulting from storms, some of which can be avoided by adaptation actions
- Developing scenarios ranging from EbA to engineering options
- Conducting a cost benefit analysis of each scenario

Results showed that the ecosystem-based approaches costed less than the engineering options, when considering both 10-year and 20-year timelines. However, taking any action to protect the coastal community from storms—either ecosystem-based adaptation or engineering—was preferable to not taking action.

~ Rao et al. 2013



172. Other cost-benefit analyses have also found that the protection and restoration of mangroves or wetlands (or “green infrastructure”) can be less costly over the long term than engineering solutions. Protecting natural habitats can also extend the lifetime of investments in costly hard infrastructure, such as the establishment of salt marsh vegetation to extend the lifetime of a sea wall and for additional coastal protection measures.

173. In Vietnam, investing in restoration and protection of 12,000 hectares of mangroves cost the Vietnamese Red Cross approximately US\$1.1 million. It was estimated to cost far more - US\$7.3 million - to pay for dyke maintenance had the restoration initiative not taken place. In addition to coastal protection, other benefits included diversifying livelihoods by enabling families to sell crabs, shrimp, molluscs and seaweed that thrive in the mangroves, and increasing the protein in their diets. The coastal protection benefits

were realized after Tphoon Wukong in 2000, where areas with the restored and protected mangroves remained relatively unharmed in contrast to neighbouring provinces which suffered losses in lives, property and livelihoods (Reid et al. 2011).

174. The UK Climate Change Risk Assessment identified risks and opportunities climate change is likely to bring to different sectors. Flood risk is predicted to increase, affecting properties, agriculture, health, transport, energy, business, and the natural environment. The Economics of Climate Resilience (ECR) was commissioned by the UK government (Defra and the Devolved Administrations (DAs)) to inform the UK's first National Adaptation Programme. In the first phase, evidence was provided to assist policymakers and wider stakeholders in understanding the extent of current and expected adaptation actions, the relative effectiveness of those actions and the barriers to their implementation. The second phase focused on how robust decisions can be made when considering alternative adaptation actions. A framework was developed for gathering data and selecting the most appropriate methods for appraising adaptation actions, as outlined in Figure 6

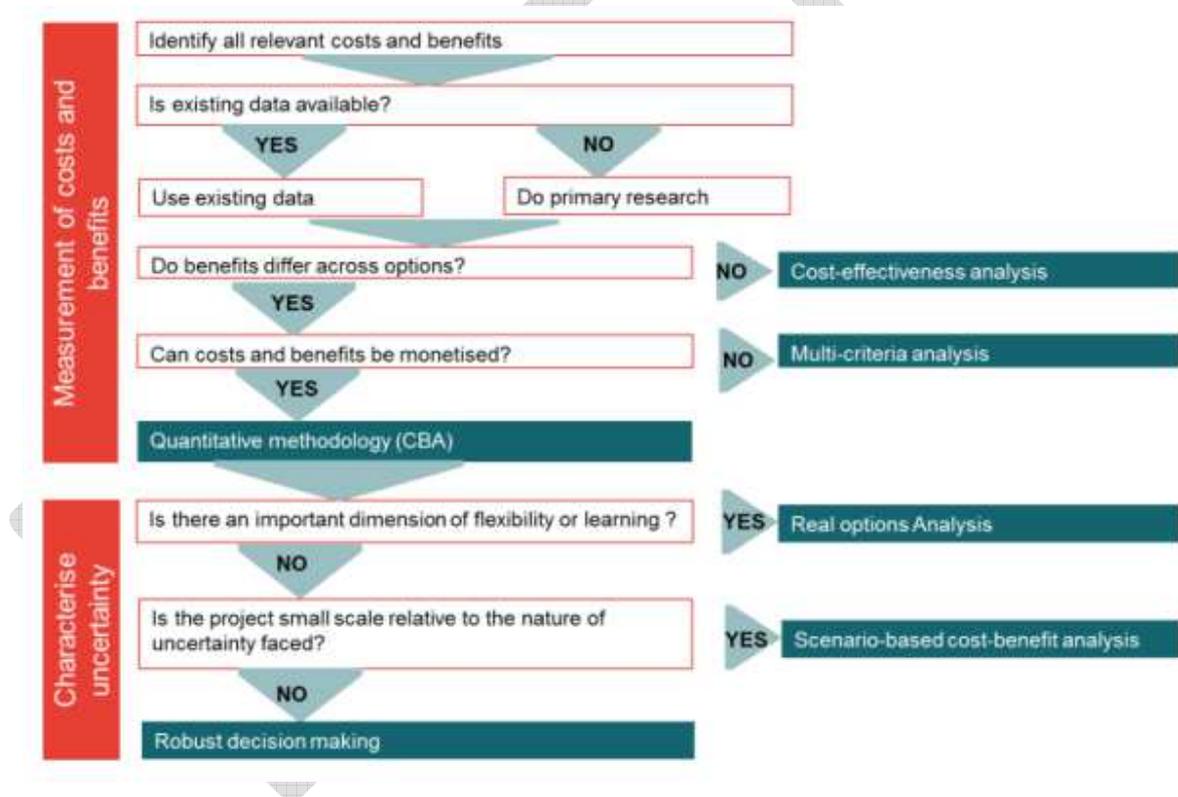


Figure 6: Framework for gathering data and selecting the most appropriate methodology for appraising adaptation (Source: Frontier Economics)

175. The conclusions of the UK study were that in the context of flood risk management, an appraisal method based on the principles of robust decision making (RDM) offers practitioners, in the majority of cases, the most reliable approach to choosing between alternative adaptation options because of its comprehensiveness and ability to deal with deep uncertainty. The case study below illustrates the application of using robust decision making to appraise natural flood defence adaptation measures.

**Case Study 7: 'Slowing the Flow': Using Robust decision making to appraise natural flood defence adaptation measures in Pickering, North Yorkshire, UK**

In the 'Slowing the Flow' project, a package of flood defence measures was proposed for the Pickering area in North Yorkshire, UK, which has suffered from £7 million of damage to businesses, homes, and local infrastructure. The hybrid defence measures included EBA/Eco-DRR activities such as planting riparian and floodplain woodlands, establishing no-burn buffer zones along moorland streams, and restoring streamside buffer zones. Robust decision making (RDM) was selected as the most appropriate appraisal method for potential adaptation actions to manage flood risk. The results of the RDM analysis showed that the package of proposed flood defence measures was largely beneficial, driven by the co-benefits created by the natural measures. Sensitivity analyses were performed in order to test the robustness of the results and also identify the conditions under which the natural flood defence measures are cost effective.

~ Frontier Economics, 2013

#### **4.2i) Challenges and Gaps**

177. The review of Fifth National Reports indicated that across the EBA activity spectrum, valuation and cost benefit analyses ranked very low in terms of Parties' reported activities, representing only 3% of all EBA activities. When reviewing a similar number of studies in the broader literature, and submissions from organizations and funders, the figure rose to 8%. This may reflect that, since economic analyses of benefits of EBA requires technical capacity and sufficient data and expertise, they have largely been conducted as broad partnerships with sufficient funds. Lack of resources, both technical and financial, may impede countries' abilities to analyze economic benefits of EBA.
178. Given the relative youth of EBA programs and activities implemented, there is also a lack of data on economic benefits to inform valuation and cost-benefit analyses.
179. Additionally, economic valuation is only one way to capture some of the benefits of EBA and Eco-DRR. Ecosystem-based approaches can also provide a suite of benefits that are non-monetary, such as cultural, spiritual, research or educational benefits. The methodology for valuing these non-monetary ecosystem services is advancing rapidly in the field of ecosystem services, but is currently not without controversy.

#### 4.2ii) Lessons Learned

180. Participants at the CBD Technical Workshop on EBA and Eco-DRR concluded that:
1. Economic valuation CBA, and CEA can vary in scope of assessment and cost. A quick assessment may suffice and is often much less expensive, whereas complex assessments can be costly.
  2. It is important to capture costs and benefits more broadly, including unintended impacts and opportunity costs, while noting that benefits to the individual are usually difficult to quantify
  3. The interpretation of the results of some economic analyses is dependent on values which may differ for decision-makers and stakeholders; for example, labour can be reported as a cost, but can also be seen as a benefit from the perspective of job creation.
  4. Other values that are non-economic or quantifiable are also important to consider, as implied by the CBD COP decision X/33 to take into account the values, not just economic, of biodiversity and ecosystem services when planning and undertaking climate change-related activities.
  5. Costs and benefits may also not be distributed equally among stakeholders or sectors of society, creating incentives for some to implement EBA, but not for others (Rizvi et al. 2014). Understanding how the benefits and costs of EBA are distributed is therefore essential for evaluating EBA benefits.
  6. Quantifying the economic benefits of EBA and Eco-DRR may be difficult given the relative youth of programs and activities implemented, and given that non-monetary benefits, such as cultural, spiritual, research or educational benefits, can be difficult to quantify. However, there have been examples where economic valuation has aided in illustrating the benefits of EBA and Eco-DRR measures.
  7. Valuation is important but is only one way to make the case for policy-makers to invest in nature; and should be part of a suite of measures/ incentives to encourage the implementation of the ecosystem approach when appropriate.

Economic valuation as a tool in decision making should not be used alone. Decision-making processes should balance economic information and non-monetary values, such as the cultural and spiritual values, ascertained from engagement with experts and local stakeholders.

~ IUCN 2014

#### 4.2iii) Opportunities

181. Costs and benefits of EBA activities need to be evaluated in order to effectively make the case for implementing EBA. While data gaps and lack of capacity may impede such efforts, innovative tools and frameworks are currently being developed and tested.
182. One example is the InVEST (Integrated Valuation of Environmental Services and Trade-offs) suite of modeling tools which maps, quantifies, and estimates the value of ecosystem services, helping to decision-makers to evaluate the economic and spatial impacts of development and climate change. InVEST combines spatial and biophysical models with economic techniques (e.g. avoided damage cost or market valuation) to value ecosystem services, improving upon traditional CBA methods by addressing variation in the distribution of costs and benefits across an area (Rosenthal et al. 2013). InVEST has been piloted in several countries, including Belize, where it was used develop a national Integrated Coastal Zone Management Plan.

183. Another example is a screening methodology currently proposed for evaluating the role of green infrastructure (GI) for mitigating vulnerability to weather and climate variability-related natural hazards at European level, as outlined in a recent report of the European Environment Agency (EEA 2015). The results of an initial assessment addressing landslides, avalanches, floods, soil erosion, storm surges and carbon stabilization has shown that it is possible to use ecosystem services to assess G and identify potential areas for conservation and restoration.
184. The development of decision-making tools such as InVEST, screening methodologies for assessing green infrastructure potential, and valuation of ecosystem services, are rapidly evolving. Many advancements are anticipated in the future. For example, InVEST currently provides options in an assumed stationary climate and therefore does not account for vulnerability of ecosystems to climate change. Developing, implementing and refining valuation methods and tools such as InVEST will be an important next step, and an important opportunity, in assisting countries to evaluate adaptation solutions and demonstrate the economic benefits of EBA and Eco-DRR approaches.

### 4.3 Communicating EBA and Eco-DRR: Developing Capacity and Disseminating Knowledge

185. The managers of EBA and Eco-DRR policies and programmes need to engage meaningfully with a diverse range of stakeholders if they are to be successful. This involves communicating complex issues and scientific evidence as well as understanding relevant local knowledge and perspectives.
186. Communicating EBA and eco-DRR require a planned systematic approach to understand the interests of stakeholders and beneficiaries, and approaches need to be tailor-made to the local context, culture and traditions.
- 187.

The Capacity for Disaster Reduction Initiative (CADRI), created in 2007, is an example of a strategic communications strategy for DRR. CADRI is an inter-agency programme of UNDP, UNICEF, WHO, and other partners. CADRI provides advisory services to national authorities and organizations on capacity assessments and strategy development; assists in training and facilitation services; generates learning packages and capacity development methodologies; and promotes knowledge exchange and networking to foster partnerships and to disseminate good practices.

188. Findings from an independent evaluation indicated that during the first implementation phase (2007-2012), CADRI successfully brought the UN system and national stakeholders together at country level to develop a robust and coordinated framework for capacity development for DRR. CADRI developed a capacity development concept and methodology that was operationalized in a number of countries, with a focus on capacity assessments, prioritization of capacity development needs, and action planning.
189. Strategic presentation of EBA and Eco-DRR options are a crucial part of national and regional strategies and programmes for climate change adaptation. An example from South Africa's Fifth National Report is presented below.

### Case Study 8: Making the Case for Biodiversity in South Africa

South Africa's Fifth National Report stated that: "The strongest value proposition for decision-makers in government is that biodiversity is a national asset that can contribute to the development priorities of the country; second, the "doom and gloom" message of impending extinctions and imminent collapse, which the biodiversity sector has tended to use for decades, not only has no traction but in fact elicits apathy."

The "Making the Case for Biodiversity" is a project undertaken with the help of marketing and communications experts, resulting in a framework identifying the indicators for local government actions that are supportive of sustainable management, restoration of ecosystems, and related job creation, and are prioritized for effective climate change adaptation and disaster risk reduction, especially in relation to water security.

Case studies were compiled and presented to appeal to audiences on a personal level, to provide good narrative evidence, and to facilitate emotional investment. An example of a project including both EbA and Eco-DRR-related activities is the assessment of impacts and vulnerability in the Eden district municipality, and identification of opportunities to adapt to the negative impacts of climate change on water resources. Opportunities for EbA and Eco-DRR activities include restoring wetlands and grasslands surrounding rivers, and clearing invasive alien species along the river banks and surrounding grasslands, thereby releasing more water back into the river.

To make the case for these activities, the costs of disasters were presented: a 3-year drought in one area cost of R166.6 million in relief funding to help farmers feed their livestock, and flood damage in other regions cost R360 million in damages. Ecosystem restoration measures were presented as a relatively small investment with massive returns in water yields, in contrast to engineering solutions such as desalinization, which is costly and energy intensive. Restoration also yields the additional co-benefits of boosting socio-economic resilience by helping job creating agribusinesses to respond to risks posed by climatic and other environmental change.

This project involved an initial research and development phase that evolved into a sector-wide communication campaign that was tested at UNFCCC COP 17 in Durban, South Africa. The Making the Case project highlighted the need to show how biodiversity is relevant to government's priority issues of the day – for South Africa these are job creation, poverty alleviation and rural development." ~ *excerpted from the Republic of South Africa's Fifth National Report and 'A Flower in the Heart of Eden,' Case Study 7 in the 'Making the Case for Biodiversity' project*

## 5. IMPLEMENTING, MONITORING & EVALUATING EBA & ECO-DRR

### 5.1 Assessing Vulnerabilities, Impacts, Hazards and Risks

191. Central to implementation of EBA and Eco-DRR are assessments of vulnerabilities, impacts, hazards and risks. While conceptually similar to both EBA and Eco-DRR, this planning phase utilizes different terminology. In EBA, impact and vulnerability assessments are conducted, usually starting with a focus on livelihoods, human vulnerability and ecosystems (e.g. impacts of climate change on biodiversity loss and ecosystem integrity), and developing future change scenarios (Doswald and Estrella 2015).
192. The UNFCCC's Nairobi Work Programme aims to improve understanding and assessment of impacts, vulnerability and adaptation to climate change, and make informed decisions on practical adaptation actions and measures to respond to climate change on a sound scientific, technical and socio-economic basis, taking into account current and future climate change and variability. A generic framework for adaptation is illustrated in Figure 2, showing the four major elements of the adaptation process: assessment, planning; implementation; and monitoring and evaluation.

The CBD COP invited Parties and other Governments to assess the threats and impacts of climate change on biodiversity and biodiversity-based livelihoods and identify regions, ecosystems and components of biodiversity, that are vulnerable to climate change.

~CBD COP decisions IX/16 and X/33

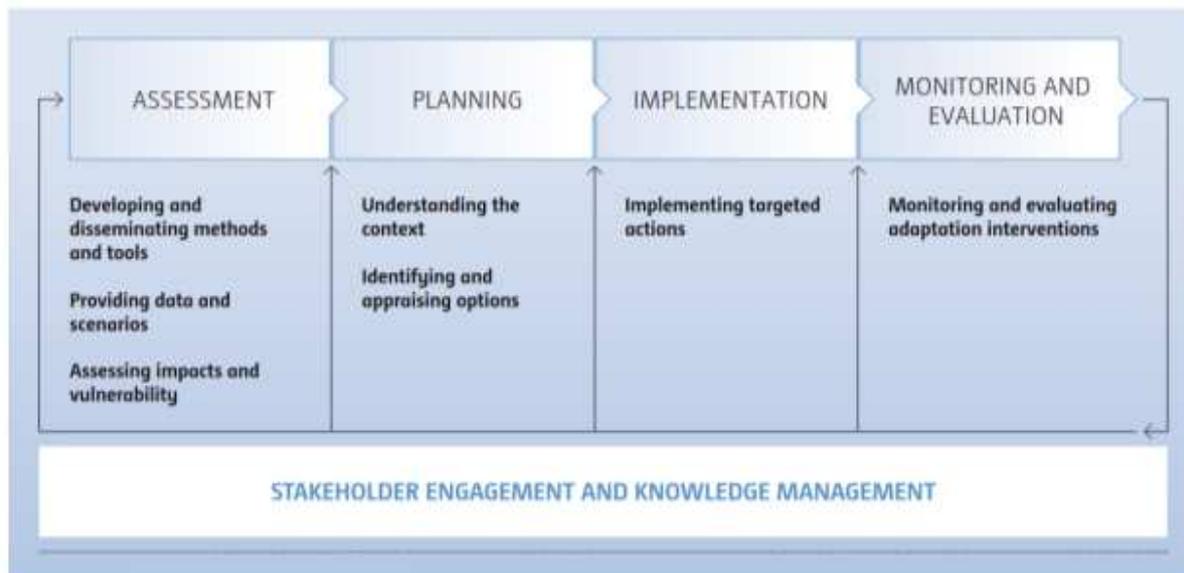


Figure 7: The adaptation process, beginning with an assessment of climate risks and vulnerability (UNFCCC 2012)

193. The implementation approach for Eco-DRR also consists of disaster risk assessments (DRA), usually starting with a focus on hazards, exposure and vulnerabilities as core elements to understanding disaster risk, but also assessing linkages to environmental conditions and natural resource management (Doswald and Estrella 2015). Figure 8 shows the typical disaster management cycle, and a modified cycle (or spiral) that incorporates the ecosystem approach.

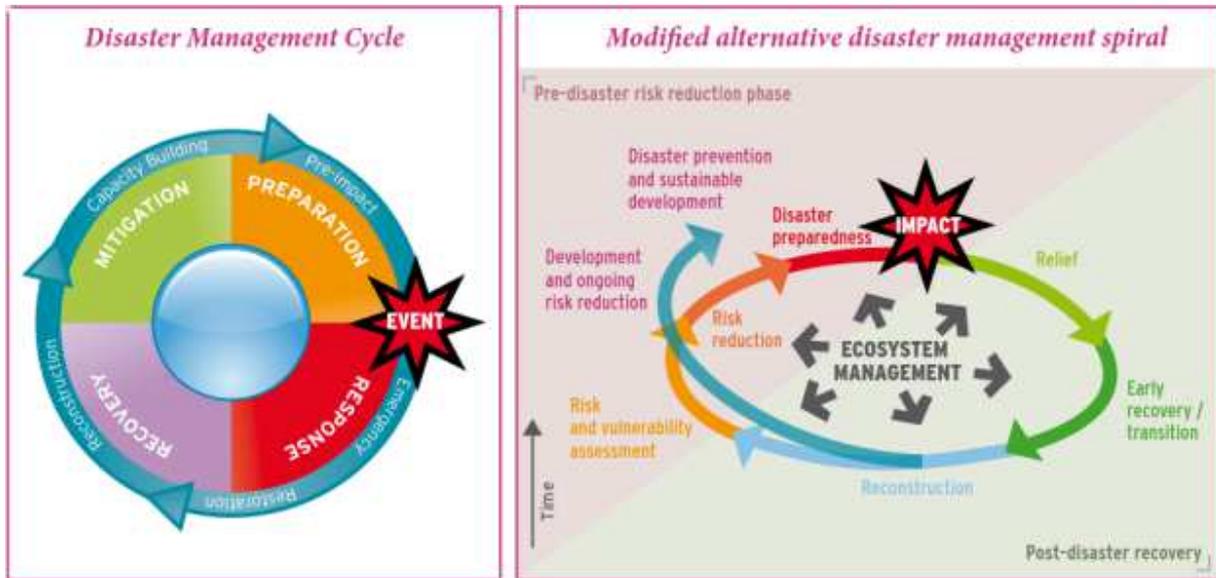


Figure 8: The traditional disaster management cycle (left panel), and disaster management cycle modified to incorporate ecosystem management (Sudmeier-Rieux 2013)

194. The review of Fifth National Reports, NBSAPs, portfolio review, and case studies from the broader literature indicated that many countries have identified vulnerabilities, impacts and exposure to climate change impacts and hazards. Some assessments were conducted in the context of the UNFCCC National Adaptation Plan (NAP) and National Adaptation Plans of Action (NAPAs) processes. Examples include:
- Burkina Faso's NAPA developed as part of the "Strengthening Adaptation Capacities and Reducing the Vulnerability to Climate Change" GEF-funded project, the agro-forest-pastoral sector was identified as the sector most affected by the climate change.
  - In Mongolia, ecological threat assessments were conducted in the Gobi, Steppe and Khangai mountain regions (reported in Mongolia's 5NR).
  - In Ecuador, the assessment of vulnerabilities and impacts were conducted as part of a project on water governance, utilizing diverse tools such as climate change scenarios, models, and vulnerability studies, which were used to increase capacity to manage water and agricultural resources (reported in Ecuador's 5NR).
  - Through the project "Assessing the Impacts of climate change on Madagascar's Biodiversity and Livelihoods," surveys in communities were combined with technical session discussions to identify vulnerable livelihoods and potential adaptation options identified for agriculture and husbandry, forestry and fishing (Conservation International & WWF 2008)

195. Experiences at a global level in assessing vulnerabilities are illustrated in the case study below.

**Case Study 9: Coastal Resilience to Climate Change in Cameroon, Fiji and Tanzania: Developing a Generalizable Method for Assessing Vulnerability and Adaptation of Mangroves and Associated Ecosystems**

A generalizable methodology for climate change vulnerability assessments and adaptation was developed in Cameroon, Fiji and Tanzania as part of the GEF-funded project “Coastal Resilience to Climate Change”. The project aimed to build the capacity of stakeholders to adopt and apply the assessment in other sites and countries.

At the start of the project, there was limited understanding and capacity for vulnerability assessment and adaptation. By the end of the project, partners and stakeholders had gained considerable understanding and skills regarding these issues, as evident in the technical reports produced, continuation of activities in the post-project period, and uptake of elements of the project results in other initiatives. It was evident that the project had also succeeded in increasing awareness among a wide cross section of stakeholders about climate change impacts on mangrove ecosystems and the human communities that rely on them.

The project was not without challenges, which included lack of in-country expertise, high staff turnover, poor communication among project partners, and limited technical guidance to the countries.

A major outcome was that by directly engaging stakeholders at local and national levels in the execution of the project as well as through targeted training workshops, the project has laid a strong foundation for climate change vulnerability assessments and adaptation of mangroves within the three countries and also helped to incorporate some of their needs.

~ GEF Portfolio, Project ID 2092

196. Scenario planning can be used to inform key decisions in adaptation planning, as it helps to account for uncertainties inherent in planning for a future under climate change. Scenarios can be quantitative or narrative to describe a range of plausible future conditions. When integrated into vulnerability assessment, scenarios can help determine future vulnerability, management actions needed to cope with future vulnerability, and if EBA should be considered as an option (WWF 2013). Scenario development was a critical component for the IPCC assessment reports, for example, enabling a range of future climate predictions given a specific set of management considerations.
197. To aid in decision-making, scenario analysis can also be used to estimate the economic implications of a given suite of activities (Rao et al. 2012), as seen in the above case study on Fiji, where scenarios enabled evaluation of EBA, socio-political, and engineering adaptation options.

#### Case Study 10: Using scenarios in assessing vulnerabilities in Tonle Sap, Cambodia

In Cambodia, climate change is altering rainfall patterns, resulting in a longer, hotter dry season for the region around Tonle Sap, the largest freshwater lake in Southeast Asia. As a result, the lake's floodplain is shrinking and impacting fishery yields and freshwater availability. High levels of deforestation and the construction of several dams pose other threats.

Approximately 1.2 million people depend on Tonle Sap for food and freshwater. In order to increase the resilience of the ecosystem to altered precipitation patterns and reduce vulnerability of people, the project aims to restore and protect the region's freshwater ecosystems.

To assess vulnerability, climate change scenarios were analyzed to determine which areas would flood the most in the future, to focus management on areas most likely to be able to continue delivery of ecosystem services. Restoration measures were also implemented to enhance flooded forests, including replanting schemes and community fisheries.

~ Government of Cambodia (Fisheries Administration), Conservation International ([url](#))

#### 5.1i) Challenges and Gaps

199. Lack of local climate data was often cited as a challenge in assessing vulnerabilities and risks to prepare adaptation strategies. Future climate change projections are generally not available at a local scale where field-level interventions are generally implemented (Doswald and Estrella 2015). The ability of current climate models to predict extreme events is not good, although improving.
200. As reported in other stages of EBA and Eco-DRR implementation, lack of financial, technical and human resources was often cited by countries as a barrier to effective assessments of vulnerabilities and impacts.

#### 5.1ii) Lessons Learned

201. EBA and Eco-DRR options selected and implemented should be guided by vulnerability assessments taking into consideration underlying drivers of change, existing policies, and community perceptions. For example, in the agricultural sector, climate impacts affect production and can result in reduced yields, which impact food security, and the economy. In addition, land use can also have impacts on production, on ecosystems and the economy. Policy decisions can also influence change in a supportive way, or in a maladaptive way by, for example, promoting monocultures of crops poorly adapted to local conditions.
202. It is also important to note that even if ecosystems are well managed and healthy now, they are still in themselves vulnerable to future climate change
203. In promoting adaptation to climate change impacts, it is important to consider unifying frameworks and concepts that recognize the linkages between people and ecosystems as integrated socio-ecological systems, rather than viewing adaptation through only a social or human lens. People are part of

ecosystems, and human and ecosystem vulnerabilities interact and impact on each other both positively and negatively

204. There is a need to be careful of conflating two strongly and closely related processes 1) the identification of vulnerable ecosystems which need to be protected and managed for biodiversity conservation; and 2) the identification of ecosystems, whether they are vulnerable or not, that can support people to adapt – in this case, it is important to assess people’s vulnerability to climate change. EBA or Eco-DRR do not necessarily focus on reducing the vulnerability of ecosystems. The main focus of EBA and Eco-DRR is to help vulnerable populations of people to adapt to climate change, using functioning, healthy ecosystems.

#### *5.1iv) Opportunities*

205. Several frameworks and planning tools have been developed to provide operational guidance on EBA, including the assessment stage. As vulnerability assessments and disaster risk assessments are relatively new in development, methodologies are not currently standardized (Doswald and Estrella 2015). Tools to assist in the process vary in their scope and data requirements.
206. Nevertheless they serve as an important starting point in adaptation and DRR activities. Some tools available for countries to use include: the UNEP Ecosystem-based Adaptation Guidance (UNEP 2012), the Community-based Risk Screening Tool – Adaptation and Livelihoods (CRISTAL) by IISD, IUCN and the Stockholm Environment Institute, the IUCN Learning Framework on EBA (IUCN 2013), and the WWF Operational Framework for EBA, which was developed for and field tested in the Greater Mekong Sub-region (WWF 2013). RiVAMP is a tool in development which aims to develop an assessment methodology that integrates ecosystems and climate change factors in the analysis of disaster risk and vulnerabilities. Some of these tools are described in greater detail in Annex 4, and are included as resources to consult in the References section.
207. The importance of effective communication to make the case for EBA and Eco-DRR has been highlighted above in Section 4. Innovative communication strategies can also be harnessed for the purpose of assessing vulnerabilities. An example of a creative approach to problem identification is providing cameras to women in rural areas in Rwanda so they can take photos of problems and potential solutions. These photographs are displayed to the government and NGOs to highlight gaps and needs (Scribner and Herzer 2013).
208. There appear to be more innovative communication strategies developed for disaster risk reduction specialists than for adaptation practitioners – perhaps due to the urgency of crisis response to save lives. For example, the Code for Resilience global initiative connects technologists with mentors and sector specialists to create tech-based tools that help reduce disaster risk<sup>12</sup>. A global competition launched in 2014 challenged software developers across the world to create useful mobile phone apps to strengthen community resilience to natural disasters. Many of the apps are more relevant to evacuation procedures and emergency responses. However, an example of an app also useful for EBA purposes is Jakarta’s Flood Alert app(from Indonesia), which monitors 14 sluices for current water levels, change in the past six hours, and other measures. Users get the latest information about the sluices’ condition and the chances of upcoming floods in specific locations, which can be shared through social media to inform and prepare others in the area.

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<sup>12</sup> <http://www.codeforresilience.org/>

## 5.2 Integrating EBA and Eco-DRR into Planning and Policy

209. CBD COP 10 urged Parties and other governments to use revised and updated NBSAPs as effective 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).
210. The Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) was the first major agreement of the post-2015 development agenda. The adopted framework contains seven targets and four priorities for action, which provide impetus for governments to strengthen and invest in disaster risk governance, prioritizing “ecosystem-based approaches...to build resilience and reduce disaster risk”.
211. A review of the Fifth National Reports, NBSAPs, literature and project portfolios unveiled details and lessons learned from several case studies of integrating EBA and Eco-DRR into national policies, outlined below.

### **5.2a) National Plans and Strategies**

#### *NBSAPs*

212. Yemen’s NBSAP contains objectives to enhance the local community & ecosystems resilience against natural disasters through strengthening disaster preparedness, renovation of terraced agriculture, river bank protection, establishment of flood protection structures and restoration and conservation of degraded watersheds, rangelands, forest, and coastal wetlands.
213. One of the five Strategic Goals for Biodiversity outlined in Jordan’s NBSAP is enhancing the national understanding of dryland ecosystem benefits to national resilience, economic sustainability and local livelihoods. More information on NBSAPs is presented in the section on National Targets below.

#### *National Adaptation Programmes of Actions (NAPAs)*

214. Established by the UNFCCC in 2001, national adaptation programmes of action (NAPAs) provide a process for Least Developed Countries (LDCs) to identify priority activities that respond to their urgent and immediate needs to adapt to climate change – those for which further delay would increase vulnerability or costs at a later stage.
215. In Samoa, climate-induced disasters affect food production, water availability, watershed health and biodiversity resources. Tourism is threatened by beach erosion, saline intrusion and degradation of coastal ecosystems. Samoa was one of the first LDCs to prepare and submit a NAPA, which integrates EBA into five out of nine priority projects. EBA activities include integrated watershed management and restoration of coastal springs, sustainable management of forests, and diversified farming systems to enhance resilience to drought (Chong 2014). The EBA activities have been implemented under the LDCF and adaptation funds.
216. In Cambodia, three of 20 high-priority projects included in the NAPA are EBA and Eco-DRR measures: rehabilitation of the upper Mekong waterways to restore flood mitigation capacity, vegetation planting to protect against damage from floods and windstorms, and community mangrove restoration to

stabilize shorelines, prevent seawater intrusion, and provide biodiversity products for coastal communities (Cambodia's NAPA, as cited in Chong 2014).

217. In the Maldives, the NAPA contains a complete vulnerability assessment of coral reef biodiversity. Activities within the NAPA to promote the adaptation of reef biodiversity include the establishment of marine protected areas, and enforcement of the coral mining ban.
218. Tanzania has identified eight projects within its national adaptation programme of action (NAPA) that have a direct or indirect link to EBA and Eco-DRR measures, including catchment conservation and sustainable use, forest-fire prevention and wildlife extension services (CBD 2014).

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### Case Study 11: EbA Activities in Madagascar's National Adaptation Programme of Action

Madagascar boasts one of the richest biological diversity in the world, which reflects one of the highest rate of endemism (80% of endemic Malagasy species) and an incredible variety of forest ecosystems. Forests cover 22.6% of the national territory.

Biodiversity distribution, species and population are vulnerable to increased extreme events such as droughts and cyclones leading to soil erosion. Health conditions, access to water and related primary needs are expected to be negatively impacted by climate change. Livelihoods and the overall national productivity will also be impacted, in addition to an increase socio-cultural and boundaries conflicts and threats to agricultural activities, which may drive migration towards urban areas or areas where there is better access to water. Adaptation strategies should take into account recurrent poverty as well as biodiversity vulnerability and provide activities that combine diverse ecosystem resilience with community benefits.

The National Adaptation Plan of Action (NAPA) of Madagascar identified two priority adaptation strategies related to the forest sector:

- i. Reforestation of rural areas with their specific reforestation plans based on locally appropriate species (estimated projects costs: 74,250 USD). Conserving corridors and connecting isolated forest blocks to have continuous forest migration routes are critical to maintaining resilience in the face of future climate change;
- ii. Promoting the transfer of forest management to local communities (estimated cost 94,980 USD).

Agroforestry is also being implemented in the de-forested hillsides of Madagascar, which are the focus of reforestation efforts. The massive erosion gullies or "*lavaka*" have a beneficial funneling effect of water and nutrients that result in rich, fertile soils at their base. Local communities are now practicing agroforestry at the base of the "*lavaka*".

The products of the agroforestry system (vanilla, clove and coffee) provide local people with important cash income, as well as other non-timber forest products such as honey. Agroforestry cultivation conserves the forest habitat for the unique flora and fauna of Madagascar. The rice terraces, moreover, stabilize the fragile soils and prevent erosion.

*~ Government of Madagascar, submitted at the CBD Technical Workshop on EbA and Eco-DRR*

### *National Adaptation Plans (NAPs)*

219. The national adaptation plan (NAP) process was established under the Cancun Adaptation Framework of the UNFCCC. It enables Parties to formulate and implement national adaptation plans (NAPs) as a means of identifying medium- and long-term adaptation needs, and developing and implementing strategies and programmes to address those needs. It is a continuous, progressive and iterative process. As NAPs are still under development, there were fewer examples available of NAPs that included EBA actions. Colombia's experience with promoting EBA and Eco-DRR within the framework of the NAP is described below.

#### **Case Study 12: EBA and Eco-DRR in Colombia's National Adaptation Plan**

Colombia's National Adaptation Plan to Climate Change has been conceived as a dynamic process that started at 2011. The NAP defines guidelines so that the country's sectors and territories prioritize their actions aimed at reducing vulnerability, and include climate change and climate variability in their planning processes, through the formulation and implementation of territorial and sectorial adaptation plans. These efforts, to date, have focused on the Caribbean and Andean regions, as well as on the transport, housing, energy, agriculture and health sectors, taking into account the damages and losses caused by La Niña phenomena in 2010-2011.

Through national guidelines, the NAP promotes EBA and Eco-DRR approaches by identifying vulnerable socio-ecological systems, concentrating efforts towards analyzing impacts of climate change in combination with drivers of transformation and loss of biodiversity and ecosystem services. Additionally, benefits that ecosystem services provide to society are investigated, and options to promote the use of biodiversity and ecosystem services in order to reduce vulnerability of the population in the face of potential disruption that may occur in climate change scenarios.

To date, Colombian entities have formulated 11 territorial adaptation plans to climate change, which have prioritized adaptation actions. These plans are the basis for decision-makers to identify the vulnerability of the territory and define adaptation measures to be incorporated in the different development and spatial planning instruments.

EBA and the Eco-DRR measures that are currently being implemented in the NAP include:

- The rehabilitation of wetlands and their hydrology as a means to reduce risk of flooding and drought associated with climate change and variability.
- The identification and implementation of adaptation measures designed to mitigate the impacts of climate change on the water yield and hydrological regulation capacity of the wetlands and high mountain ecosystem.

The NAP also identifies key entry points for the application of EBA and the Eco-DRR approaches regarding water supply, specifically:

- Moors (páramo, andean woodlands), wetlands, high Andean forests, cloud forests and tropical forests.
- Ability of soils and microclimates setting for growing crop
- Moderation of extreme events through buffer structures
- Prevention of erosion and sediment control

*~ Government of Colombia, submitted at the CBD Technical Workshop on EBA and Eco-DRR*

### *National Climate Change Policy*

220. EBA activities have been included in the Government of Niue's National Climate Change Policy, developed in 2009, which defines the position of government and other stakeholders on the issues of climate change, variability and sea level rise. The vision and goal of the Climate Change Policy are "A safer, more resilient Niue to impacts of climate change and towards achieving sustainable livelihoods." A specific action is the documentation and sharing of traditional practises, which include ecosystem-based approaches, regarding crop production, forestry and fisheries management, climate forecasting and water, to share how these lend to coping mechanisms for climate variability and extreme events.

### *Disaster management plans*

221. The Government of Niue's Joint National Action Plan (JNAP) for Climate Change Adaptation and Disaster Risk Management<sup>13</sup> provides a three year plan of action to address existing gaps relating to vulnerability to climate change impacts and disasters. Developed in partnership with Pacific regional organisations (SPC/SOPAC and SPREP), the Government of Niue has identified five priority areas of attention, which form the goals in the JNAP Implementation Matrix: 1) Strong and effective institutional basis for disaster risk reduction / climate change adaptation; 2) Strong public awareness and improved understanding of the causes and effects of climate change, climate variability and disasters; 3) Strengthened livelihoods, community resilience, natural resources and assets; 4) Strengthened capacity to adapt renewable energy technologies and improve energy efficiency; 5) Strengthened disaster preparedness for effective response.
222. The Government of Yemen's national coordination body addresses disasters such as floods and heavy rains. A national plan and the adoption of policies and measures are being developed (from Yemen's Fifth National Report).

### *Development Policy*

223. Climate change has been recognized as the largest threat to sustainable development in Samoa. There is significant conservation focus on forests and trees given their role in the protection of vulnerable coastal areas, steep slopes and coastal infrastructures and settlements against storm surges, coastal erosion, and decreased provisioning of water resources as a result of climate change impacts (Samoa's Fifth National Report).
224. The Strategy for the Development of Samoa 2012 – 2016 contains strategies to strengthen community resilience, such as the ability of natural systems to buffer the impact of cyclones and floods. An associated indicator is the percentage of land area covered by forests, which is relevant to slope stabilization and coastal protection.
225. A key strength of the adaptation process in Samoa is the integration and alignment of adaptation with the cross-sectoral "Strategy for the Development of Samoa," which also includes economic stability, growth, employment, education, and health. Additionally, the incorporation of customary law and practice into natural resource management laws and policy has led to a strong governance systems that recognizes traditional knowledge and rights. As an example, communities are permitted to develop their own fisheries by-laws and to oversee management plans (Chong 2014).

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<sup>13</sup> [https://www.humanitarianresponse.info/system/files/documents/files/NIU\\_Joint\\_NAP\\_CC\\_DRM\\_2012.pdf](https://www.humanitarianresponse.info/system/files/documents/files/NIU_Joint_NAP_CC_DRM_2012.pdf)

226. South Africa's Fifth National Report has indicated that mainstreaming is a major focus of work across its biodiversity, climate change and development strategies.
- a) The National Strategy for Sustainable Development and Action Plan (NSSDAP) includes three of five strategic priorities that reflect the need for sustaining healthy ecosystems, sustainable utilisation of natural resources and the role of ecosystems in climate change adaptation.
  - b) Recent revisions of the National Water Resource Strategy (NWRS) and Water Pricing Strategy have recognised the importance of freshwater ecosystems for water security, as a result of engagement by the biodiversity sector in these processes.
  - c) The South Africa National Biodiversity Institute (SANBI) was accredited as South Africa's National Implementing Entity (NIE) to the UNFCCC's Adaptation Fund. Projects submitted include EBA and Eco-DRR elements, such as "Building resilience in the greater uMngeni catchment, South Africa", focuses on building resilience for vulnerable communities in a catchment that provides water to two of South Africa's large cities, and it will focus on climate smart agriculture, climate proofing settlements with built and ecological infrastructure, and early warning systems using near real time weather stations and community monitors
227. Implementation of measures to reduce disasters were also reported in other ways in the CBD Fifth National Reports, such as through progress towards the Millennium Development Goals (MDGs). For example, the government of Botswana reported progress on MDG 1 on eradicating extreme poverty and hunger, and MDG 7, on ensuring environmental sustainability.

### *Drought Policy*

228. In Namibia, climate change impacts are linked with land degradation, with increased temperatures and reduced rainfall leading to loss of vegetation (due to decline in water availability) and lower crop productivity from reduction in topsoil through soil erosion. As part of an overarching effort to implement an integrated sustainable land management framework, the government is internalizing climate change risks and opportunities into National Drought Policy strategies and other relevant policy instruments. Through participation in planning processes centered on the National Development Plan including a series of national consultations, the Government plans to identify and effect the necessary policy revisions at the sector and national level (UNDP-GEF).

## **5.2b) National Targets**

### **Progress towards the Aichi Targets Relevant to EBA and Eco-DRR**

229. As discussed in Section 2, the review of the selection of Fifth National Reports and NBSAPs were an important source of information for compiling targets related to EBA and Eco-DRR, as they focused on progress on the Aichi Targets, including those directly relevant to the EBA and Eco-DRR. The Aichi Targets analyzed included Targets 5, 6, 9, 10, 11, 13, 14 and 15. The rationale of choosing these targets and their linkages to EBA and Eco-DRR are provided in Annex 2.
230. Approximately 37 countries assessed their Aichi Targets, out of the 61 Fifth National Reports that were analyzed for this report. Figure 7 shows the relative percentages of implementation that is considered low, fair, good, or very good, as explained in the framework presented in Section 2.

231. Progress towards the Aichi Targets were globally assessed in the Global Biodiversity Outlook, 4<sup>th</sup> Edition (SCBD 2014). A brief snapshot of the summary review is provided for the relevant Aichi Targets:
- a) Target 5: Loss of forest habitats in some regions, for example the Brazilian Amazon, has been significantly slowed. However, deforestation in many other tropical areas of the world is still increasing, and habitats of all types, including grasslands, wetlands and river systems, continue to be fragmented and degraded.
  - b) Target 6: Overfishing continues to be a major problem, with an increasing percentage of fish stocks overexploited, depleted or collapsed, and inappropriate fishing practices causing damage to habitats and non-target species.
  - c) Target 9: The overall rate of invasions by alien invasive species has not slowed
  - d) Target 10: Multiple land and marine based pressures on coral reefs continue to increase, although some large coral areas are being incorporated into marine protected areas
  - e) Target 11: Taking current commitments into account, conserving 17 per cent of terrestrial areas by 2020 is likely to be met globally, although protected area networks remain ecologically unrepresentative and many critical sites for biodiversity are poorly conserved.
  - f) Target 13: Genetic diversity of domesticated livestock is eroding, with more than one fifth of breeds at risk of extinction, and the wild relatives of domesticated crop species are increasingly threatened by habitat fragmentation and climate change
  - g) Target 14: Habitats important for ecosystem services, for example wetlands and forests, continue to be lost and degraded
  - h) Target 15: Many countries, organizations and companies have pledged to restore large areas. Abandonment of farmland in some regions, including Europe, North America and East Asia, is enabling “passive restoration” on a significant scale

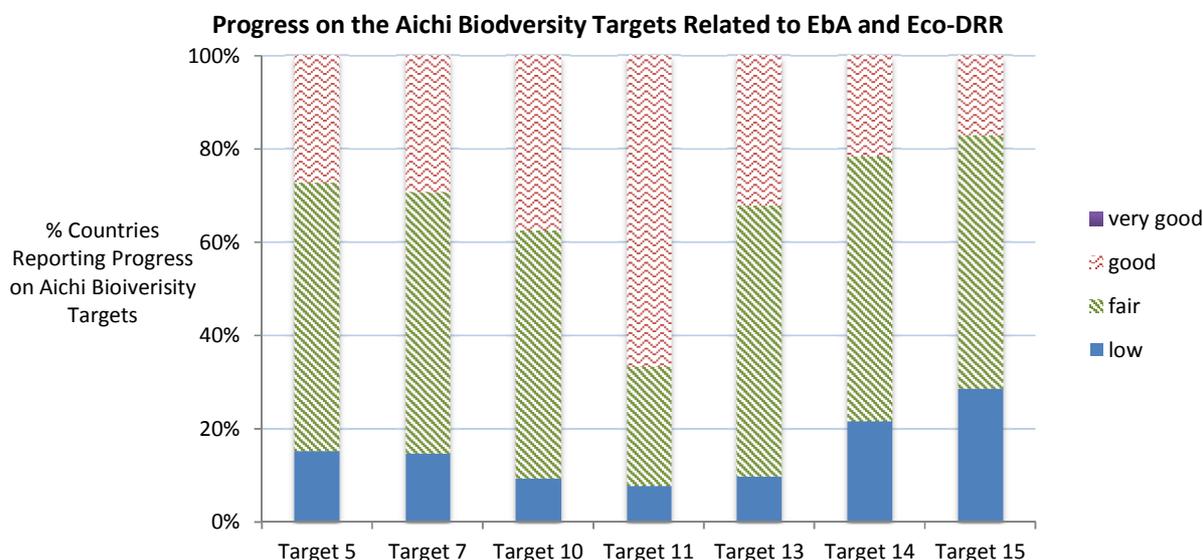
*~ excerpted from GBO-4 (SCBD 2014)*

232. The qualitative progress on the Aichi Targets evaluated shows mixed progress in achievement – which is also reflected in the analysis of information from the selection of Fifth National Reports that were analyzed for this report. Target 11, on protected areas, had the largest proportion of countries reporting “good” implementation, followed by Targets 10 and 13. It is not surprising that Parties are reporting good progress on Target 11, as protected areas were the activity implemented to the greatest degree in the country reports analyzed. However, it must be noted that in this particular analysis, it is difficult to distinguish between “business-as-usual” protected areas implementation and conservation measures, and activities designed for the purpose of enhancing resilience of people and communities to the impacts of climate change, as there was not always enough detail in the reports to make the distinction.
233. While ecosystem restoration was widely reported as an EBA activity in the national reports, progress on Target 15 was low or fair, reflecting that many of the restoration initiatives were not yet implemented or had limited implementation.
234. Information on targets was supplemented with the ‘Find National Targets’ database of the CBD<sup>14</sup>. This database maps national targets to corresponding Aichi Biodiversity Targets, from 54 NBSAPs submitted

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<sup>14</sup> CBD ‘Find National Targets’ database: <https://www.cbd.int/nbsap/targets/default.shtml>

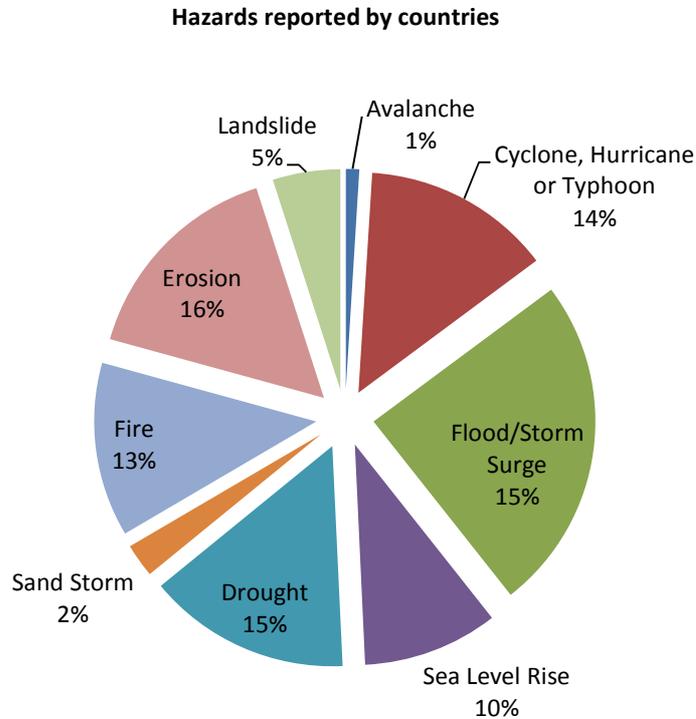
since CBD COP 10. Out of these 54 NBSAPs contained in this database, 35 and 32 countries have established one or more national targets that address Target 14 and 15, respectively.



**Figure 9: Progress towards achieving the Aichi Biodiversity Targets that are relevant for EbA and Eco-DRR. Values shown are percentages of reports identifying levels of progress for each Aichi Target. 61 reports in total were reviewed for this report.**

235. Aside from targets developed that aligned with the Aichi Targets, the Fifth National Reports and NBSAPs were also reviewed for evidence of national targets explicitly mentioning EbA and Eco-DRR. In terms of EbA there were limited examples of specific targets, although there has been more evidence of mainstreaming of overall EbA considerations into national plans, as discussed in the next section.
236. Climate change has been recognized as the largest threat to sustainable development in Samoa. There is significant conservation focus on forests and trees given their role in the protection of vulnerable coastal areas, steep slopes and coastal infrastructures and settlements against storm surges, coastal erosion, and decreased provisioning of water resources as a result of climate change impacts (Samoa’s Fifth National Report).
237. In the Solomon Islands, a target included in the NBSAP is “By 2015, develop and adopt an Integrated Water Resources Management (IWRM) or Catchment Management Plan for at least 20% of the river systems in the Solomon Islands by reaffirming and scaling up of the current IWRM project lessons learned and to include those largest river system in the Solomon Islands including Wairaha in Malaita and Lunga in Guadalcanal.”
238. Swaziland has proposed numerous updates to its NBSAP related to change in its Fifth National Report. For example, the following target is proposed: “By 2015, Swaziland’s climate change response strategies (e.g. NAP) fully incorporate ecosystem-based resilience such as establishing carbon sinks and controlling invasive species” (discussed further in Case Study 13).
239. A brief analysis of hazards faced by countries was conducted through the review of Fifth National Reports, NBSAPs, submissions to the CBD, and case studies from project portfolios and the broader literature. The analysis provides a brief breakdown of the hazards by category (shown in Figure 10).

According to this analysis, flooding and storm surges, drought, and erosion were the hazards most highly reported, out of the 118 sources consulted.



**Figure 10: Breakdown of hazards reported by countries (Figures are percentages of the 118 reports reviewed)**

240. When considering only the Fifth National Reports and NBSAPs, 32 of the reports analyzed (55%) included some mention of disasters or hazard risk management. However, only about two thirds of these (21 reports) had an associated disaster risk management target. These targets were reported in various ways in the National Reports:
- a) The Solomon Islands - Priority 10 on Climate Change and Disaster Risk Management and Green Infrastructure, and associated Target 11: By 2020, 50% of the biodiversity priority areas identified in NAPA and the Climate Change policy are operational, and a mitigation action plan in place, integrated with infrastructure developments and disaster risk management (in the Solomon Islands' Fifth National Report).
  - b) Gambia has included a target in its NBSAP, aiming for, by 2020, communities dwelling in flood prone and watershed areas are reduced by 50%
  - c) Jordan has set a national target of developing and implementing a national climate change adaptation strategy and action plan, including mainstreaming of biodiversity and ecosystems, by 2016. Associated Key Performance Indicators have been set, such as strengthening national capacities on climate change adaptation and raising awareness, with key priority actions to include stakeholder mapping on climate change and biodiversity and preparing a report on protected areas and resilience.

241. The review of Fifth National Reports indicated that disaster risk considerations were not always mentioned explicitly, even when there were examples of Eco-DRR activities being implemented (discussed in the Implementation section below). As can be seen in Figure 10, many countries have identified vulnerabilities to climate-related natural hazards. Some national adaptation and disaster-risk reduction targets have been developed in response to climate change impacts and the hazards identified. However, the majority of the reports reviewed for this study indicate that there is not yet a response at national level to address these hazards through specific targets related to EBA or to Eco-DRR.

### *5.2i) Challenges*

242. Challenges in mainstreaming have been identified by Parties to the CBD in their Fifth National Reports, particularly related to coordination among multiple agencies and influencing planning processes, a key challenge raised by Eritrea in its Fifth National Report.
243. The review of Fifth National Reports indicated that disaster risk considerations were not always mentioned explicitly, even when there were examples of Eco-DRR activities being implemented (discussed in the Implementation section below). As can be seen in Figure 10, many countries have identified vulnerabilities to climate-related natural hazards. Some national adaptation and disaster-risk reduction targets have been developed in response to climate change impacts and the hazards identified. However, the majority of the reports reviewed for this study indicate that there is not yet a response at national level to address these hazards through specific targets related to EBA or to Eco-DRR.
244. Other challenges include timeframes; as identified by South Africa in its Fifth National Report, mainstreaming requires institutional changes, which takes seven to ten years – beyond the lifetime of typical adaptation projects.
245. Experience in mainstreaming adaptation into development frameworks in Mozambique revealed the following challenges to mainstreaming climate change adaptation into development frameworks: the unavailability of long-term climate data in the most appropriate and easily usable format, the inadequate capacity and tools to address the serious loss of soil and property in coastal cities, the lack of community based coastal zone management plan, and the lack of climate change integrated curriculum especially at the University level (Nkem, Munang and Jallow 2011).
246. In Samoa, a key barrier to implementing EBA projects identified in the adaptation strategy is lack of financial and human resources, lack of data on baseline conditions, and the need for improved institutional and legal frameworks (Chong et al. 2014).
247. The issue of ensuring project sustainability was also discussed at the CBD Technical Workshop on EBA and Eco-DRR. One participant commented that most efforts on Eco-DRR and EBA were project-based and raised the concern of ensuring sustainability beyond the project lifetime. Linked to this issue is the challenge of scaling-up field interventions, for instance to increase the geographic scope and thus the impact of interventions, facilitate replication, or expand into national-level programmes and plans.
248. Factoring in incentives to ensure long-term buy in or ownership of the interventions was considered key to sustainability. However, incentives need to be carefully targeted for specific stakeholders, e.g. national government ministries, households, etc. On the other hand, “perverse” incentives, e.g. stemming from subsidies or tax exemptions, should be eliminated.

### 5.2ii) Lessons Learned in Mainstreaming EBA and Eco-DRR

249. Integrating and mainstreaming EBA and Eco-DRR will require bringing together different actors and expertise across sectors and encouraging multi-disciplinary approaches at the project implementation and policy levels (Doswald and Estrella 2015).
250. As expressed by Vanuatu in its Fifth National Report, a lesson learned is that “the new emerging priorities at the national, regional and international levels are important not just to addressing environmental challenges, particularly to the development of biodiversity and conservation in the country, but also in the development of other environmental thematic areas in the country. This is especially apparent in areas such as climate change and waste and pollution. Integration of these priorities into development strategies has become more apparent at all levels.”
251. This point was also echoed by Costa Rica in its Fifth National Report, which noted that inter-institutional and inter-sectoral coordination is integral to achieving the Strategic Plan on Biodiversity.
252. Participants at the CBD Technical Workshop on EBA and Eco-DRR identified additional conclusions and lessons learned:
253. Participants identified several entry points for mainstreaming EBA and Eco-DRR, including NBSAPs, wetland management plans, NAPs, as well as into productive sectors (e.g. agriculture, tourism, etc). The institutional “set-up” matters for mainstreaming Eco-DRR /EBA into policies and practice, in addition to having the right enabling conditions.
- 254.

#### Case Study 13: Mainstreaming EBA and Eco-DRR into the National Development Strategy of the Cook Islands

The Cook Islands have been able to mainstream Eco-DRR /EBA approaches into its national development strategy. National adaptation plans were completed just before the national development plan, where EBA and Eco-DRR are integrated but not necessarily called as such. The population is also already highly sensitized; therefore, there is already strong public support for DRR and CCA. National Adaptation and DRR plans are already integrated, which made mainstreaming of ecosystem-based approaches easier. In addition, the Disaster Management department is under Prime Minister’s Office. The climate change function was also moved from the Ministry of Environment to the Prime Minister’s Office. Development Planning also sits under the Prime Minister’s Office, which facilitated integration and coordination into the national development plan.

A game changing event also took place which facilitated this process of mainstreaming – the collapse of the black pearl industry due to toxic chemicals in the water helped /enabled application of ecosystem-based approaches; the “disaster” helped foster the idea that other alternatives were needed for improved ecosystem management.

255. The development and review of national adaptation plans and national biodiversity strategies and action plans presents an important opportunity to promote EBA and Eco-DRR. NAPs and NBSAPs can be effective instruments for mainstreaming ecosystem-based approaches for adaptation and disaster risk reduction into development plans and processes, and sectoral policies. There are similarities in these processes and considerable opportunity for them to be mutually reinforcing.

256.

In the development of the National Adaptation Plan, Brazil engaged 15 different Ministries, established sectoral networks, and facilitated direct public dialogue with representatives from the private sector, Federation States, NGOs and broader civil society. One of the underlying principles for the NAP is that EBA and ecosystem service considerations must be integrated into actions, plans, strategies and public policies across sectors. Of 66 adaptation measures recommended, 24 of these are EBA.

257. Mainstreaming of Eco-DRR / EBA is often well-understood at the national level and at the level of field implementation. The main problem area is between national and local level implementation, which includes the translation of policies into plans, programmes, budgeting/resource allocations, and across and into development sectors. Different sectors do not necessarily talk to each other or work together, whereas Eco-DRR /EBA approaches are multi-disciplinary and require inter-sectoral collaborations. Therefore, mainstreaming of Eco-DRR / EBA into policies and practice will need to strategically engage this middle level and clearly define the governance level for mainstreaming, i.e. policy, planning, programming, budgeting, etc. It is also important to articulate the main aims/objectives of undertaking mainstreaming, i.e. what we want to achieve.
258. Nonetheless, it still important for Eco-DRR /EBA to be embedded in national development plans/vision/strategy to provide an enabling framework for local-level implementation and facilitate access to budgets/funds.
259. Emphasis was also stressed in ensuring a balance between top-down and bottom-up processes, specifically recognizing the important role of local communities and indigenous peoples and ensuring that experience and lessons learned from projects on the ground feedback into policy making processes. Representatives from local communities and indigenous peoples, and practitioners, must therefore be part of decision-making.
260. It is also important to recognize immediate and long-term needs and address trade-offs (e.g. who pays/who benefits, biodiversity values / development priorities) when implementing specific measures (addressed further in the Section 6 on Policy Issues). The limits of Eco-DRR and EBA should be clearly articulated and acknowledged (especially to vulnerable communities), and Eco-DRR and EBA should be part of a broader DRR and CCA strategy.
1. Developing guidelines to facilitate national and local level implementation is also needed, e.g. Japan's Ministry of Environment is developing guidelines for local governments to implement Eco-DRR on the ground.
  2. The use of existing regulatory processes in the country, such as Environmental Impact Assessments (EIAs), could help support mainstreaming of biodiversity priorities, Eco-DRR and EBA. For instance, Malawi is undertaking review of its EIA guidelines, which offers an opportunity, during the project approval process, to take into account climate change and disaster risks and promote ecosystem-based options for project impact management.

***Lessons Learned in developing innovative ways to maximize multi-stakeholder engagement that adds value to Eco-DRR and EBA practice***

261. Eco-DRR and EBA are inherently inter-disciplinary and cross-sectoral and thus call for a multi-stakeholder process. However, stakeholder engagement needs to be improved through long-term relationship-building between actors. Identifying and working with a clear “champion” who has the mandate to bring all the key actors together is important. Stakeholder engagement needs to be institutionalized.
262. CBD national focal points can and should take a leading role for coordination and mainstreaming of Eco-DRR and EBA approaches, in collaboration with other national environmental focal from the Ramsar Convention, UNCCD and UNFCCC, and other MEAs.
263. Effort should be made to engage with the disaster risk reduction / disaster management sector because it has established institutions from national to community levels. It is also important to note that in some countries, such as Honduras, the same key actors, namely academia, are the same actors who undertake both CCA and DRR work.
264. Other key actors who should be engaged include:
- Universities /academia – who can play an important role in linking scientific research with policy; e.g. coordinating the production of data such as Honduras’s National Observatory.
  - private sector – but we need clarify what specific role they can play and what they can they bring to the table (e.g. through guiding principles for private sector engagement); Public-private partnerships for Eco-DRR /EBA should be further explored.
  - Engineers - who can provide the technical expertise in testing regulating services of ecosystems and help design natural infrastructure solutions for DRR or CCA.
  - Local communities and indigenous peoples – but it is also important to speak to multiple local representatives (not just one), build on their traditional knowledge and practice and ensure principles of prior consent are followed. Local stakeholders should understand the pros and cons of EBA and Eco-DRR. Active / empowered participation of communities in decision-making should be institutionalized.
265. Multi-stakeholder engagement is key towards the “co-production” of knowledge and establishing common/shared experiences of Eco-DRR and EBA at national and local levels.

***Lessons Learned in capacity-building needs for Eco-DRR and EBA***

266. Capacity building for Eco-DRR/EBA for different stakeholders at different levels is needed in order to support mainstreaming efforts. Awareness by national policymakers and decision makers is limited. Technical skills to implement Eco-DRR and EBA approaches are also limited in countries. In addition, the constant turn-over of focal points within government makes it difficult to ensure continuity of practice.
267. A review of available capacity building / training services on Eco-DRR and EBA is needed. For instance, UNEP has developed several capacity building packages on Eco-DRR/EBA, both in-classroom and online,

designed for different audiences, namely policymakers, planners and practitioners, university instructors and trainers, graduate students – with the aim of generating a continuous pool of policymakers, decision makers and practitioners that understand and promote the role of ecosystems in DRR/CCA.

### 5.2iii) Opportunities

#### **Opportunities for mainstreaming: Importance of policy integration at the national level**

268. A unique opportunity exists in promoting ecosystem-based approaches for disaster risk reduction and climate change adaptation, given the convergence of the post-2015 development agendas, namely the: Sendai Framework for Disaster Risk Reduction (2015-2030), 2030 Sustainable Development Agenda, CBD Decision XII/20 on linking biodiversity, climate change and disaster risk reduction, Ramsar COP-12 Resolution on wetlands and disaster risk reduction, and the upcoming climate change COP in Paris, 2015.

269. Global policy frameworks generally provide an enabling environment for national policies, and they can help reinforce each other. In some countries, a review of existing national policies and planning processes is useful to identify entry points for integrating Eco-DRR and EBA.

270.

The Government of Japan has actively engaged in promoting ecosystem-based disaster risk reduction (Eco-DRR) in various global policy processes, and has established the National Resilience Act (2013) and the National Spatial Development Plan (2015) which recognize the important role of ecosystems for disaster risk reduction and climate change adaptation.

271. A key challenge will be for countries to translate these global policy frameworks at the national level in an integrated and concerted manner, which would maximize available expertise, resources and tangible impacts on the ground.

272. Mainstreaming of Eco-DRR and EBA into national policies should learn from *other* mainstreaming processes, for instance gender mainstreaming.

273. Promoting sustainable ecosystems management facilitates in bridging national development policy priorities. Healthy, well-managed ecosystems provide multiple benefits to meet multiple priorities, including enhancing people's resilience to climate change and disasters, supporting biodiversity, and protecting food, water and livelihood security especially of vulnerable populations.

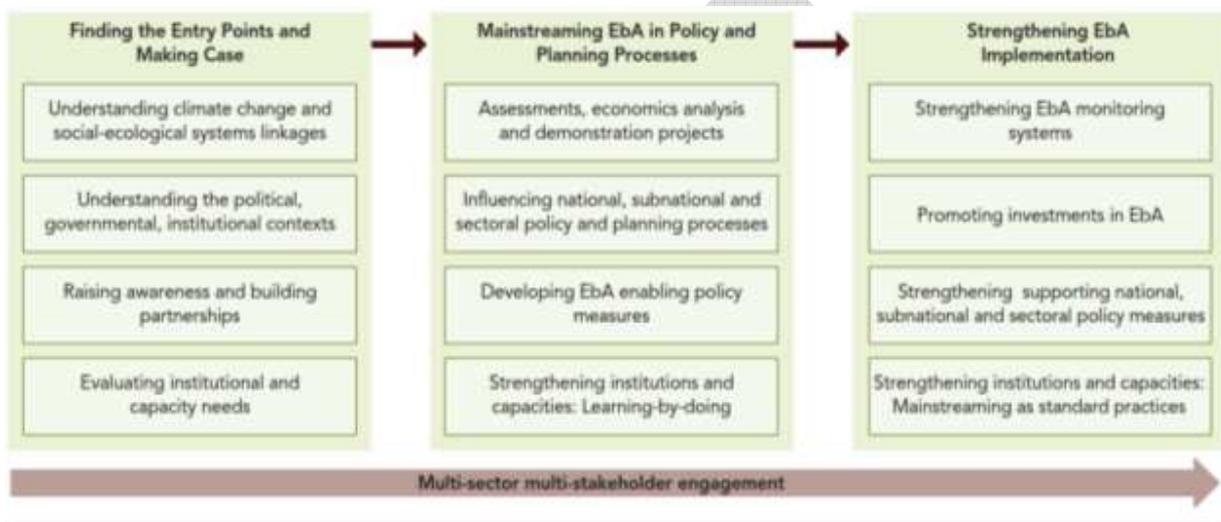
274.

In Honduras, the Climate Change Office has four strategic lines: Adaptation, Mitigation, knowledge transfer (National Observatory), and managing climate funds. Priority sectors identified are: Public Health, Agriculture and Livestock, Forest, Protected Areas, Disaster Risk Reduction, Marine coastal zones, and Infrastructure. Ecosystems provide a common ground for linking DRR and CCA.

275. Learning from Samoa’s experience, it is evident that customary laws and recognition of traditional knowledge can build resilience of communities to climate change (Chong et al. 2014). Additionally, integration of EBA into NAPAs has been shown to work and be essential to delivering ecosystem-scale adaptation interventions on the ground, and encourage uptake of EBA into other sectoral policies including water, wetlands, environment and agriculture (IUCN, UNEP and UNDP).

**Opportunities for Mainstreaming: Innovative Tools**

276. Various guidance tools are available for mainstreaming and could be utilized to a greater extent. An example from WWF’s EBA Operational framework developed for the Greater Mekong is shown below, as adapted from the UNDP-UNEP framework for mainstreaming adaptation into development planning.



Source: Adopted from UNDP-UNEP framework for mainstreaming adaptation into development planning.

Figure 11: Framework for Mainstreaming EBA into Development Planning (WWF 2013)

### 5.3 Synergies for EBA and Eco-DRR at National Level

277. EBA and Eco-DRR have many commonalities, and yet operate in different communities of practice, with EBA more commonly in the domain of environmental and development NGOs and academia, while DRR practice has more often been a focus of humanitarian organizations. Integrating policy and institutional contexts will require identification of policy and institutional entry points for promoting ecosystem-based principles, approaches and strategies; and work across sectors and discipline, and development of partnerships that seek to achieve multiple priorities (Doswald and Estrella 2015). On EU level integration efforts are on-going, but they need to be further strengthened.

278.

Decisions under the UNFCCC have highlighted the need for enhanced coordination among the Rio Conventions through involvement of national experts and sharing of relevant information (FCCC/SBSTA/2001/2). In the same vein, parties to the CBD have reiterated the importance of activities to integrate biodiversity into relevant climate change activities and to ensure coherence in national implementation of both the United Nations Framework Convention on Climate Change and the Convention on Biological Diversity (decisions XI/2, VII/15; X/33; VI/15 and XII/20).

279. The linkages between climate change, biodiversity and ecosystem services are well established (e.g. CBD 2009). Thus, there is much to gain from optimizing the opportunities provided by biodiversity and ecosystems to help people manage the impacts of climate change and contribute to mitigation. For example, synergies can be realized at national level by linking National Adaptation Plans and NBSAPs, key planning tools for implementing the UNFCCC and the CBD.
280. There is much overlap between the NAP and NBSAP processes, which both include stakeholder engagement, assessment of status and trends, knowledge management, and prioritization of actions. Promotion of synergies between the two processes will aid countries in meeting international obligations for climate change and biodiversity conservation, reduce vulnerability to climate change by building adaptive capacity and resilience, avoid duplication in actions to address threats of climate change and biodiversity, and ensure consistency in policy development and project implementation (CBD 2014).
281. There are several examples of country actions to integrate NAP and NBSAP processes, such as in a of reef biodiversity include the establishment of marine protected areas, and enforcement of the coral mining ban, which will help maintain the coastal protection properties of corals. These conservation actions are also in line with the Aichi Target 10 and the priority actions for coral reefs set out in CBD COP decision XI/23.

#### **Experiences with synergies at national level**

282. In Mozambique, activities to mainstream adaptation into development frameworks involved activities across different ministries. The National Meteorological Services inventorized, digitized, and processed available climate data to assess vulnerabilities and impacts. The Centre for Sustainable Development of the Ministry of Environment produced an Ecological Zoning Map and Management Plan to be used for the management of the coastal zone of Guvuro. EBA and Eco-DRR approaches were incorporated into the overall adaptation plan: the Municipal Council of Xai Xai led the citizens of the city to construct and maintain soil erosion and sand stabilization walls landscaped with vetiver grass and shrubs in the city to serve as adaptation measures to climate change and sea level rise induced erosion and destruction of properties (Nkem, Munang and Jallow 2011).
283. Cambodia's Climate Change Strategic Plan (CCCSP) 2014-2023, was launched in November 2013. It builds synergies with existing government policies to ensure a strategic cohesion to address a wide range of climate change issues linked to adaptation, GHG mitigation, and low-carbon development. The CCCSP

covers strategic objectives related to EBA, such as reducing vulnerability of sectors, regions, gender and health to climate change impacts, and ensuring climate resilience of critical ecosystems (Tonle Sap Lake, Mekong River, coastal ecosystems, highlands etc.), biodiversity, protected areas and cultural heritage sites. The CCSP also aims to strengthen institutions and coordination frameworks for national climate change responses and strengthen collaboration and active participation in regional and global climate change processes (Cambodia's Fifth National Report).

284.

**Case Study 14: Promoting Synergies in Implementation of the Rio Conventions and other Conventions in Burkina Faso**

Burkina Faso, which is party to the CBD, Ramsar Convention, CMs, CITES, UNFCCC, UNCCD and the International Treaty on Plant Genetic Resources for Food and Agriculture has promoted synergies in implementation of these conventions by:

- The consolidation of conventions one department (MEDD) and the same coordination structure (SP/CONEDD)
- The existence of a single consultation framework agreements (CCCPU)
- A strategy for concerted implementation of the Conventions
- The involvement of focal points in the creation of national reports

*- excerpted from Burkina Faso's Fifth National Report*

285. Less evident in the review of Fifth National Reports and NBSAPs are examples of countries that have clearly identified ecosystem-based approaches to adaptation for the benefit of people and communities as a common denominator in NAP and NBSAP processes. South Africa's NBSAP is linked to its Climate Change Response Strategy and National Action Programme to Combat Land Degradation and Alleviate Rural Poverty, which will address ecosystem-based approaches to drought through the landscape approach. And as mentioned above, Tanzania national adaptation programme of action (NAPA) includes EBA and Eco-DRR measures, including catchment conservation and sustainable use, forest-fire prevention and wildlife extension services (CBD 2014).

### Case Study 15: Synergies in Swaziland for implementing EBA

Synergies in implementing the UNFCCC and CBD in terms of climate change adaptation are realized by the following measures:

- Swaziland's National Climate Change Policy aims to provide a national strategic framework for Swaziland to address the challenges and address benefits as well as opportunities presented by climate change. The Policy recognizes and promotes ecosystem-based adaptation.
- Swaziland's Sectoral Strategy explicitly calls for increased ecosystem-based approaches and protection-worthy areas into the NAP and climate change strategy. An associated target is: "By 2015, Swaziland's climate change response strategies (e.g. NAP) fully incorporate ecosystem-based resilience such as establishing carbon sinks and controlling invasive species. The indicators to assess progress are the budget allocation to ecosystem-based approaches to climate change adaptation, amount of carbon stored/captured by different ecosystems, and per cent reduction of total land area under alien plant invasion
- Development of the Comprehensive Agriculture Sector Policy and the National Food Security Policy that promote sustainable land management practices which include conservation agriculture and community-based sustainable range management on rangeland and arable land. Cattle farmers are encouraged nationally to prevent overgrazing by rotating their livestock while arable farmers are legally required to plant contour strips in between their agricultural fields to reduce erosion limiting further land degradation.

*~ excerpted from Swaziland's Fifth National Report*

### 5.3i) Gaps and Challenges

287. Participants at the UNFCCC Technical Workshop on EBA in Tanzania identified that poor coordination and alignment between sectors prevent the integration of ecosystem-based approaches for adaptation into sectoral policies. Participants mentioned the need to establish strong communication channels among the focal points of the three Rio Conventions in order to foster synergy (UNFCCC 2013).
288. Limits to synergies have also been identified as policy, institutional and funding tracks are likely to stay separate; however integration of EBA and Eco-DRR is more likely to be achievable at the project level (Doswald and Estrella 2015). The implementation of EBA/Eco-DRR projects may help to achieve better policy integration and contribute to biodiversity mainstreaming into other sectors.
289. At the global level, there is a need for closer alignment of funding for NBSAP and NAP processes so that common tasks such as biodiversity vulnerability assessments can be carried out using shared resources (CBD 2014).

### *5.3ii) Lessons Learned*

290. Many countries have prioritized the establishment or strengthening of collaboration between ministries and government agencies responsible for biodiversity and climate change as an important component of enhanced implementation. Examples of successful inter-agency collaboration drawn from national reports under the Rio Conventions include:
- Regular meetings among staff from different agencies;
  - Shared office space between agencies;
  - Establishment of issue-based working groups; and
  - Assignment of shared responsibilities for overlapping issues (CBD 2014)
291. Although most NBSAPs and NAPs have processes in place for stakeholder engagement, there is a need to increase the extent to which such processes are brought together. The timing of NBSAP revision and NAP development may present challenges with regard to common stakeholder engagement processes. NBSAP working groups and lists of stakeholders participating in relevant processes could be used to strengthen stakeholder engagement in addressing both biodiversity and climate-related concerns (CBD 2015).
292. Participants at the CBD Technical Workshop on EBA and Eco-DRR concluded that:
- a) Conserving, restoring and sustainably managing ecosystems can deliver on a number of national and international development priorities and obligations, including enhancing people's resilience to climate change and disasters, supporting biodiversity, and protecting food, water and livelihood security especially of vulnerable populations.
  - b) Cooperation among ecosystems/biodiversity, adaptation and disaster reduction communities results in a greater ability to design interventions that deliver multiple dividends.
  - c) Strong coordination between focal points for multilateral environmental agreements (MEAs) such as Ramsar, UNCCD, UNFCCC, and CBD can help to ensure synergies between MEAs are harnessed.
  - d) It is important to scale-up knowledge-sharing at local, national, regional and global levels between and across different disciplines, and continue to utilize knowledge-sharing platforms such as the Nairobi Work Programme under the UNFCCC.
  - e) Designing interventions for multiple benefits can be supported by creating space and incentives for collaboration and dialogue about trade-offs, establishing political commitment to integrated approaches, clarifying roles and responsibilities of various institutions and encouraging financial support to integrated action through looking at the policies of donor partners.

### *5.3iii) Opportunities*

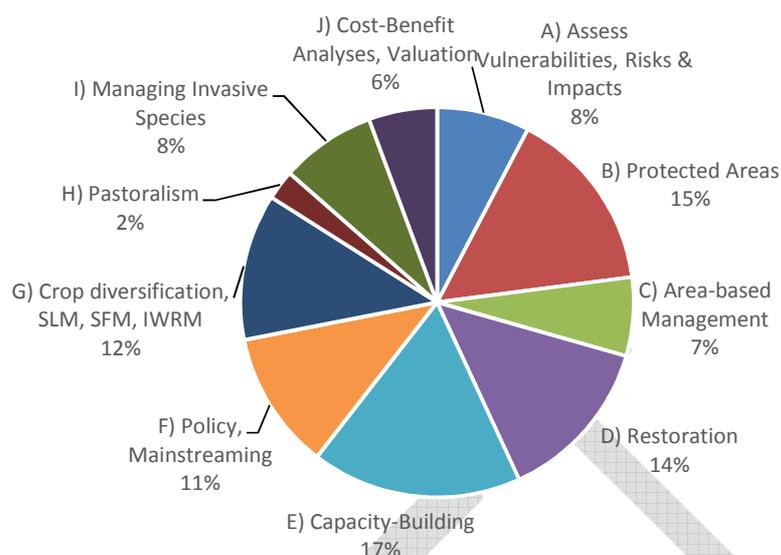
293. There are several key entry points in the NAP process for consideration of ecosystems, and Conservation International is currently working with partners on a tool that identify these entry points and key considerations for capacity and information needs. The tool will provide support to enable consideration of ecosystems in adaptation planning using a step-by-step process that supplements the NAP Technical

Guidelines and is focused on both the current phasing of their planning and local policy priorities (Conservation International 2015).

## 5.4 Implementation

### Experiences from Fifth National Reports

294. All of the fifth national reports analyzed indicated that EBA activities were being implemented, or were planned for implementation. Some caution was needed in interpreting what constitutes an EBA activity, as in many reports it was difficult to distinguish “business-as-usual” conservation with the goal of enabling ecosystems to adapt to climate change, vs. EBA activities which prioritize enabling people to adapt to climate change.
295. Activities in support of implementing the Strategic Plan were often not reported as EBA, even though they could be considered as EBA because: a) It was clear that the outcomes of some activity (such as protected areas or restoration) was linked to enhancing resilience of ecosystems providing essential services (such as mangrove restoration in SIDs); and additionally b) the project was linked to a funded programme where additional documentation was available to ascertain that the activities implemented were in support of EBA. A clear challenge identified for many LDCs is capacity to implement and report on biodiversity and climate change commitments.
296. EBA measures were explicitly integrated into 26 (of the 61 reports) of the country NBSAPs as targets, and were also integrated into 5 climate change strategies (including National Adaptation Plan of Action (NAPAs) under the UNFCCC).
297. The majority of the national reports (45 out of 61 reports analyzed) indicated that the EBA approaches implemented were focused primarily on building resilience of people and communities to impacts of climate change. The remaining countries reported activities that aim to help ecosystems cope with climate change, rather than emphasizing people and communities as the primary targets.
298. The types of EBA activities most often implemented, according to the typology developed (as described in Table 6), were capacity-building activities, protected areas, restoration, and crop diversification (see Figure 12). Information from all sources of information are included, for a total of approximately 500 activities classified.



**Figure 12: Types of EBA activities implemented or being implemented, as a percentage of total number of activities, as reported in Fifth National Reports and NBSAPs submitted by Parties to the CBD, submissions to the CBD, and case studies from project portfolios and a broader literature review. Approximately 500 activities were categorized.**

299. Maintaining healthy, functioning wetlands plays a vital role in DRR measures. Mangroves and other coastal vegetation stabilize shorelines, reducing the impacts of storms. Lakes and marshes reduce peak flooding, and in arid regions wetlands provide relief from droughts. Contracting Parties to the Convention on Wetlands of International Importance (the Ramsar Convention) commit to designate and effectively manage Wetlands of International importance, or Ramsar Sites.
300. The Ramsar Sites Information Service (RSIS) provides online information on Ramsar Sites<sup>15</sup>, with the ability to filter information according to region, wetland type, provisioning of ecosystem services, management status, and other criteria.
301. The RSIS was used to filter through the 2210 total designated Ramsar Sites to quantify the number of sites that are considered to have regulating services essential for DRR: Hazard reduction, maintenance of hydrological, erosion protection, and climate regulation.
302. Results showed that about half of the total number of Ramsar Sites provide hazard reduction ecosystem services, 15% maintain hydrological regimes, and 13% provide protection from erosion, (results are listed in Table 5). This brief analysis of Ramsar Sites demonstrates that there are many designated wetlands that are recognized for their contribution to DRR. However, only about half of these sites have a management plan for wise use, indicating a need for governments to implement planning and

<sup>15</sup> Ramsar Sites Information Service: <http://rsis.ramsar.org>

management to ensure these sites continue to provide essential ecosystem services for adaptation and DRR.

**Table 5: Number of Ramsar Sites in each region that contribute to the provisioning of regulating services important for disaster risk reduction measures**

Region	Hazard Reduction	Maintain Hydrological Regimes	Erosion protection
Africa	226	173	157
Asia	175	110	85
Europe	513	238	162
Neotropics	120	55	69
North America	121	88	79
Australia & Oceania	43	21	18
<b>Total No. of Sites</b>	<b>1199</b>	<b>685</b>	<b>570</b>
<b>Total No. of Sites with Management Plan</b>	<b>624</b>	<b>332</b>	<b>284</b>

#### 5.4i) Challenges and Gaps

303. Limits to be EBA and Eco-DRR must be recognized in addressing adaptation and disaster risk reduction. Ecosystems can only support adaptation if the ecosystems themselves are not vulnerable to climate change (WWF 2013). For example, investing in reforestation to protect watersheds will waste valuable resources if the trees or vegetation will not survive under future climate conditions. It is imperative to plan carefully to avoid implementing EBA and Eco-DRR activities that will not be effective in the long term.
304. Several countries have cited lack of reliable funds as an impediment to implementation, and have also noted that short project cycle funding interrupts the continuity of adaptation work.
305. Additionally, lack of capacity, resulting from high staff turnover, was cited by several countries as a major impediment to maintaining institutional memory. Lack of staff capacity also prevents effective planning, implementation and monitoring of EBA and Eco-DRR activities and programs.

#### 5.4ii) Opportunities and Entry points

306. The review of Fifth National Reports and case studies from a wide variety of sources revealed several gaps and challenges in making the case for EBA and Eco-DRR and planning, monitoring and evaluation of effectiveness. However, several opportunities have emerged that can provide key entry points for further action on EBA and Eco-DRR, outlined below.

#### **Opportunities: Ecosystem-based Approaches to Mitigation**

307. Reducing Emissions from Deforestation and Land Degradation (REDD) is an effort to create a financial value for the carbon stored in forests, offering incentives for developing countries to reduce emissions from forested lands. "REDD+" goes beyond deforestation and forest degradation, and includes the role of conservation, sustainable management of forests and enhancement of forest carbon stocks. While a detailed discussion of REDD+ is beyond the scope of this report, it is important to note that while primarily envisioned as mitigation, REDD+ can offer adaptation and disaster risk reduction benefits if

implemented carefully. For example, utilizing an ecosystem-approach such as conserving forests to reduce greenhouse gas emissions can reduce the risks of soil erosion or landslides by stabilizing slopes.

308. The fact that coastal vegetation can sequester significant amounts of carbon – (if undisturbed, or else they are a source of greenhouse gases rather than a sink) is another argument for restoring and protecting them. There is increasing advocacy for ‘blue carbon’ initiatives. In Mexico, carbon stocks in mangroves have been quantified in three protected areas, in order to calculate carbon emissions and sequestration. It was demonstrated that the carbon stocks in Sian Ka’an store the equivalent of almost half of Mexico’s emissions during 2009.
309. There are challenges and trade-offs associated with REDD+ and blue carbon initiatives, but with careful planning and implementation, many co-benefits and complementarities can be realized (Munroe & Mant 2014).

**Opportunities: Payment for Ecosystem Services**

310. The people and the economy Seychelles, with its low-lying island geography, are especially vulnerable to the impacts of climate change, which include severe storms, sea level rise, warmer ocean temperatures, and increasing ocean acidity which damages coral reefs and reduces their buffering capacity against storms. The Nature Conservancy is acting to mobilize a \$30 million (USD) debt-swap for the government of the Seychelles in exchange for their commitment to enhance marine conservation, thereby increasing resilience of ecosystems and people to the impacts of climate change. The effort will also establish a permanent endowment that generates sustainable financing for Seychelles’ marine conservation and climate adaptation activities (TNC [case study](#)).

**Opportunities: Disaster Recovery - Building Back Better**

311. The phrase “Build Back Better” first emerged during the recovery effort after the Indian Ocean Tsunami in December 2004, when there was a clear need to improve current reconstruction and recovery practices and generate safer communities (Mannakkara and Wilkinson 2014). One of the four key priorities in the Sendai Framework for Disaster Risk Reduction is “enhancing disaster preparedness for effective response and to “Build Back Better” in recovery, rehabilitation and reconstruction.”

312. BBB is defined as a way to utilize the reconstruction process to improve a community’s physical, social, environmental and economic conditions to strengthen resilience to future natural disasters. Various principles for building back better include <sup>16</sup>

- Avoiding unnecessary damage to future recovery
- Agencies being accountable to people they assist
- People affected by disaster drive their own recovery

Disasters have demonstrated that the recovery, rehabilitation and reconstruction phase, which needs to be prepared ahead of a disaster, is a critical opportunity to “Build Back Better”, including through integrating disaster risk reduction into development measures, making nations and communities resilient to disasters.  
~ Sendai Framework for Disaster Risk Reduction 2015-2030

<sup>16</sup> Key propositions for building back better, p. 3, Fan et al. 2013 <http://www.odi.org/sites/odi.org.uk/files/odi-assets/publications-opinion-files/8693.pdf> ,

- Recovery must promote fairness and equity
- Recovery of local economy and livelihoods is a priority
- Empowerment of local governments
- Clarity and responsibility of multilateral agencies and NGOs
- Recognizing diversity in reconstruction and recovery efforts
- Drawing on social and economic resources from within communities affected
- Account for future hazards and risks – assessment and decentralized DRR

313. The principles of BBB provide key entry points to incorporate opportunities provided by nature to build back better.

314. An encouraging example of building back better is the Mangroves for the Future initiative, a multi-party initiative led by IUCN and UNDP, aimed at promoting investment in coastal ecosystem conservation for sustainable development. The MFF grants facility offers small, medium and large grants to support initiatives that provide practical, hands-on demonstrations of effective coastal management in action. MFF builds on a history of coastal management interventions before and after the 2004 Indian Ocean tsunami. It initially focused on the countries that were worst affected by the tsunami and has expanded to include Bangladesh, Cambodia, Myanmar, Pakistan and Viet Nam.

315. Planting the right kind of vegetation is also part of building back better. There are ongoing research efforts aiming to identify species in certain regions that are more resistant to disasters, as demonstrated by the governments of Switzerland and Japan's research efforts to create effective multi-functional disaster protection forests. It is crucial to plan restoration efforts carefully, conducting systematic surveys to identify suitable sites where vegetation can thrive, planting the right species with proper timing (Durst 2015).

***Opportunities: Private Sector Engagement***

316. Climate change will impact industry sectors in different ways, particularly the sectors depending on coastal infrastructure or reliable water supply – for example, ports, hydropower, agribusiness and water-intensive industries.

317. Proper regulation and incentives can help prepare industry for climate impacts. Partnerships with industry associations can also aid with 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, which includes EBA and Eco-DRR activities such as ecosystem restoration (GEF 2014).

318. The GEF's programming strategy on adaptation for the Least Developed Countries Fund and the Special Climate Change Fund promotes more partnerships with industry, with a special focus on the insurance industry. Areas of action for catalyzing adaptation includes expanding insurance access for developing countries, supporting the introduction of innovative adaptation products and services, preparing the

ground to allow insurers to directly invest in adaptation, and facilitating a formal space for engaging insurers to provide support for policy reform, land-use planning, capacity-building and technology transfer.

319. Several private sector activities that have been proposed for adaptation and DRR utilize the ecosystem approach, including promotion of sustainable land use planning – however, as work expands in this area, the opportunity to mainstream the ecosystem approach into private sector activities should not be missed.
320. The Global Mechanism (GM) of the UNCCD is establishing the Land Degradation Neutrality (LDN) Fund, to be launched in December 2015 at the UNFCCC COP21 in Paris, France. The Fund is designed to act as a coordination platform for blended finance, established as a Public-Private Partnership (PPP)<sup>17</sup> among private institutional investors, international finance institutions and donors. It supports the transition to LDN through land rehabilitation while generating revenues for investors from sustainable production on rehabilitated land. An example of an EBA and Eco-DRR activity aimed for is the restoration of natural and semi-natural ecosystems that provide valuable functions and benefits. The Fund seeks to mobilize US\$2 billion annually, with a potential total of \$50 billion over 20 years.
321. The increasing risk of disasters posed by climate change has also catalyzed the insurance industry to action, given the costs of recovery from natural disasters to governments, communities, and businesses. In 2013, global economic losses due to natural disasters was estimated at USD 131 billion, of which 37 billion were insured (UNEP FI 2014). Innovative ways to insure against losses are being developed, such as microinsurance which provides protection to low-income communities by insuring crops or assets. Catastrophe insurance pools can cover high-risk communities exposed to natural hazards.

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<sup>17</sup> Public-private partnerships (PPPs) are a mechanism for government to procure and implement public infrastructure and/ or services using the resources and expertise of the private sector ([World Bank](#)).

#### Case Study 16: The Sustainable Insurance Initiative

The UNEP Finance Initiative Principles for Sustainable Insurance Initiative (PSI Initiative) was launched at the 2012 UN Conference on Sustainable Development. The principles serve as a global framework for the insurance industry to develop and expand the innovative risk management and insurance solutions needed to promote sustainable cities, food security and disaster-resilient communities.

The principles include: embedding environmental, social and governance issues into decision-making related to the insurance business; raising awareness and managing risk; working with governments, regulators and stakeholders to promote action on environmental, social and governance issues; and demonstrating accountability and transparency in disclosing progress in implementing the Principles (UNEP FI 2014).

The PSI Initiative evaluated the effectiveness of risk reduction measures, with plans to develop a global disaster map, and mentor at-risk communities. In the review of risk reduction measures, several EBA and Eco-DRR approaches were demonstrated to be highly effective. For example, mangrove forests in Orissa India, protected villages from a 1999 super cyclone, while there were higher numbers of deaths in unprotected villages. The role of wetlands in flood protection was also evaluated, and studies demonstrated that wetlands provide the same social benefits as permanent barriers, but with positive downstream environment impacts such as nitrogen and phosphorous control, and recreational benefits (UNEP FI 2014).

#### ***Opportunities: Linkages between Climate Change, Biodiversity and Health***

322. Climate change impacts on health have been well documented - example, the number of reported weather-related natural disasters has more than tripled since the 1960s, resulting in over 60 000 deaths each year, mainly in developing countries (WHO). Rising sea levels and increasingly extreme weather events will destroy homes, medical facilities and other essential services. A lack of safe water, which can result from changing rainfall patterns, can compromise hygiene and increase the risk of diarrhoeal disease, which kills almost 600 000 children aged under 5, every year (WHO). Heat waves and heat island effects in cities also put the elderly and vulnerable people at risk.
323. The World Health Assembly adopted a work plan on climate change and health in 2009. Linkages between health and biodiversity have been more recent - at CBD COP12, in Pyeongchang, a cooperation between the WHO and CBD was established. Health and biodiversity will continue to be discussed at the 19<sup>th</sup> Meeting of the CBD Subsidiary Body on Scientific, Technical, and Technological Advice (SBSTTA 19).

324. Recent research has also established links between biodiversity exposure and improved health and well-being, including a comprehensive summary of health effects of ES, nature and biodiversity (Sandifer et al. 2015) and a review of the state of knowledge on biodiversity and health, including the value of biodiversity and ecosystem approaches to increasing resilience and disaster risk reductions (WHO and CBD 2015). These studies point to areas for further research, including addressing causation of health benefits and action mechanisms, and the need for multidisciplinary collaborations to enhance health and conservation. This can also provide impetus or an entry point for implementation of EBA and Eco-DRR measures to contribute to increasing resilience of communities in terms of health and well-being.

#### *5.4iii) Lessons Learned*

325. Participants at the CBD Technical Workshop on EBA and Eco-DRR identified the following set of challenges and lessons learned with regard to implementation of EBA and Eco-DRR:

326. Project implementation can be hampered by different understandings of concepts and different values regarding ecosystems and biodiversity. In achieving adaptation and DRR objectives, it is important to be tolerant and flexible with different terminologies, and strive for maximum implementation on the ground, working towards wide global implementation of initiatives that contribute towards building resilience of as many local communities as possible.

1. There should be increased engagement between the scientific community and project executors in developing and implementing EBA and Eco-DRR activities, making use of available guidance to ensure optimal and appropriate use of ecosystems for adaptation and DRR. Experiences from the field have often shown that inappropriate species are used in wrong locations even when scientific guidance pointed to the contrary.
2. In implementing EBA and Eco-DRR activities, the quality of ecosystems used to reduce vulnerability to climate change impacts is often not considered. EBA and Eco-DRR should, but has not always, maximized the appropriate use of biodiversity in solutions. There have been many examples of activities that use single or exotic species in implementation.
3. EBA and Eco-DRR are cross-disciplinary and require effective engagement and coordination of multiple stakeholders such as engineers, academics, local and indigenous communities, civil society and private sector. Eco-DRR and EBA would benefit from more effective mechanisms for promoting “co-production” of knowledge between stakeholders and channeling this knowledge into decision-making.
4. Even the most-well developed activities may be rejected by communities if they are not involved in project design from the beginning, even if they understand they will benefit from the project.

327. Guidelines on implementing EBA and Eco-DRR at a local and sectoral level can aid in the increased use of ecosystem-based approaches and effective implementation of policy.

### **5.5 Monitoring & Evaluation**

328. Monitoring and evaluation (M&E) are key elements of adaptation strategies. Monitoring enables planners and practitioners to improve adaptation efforts by adjusting processes and targets, and can be carried out during implementation, as throughout the lifetime of the adaptation action (UNFCCC 2012). Evaluation is a process for systematically and objectively determining the effectiveness of an adaptation

action, answering whether the objectives and targets been achieved, and whether it can be attributed to the adaptation measure taken (UNFCCC 2012). Together, M&E also improves implementation by applying lessons learned.

329. Activities involved in developing an M&E system include formulating indicators that measure changes in vulnerability and context. Various guidance is available on identification of suitable indicators, but a common goal for indicators is they are, as much as possible, SMART - specific, measurable, achievable and attributable, relevant and realistic, time-bound, timely, trackable and targeted (WWF 2013).
330. An example of SMART indicators was provided by UNEP-PEDRR in their submission to CBD outlining several examples of Eco-DRR. One initiative addresses “Managing Environment and Disaster Risk in Afghanistan’s Central Highlands (Koh-e Baba Mountain range),” a project implemented with UNEP and the European Commission. The basis of evaluation are the following indicators:
- a) Eco-DRR mainstreamed into development policies and plans
  - b) New partnerships and collaborative initiatives on Eco-DRR
  - c) Strengthened local / national capacities to implement Eco-DRR
  - d) Field interventions on Eco-DRR demonstrate contribution to DRR in terms of hazard mitigation, exposure or vulnerability reduction or enhancing local resilience.
331. These indicators point to completion of activities that are assumed to reduce vulnerability or build resilience, but, as with many other EBA or Eco-DRR interventions, the early stages of the project do not enable full evaluation of its effectiveness.
332. In the Fifth National Reports, NBSAPs, and case studies reviewed, there were limited quantitative evaluations of success. Projects that were formally evaluated, such as the independent evaluations carried out for projects under funds administered by the Global Environment Facility, were more likely to quantify success.
333. Partly this may be due to the fact that the majority of the activities described in case studies and fifth national reports have only been recently implemented, making it difficult to evaluate benefits quantitatively. However, many initiatives have already demonstrated early benefits. The Mountain EBA Initiative, implemented by UNDP, UNEP and IUCN and supported by the German government, has yielded some early benefits, with lessons learned to be fed into a framework for scaling up EBA in other areas.

### Case Study 17: Adapting to Climate Change in Mountain Ecosystems in Uganda

Increasing temperature and rainfall are impacting the intensity and occurrences of hazards in Uganda's mountain areas, including floods and landslides. In turn, these hazards impact health, food security and the economic development potential of the people. Enhancing ecological services, such as catchment and natural resource management, could reduce such vulnerabilities and enhance livelihoods.

In Uganda, the Mountain EBA Programme has demonstrated that the implementation of soil and water conservation strategies like contour trenches have proven to be very effective. Immediate results include the reduction of impacts of soil erosion and floods. In only six months of implementation, combined with other good management practices on farm, there is already a clear and visible difference between those implementing climate resilient measures and those not, in terms of quantity and quality of crops and yields

Uganda was chosen as one of three pilot sites for implementing the mountain EBA programme, for its representative social and environmental conditions, which will enable replication and upscaling in other areas. A framework for implementation will be developed based on the results from the pilot programs in Peru, Uganda and Nepal.

~UNEP, UNDP and IUCN 2014

### 5.5i) Challenges

334. The limited hard evidence for EBA is likely due in part to lack of capacity to develop and implement monitoring and evaluation systems. A part of the challenge also stems from the time lag from implementation of some EBA activities to realizing its benefits - effectiveness of EBA measures are sometimes not seen until at least a decade after the intervention. And the benefits may manifest differently in different sectors of society.
335. M&E frameworks were not often elaborated on in the national reports or submissions, but several countries identified lack of capacity as a key challenge, including insufficient technical capacity and finances leading to problems with periodic data collection and monitoring protocols (e.g., from Antigua & Barbuda's Fifth National Report).
336. M&E challenges identified in the GEF-funded project, "Implementation of Pilot Adaptation Measures in coastal areas of Dominica, St. Lucia and St. Vincent & the Grenadines" included:
  - Lack of clear links between the objectives, outputs and indicators
  - Indicators that were not measurable or did not demonstrate effectiveness of the intervention - for example, the number of nesting parrots in a Dominica National Park. Once the project was restructured, appropriate and measurable indicators were selected, enabling the results framework to be used as the instrument to evaluate on-the-ground progress.
  - M&E tools should have been inherently built inside each activity, and appropriate instruments for measurement, registry and stocking of information should have been included. Their absence in several pilot activities (in some cases due to increased costs resulting from the purchase of such tools) has prevented a more accurate and detailed gathering of information.

337. M&E was identified as a specific concern for the government of Palau in its Fifth National Report. However, this has been addressed by using community members' often extensive anecdotal knowledge of local environmental conditions, which is valuable in bridging some information gaps.
338. Improved M&E methods are needed, particularly methods with some level of standardization, if appropriate, which will enable comparisons between EBA approaches. Currently much evaluation is anecdotal, has not been peer-reviewed, and focus mainly on success stories (Royal Society 2015).

### *5.5ii) Lessons Learned*

339. Participants at the CBD Technical Workshop for EBA and Eo-DRR identified several challenges and lessons learned:
- a) Beyond defining concepts, the key to leveraging the expertise from diverse communities (ecosystem, adaptation and disaster reduction) is supported by a focus on the objectives that each community is trying to achieve and understanding the various indicators that each use. This is the basis for dialogue and finding common ground.
  - b) Monitoring and evaluation are important policy instruments that can enable review of policy and plans based on understanding of progress and challenges in reaching objectives. Risk informed decision making, including climate related risk, is at the heart of disaster risk reduction, but it is also important to consider "opportunity-informed decision making". For example, identifying the watersheds where there are opportunities for delivering measurable results in ecosystem/biodiversity, adaptation and disaster risk reduction – the restoration opportunity mapping methodology developed for the Bonn Challenge, is an example of this.
  - c) Designing interventions for multiple benefits can either be supported or inhibited by the policy environment. This can include creating space and incentives for collaboration and dialogue about trade-offs, establishing political commitment to integrated approaches, clarifying roles and responsibilities of various institutions and encouraging financial support to integrated action through looking at the policies of donor partners.

### *5.5iii) Opportunities*

340. M&E also provides a basis to incorporate adaptive management, which enables a flexible approach in the face of uncertainty of future climate impacts. For example, deforestation pressures from agricultural expansion may change as suitability of areas for production change (Munroe and Mant 2014). Adaptive management enables incorporation of relevant information as it becomes available (for example on emerging local changes due to climate change), and maintaining flexibility and diversity in approaches.
341. A variety of innovative tools for monitoring and evaluation has been developed and could be utilized to a greater extent. For example, the CBD and the Biodiversity Indicator Partnership have developed a series of factsheets and potential indicators to assist with national implementation of activities. As discussed above, several of the Aichi Targets have bearing on EBA and Eco-DRR strategies to address adaptation to climate change and DRR. An example of indicators associated with Target 15 is shown

below. Factsheets have been developed on proposed indicators for the the Strategic Plan and potential sources of information<sup>18</sup>. Regional facilitators to assist in biodiversity indicators development are also available.

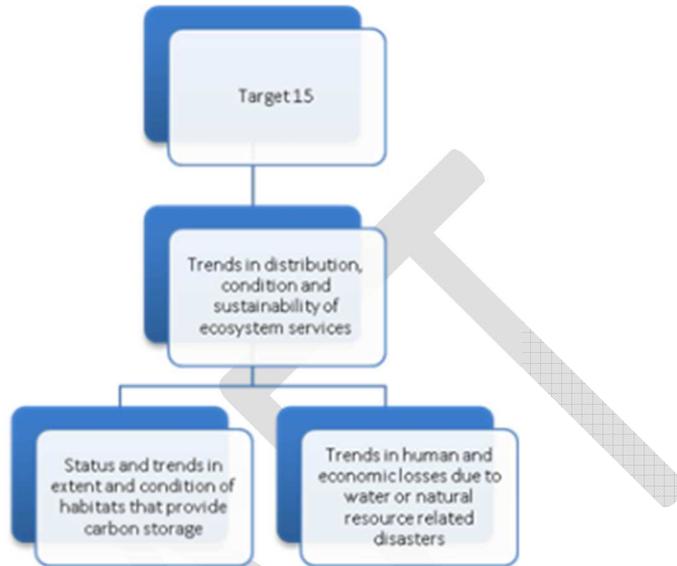


Figure 13: Examples of indicators related to the achievement of Aichi Target 15

## 6. POLICY ISSUES

### 6.1 Contribution of Indigenous Peoples and Local Communities to Ecosystem Approaches

342. Climate induced impacts on the territories and communities of indigenous peoples and local communities (IPLCs) are both early and severe due to their location in vulnerable habitats, including small islands, high altitude zones, desert margins and the circumpolar Arctic (UNU 2013). Climate change response policies and strategies that do not take into consideration the particular needs and circumstances of IPLCs may prove to be inadequate, ill-adapted or inappropriate.
343. IPLCs have long coped with variability, uncertainty and change through multi-generational histories of interaction with the environment (UNU 2013). Traditional knowledge and coping strategies can thus form an important basis for climate change and disaster risk reduction responses.
344. Traditional and indigenous knowledge was included as a guiding principle for the Cancun Adaptation Framework under the UNFCCC. At CBD COP 10, Parties and other Governments were invited to recognize the role of indigenous and local community conserved areas (ICCAs) in strengthening ecosystem

<sup>18</sup> The Strategic Plan Indicators Factsheets are available via a searchable database at <http://www.cbd.int/sp/indicators/>. Regional facilitators can be contacted via <http://www.bipnational.net/GetInvolved/FindaFacilitator>.

connectivity and resilience and supporting biodiversity-based livelihoods in the face of climate change. Parties were also invited to consider traditional knowledge, including the full involvement of indigenous and local communities in planning and implementing effective climate-change mitigation and adaptation activities (decision X/33).

345. The IPCC Fifth Assessment Report (AR5) highlighted that integrating indigenous, local and traditional knowledge systems and practices with existing practices will increase the effectiveness of adaptation (IPCC 2014). This was reiterated by Parties to the CBD at COP 12 in decision XII/20.

• • •  
“Ensuring science-based actions, with significant community engagement has been key to success.”

~Conservation International, EbA pilot project in the Philippines

346. The Sendai Framework for DRR 2015-2030 also emphasizes the contribution of traditional, indigenous and local knowledge in addressing key priorities laid out in the framework, including understanding disaster risk and strengthening disaster risk governance.

347. Key safeguards are rights enshrined in the UNDRIP and human rights treaties, particularly the rights to self-determination and self-governance and to provide or withhold FPIC for activities on their territories, lands and resources.

348. In 2007, the UN Declaration on the Rights of Indigenous Peoples recognized the rights of IPLCs to the territories & resources traditionally owned, occupied, used or acquired. Crucially, it is also recognized the right to culture. The UN Declaration is now adopted by all countries in the world.

349. These policies and conventions set out the rights of IPLCs, which must be respected and upheld in disaster risk reduction, prevention and preparedness activities, including their full and effective participation in national planning processes and other decision-making processes that affect them.

• • •  
“Indigenous, local, and traditional knowledge systems and practices, including indigenous peoples’ holistic view of community and environment, are a major resource for adapting to climate change, but these have not been used consistently in existing adaptation efforts. Integrating such forms of knowledge with existing practices increases the effectiveness of adaptation.”

~IPCC Fifth Assessment Report (WGII Summary for Policymakers)

351. The government of Canada, as included in their Fifth National Report, is using traditional knowledge to guide national park management. Cooperative management allows Aboriginal traditional knowledge to inform aspects of park planning and operations, including the monitoring and restoration of park ecosystems.

352. Shellfish are an important part of the local economy and diet of the Coast Salish First Nations. Impacts of climate change may include reduced shellfish harvests due to changes in water temperature or ocean circulation, harmful algal blooms or invasive species. As part of a collaborative clam monitoring and management project with the Coast Salish Nations, Parks Canada undertook a traditional knowledge study with Elders and knowledgeable people to gain more information regarding historic clam abundance levels and traditional management techniques. This study has enabled better understanding of contemporary shellfish data, and identification of potential techniques to improve restoration and

management of clam populations in Gulf Islands National Park Reserve in British Columbia (Canada's Fifth National Report).

353. On the Northwest Coast of North America, clam gardens are a form of shellfish management designed to ensure a reliable food source for the large populations of First Nations and Native Americans that inhabit the Northwest Coast. The Clam Garden Network, an inter-disciplinary, cross-sectoral network, has been formed to research and promote clam gardens for their significant cultural and ecological properties. It involves a community of First Nations, academics, researchers, and resource managers from coastal British Columbia, Washington State and Alaska.
354. Impacts of climate change in Niue, as in other SIDS, have serious consequences for inhabitants and the economy. A study by the Secretariat for the Pacific Community predicts more permanent El Niño conditions as a result of climate change, which mean increased fluctuations in fish numbers and distribution. Relative warming could reduce the strength of the water up-welling system in the central equatorial Pacific where Niue is located, which in turn may reduce fish productivity (Secretariat for the Pacific Community 2008).
355. The Government of Niue encourages traditional practices associated with hunting, fishing and agriculture which incorporate long-term closures of forest or coastal areas to harvesting (tapu) or short-term bans in particular areas (fono). While not specifically referred to as EBA, these conservation practices are implemented to ensure sustainability of resources that Niueans depend on for food and traditional arts and crafts such as weaving, and may enhance the resilience of the ecosystems to impacts of climate change (Government of Niue's Fifth National Report). Other examples of closures similar to tapu/fono can be found in French Polynesia, Palau, and other countries.
- 356.

**Case Study 18: Addressing Food Security - The use of traditional knowledge for adapting productive systems to climate change in Mexico**

Changing temperature or precipitation patterns and climate extremes can threaten crop productivity. Risk of food shortages or famine can be mitigated by diversifying crops, land use or livelihood options, or implementing agroforestry or conservation agriculture. In the Central Region of the Sierra Madre Oriental (RCSMO, acronym in Spanish), in Mexico, families depend on corn crops to survive. However, this region has experienced extreme weather/ meteorological events for the last 30 years – a rise in average temperature of 3 degrees in May in the last decade, and declines in rainfall. Communities have adapted through their accumulated traditional knowledge from their ancestors, which enables them to select seeds from their own diverse harvests, rather than sowing certified seeds which have not been adaptable to different ecological conditions and climate change impacts

*~Avalos et al. 2012, extracted from Mexico's submission to the CBD*

357. The case study below outlines the importance of participatory approaches in the planning, design, validation and implementation phases of EBA and Eco-DRR measures in the Peruvian Andean highlands.

### Case Study 19: Implementing low-regrets measures in the Peruvian Andes (Nor Yauyos Cochas Landscape Reserve)

The Nor Yauyos-Cochas Landscape Reserve (NYCLR), located in the Peruvian Andean highlands, is one of 76 natural protected areas managed by Peru's National Service of Natural Areas. In this area, a number of EbA measures are being implemented, via a participatory methodology to select adaptation measures. EbA and Eco-DRR measures that are seen as 'low-regrets' activities from the communities' perspective include:

- Sustainable water and grassland management, where upper microwatersheds, wetlands, water courses, and their associated vegetation (mainly grasslands) are managed to provide water storage, groundwater recharge and regulation services, and
- Community-based sustainable native grassland management to enhance pastoral livelihoods and increase resilience to extreme climatic events.

The process of consultation, diagnosis and design of the measures lasted eight months. Project sites were selected based on environmental, social, ecological, political, and operational criteria. Field trips and workshops were carried out to identify vulnerabilities based on local perceptions, the local communities' needs and priorities, and ideas to address the vulnerabilities. Proposed activities were presented and validated by local stakeholders, reserve staff and project partners.

The participatory approaches used so far in the planning, design, validation and implementation phases have been key to delivering bottom-up activities that empower and enhance local community ownership.

A recommendation is to incorporate climate change adaptation into protected areas systems is to follow a horizontal model of co-management with all the various actors at different levels. Overall, the no-regret measures presented in this case study strengthens the overall governance of ecosystem management as a nature-based solution towards climate change adaptation including the main stakeholders – the local communities and the reserve.

*~ Global Mountain EbA Programme, funded by the German Government and implemented by  
UNEP, UNDP and IUCN*

347. Indigenous Peoples and Community Conserved Territories and Areas (ICCAs) are the oldest form of conservation on earth involving collective decision-making about nature, and are closely related to peoples' livelihoods, culture and identity. ICCAs can be found everywhere, span all types of ecosystems and cultures, have thousands of local names and are extremely diverse. They are built on collective ecological knowledge and capacities, including sustainable use of wild resources and maintenance of agrobiodiversity.

348.

ICCAs are typically designed to maintain livelihood resources for times of stress, such as during severe climate events, war and natural disasters. Examples of ICCAs include:

- Sacred spaces such as the Chizire sacred forest, Zimbabwe, Khumbu of the Sherpa people (Mount Everest National Park), sacred lake, Indian Himalayas
- Indigenous territories and cultural landscapes/seascapes such as the Paruku Indigenous PA, Western Australia, Traditional territory of ASATRIZY, Yapù, Vaupès, Colombia
- Territories and migration routes of nomadic herders/mobile indigenous peoples, such as wetlands in Qashqai mobile peoples' territory, Iran
- Sustainably managed wetlands, fishing grounds and water bodies (Temporarily and/or permanently forbidden sites (manjidura), Bijagos biosphere reserve, Guinea Bissau)
- Community-established, owned and managed areas in industrialised countries (Gajna floodplain commons, Croatia)

349. Indigenous, traditional and local knowledge systems - and forms of analysis and documentation such as community mapping - can play a significant role in identifying and monitoring climatic, weather and biodiversity changes and impending natural hazards, similar to early warning systems.

350. Challenges to implementing ICCAs are internal and external: internally, erosion of local knowledge, the loss of local language and cultural practices, the abandonment of traditional learning processes within communities (elders and youth) and the loss of the institutions capable of governing the commons (deciding and acting together). Externally, a serious external threat is forced eviction, climate change and imposition of destructive practices on the ICCAs— often resulting from combined private interests and government decisions.

### *6.1i) Challenges and Gaps*

351. Challenges in integrating indigenous, local, and traditional knowledge into EBA and Eco-DRR practices include:

- a) It is often challenging to bring local knowledge and experience to national and regional policies and strategies;
- b) Contentious territorial and land ownership often presents challenges with regard to engaging indigenous groups;
- c) Ecosystem-based approaches for adaptation are often too top-down and do not integrate lessons learned from community-based adaptation;
- d) Guidelines on how to support the integration of gender considerations and local knowledge into adaptation actions have not been synthesized or integrated into the current principles of and/or guidelines for ecosystem-based approaches for adaptation (UNFCCC 2013)

352. Under the auspices of the UNFCCC Nairobi Work Programme, a workshop was held in Bonn, Germany in April 2014, on the use of indigenous and traditional knowledge and practices for adaptation, and the application of gender-sensitive approaches and tools for understanding and assessing impacts, with a view to developing recommendations for practitioners. Participants at the workshop further identified challenges and needs related to:
- Limited resources, including finance, technology and capacity. While the indigenous and local communities vulnerable to impacts of climate change have rich knowledge in managing natural resources sustainably, they have minimal access to resources to address adverse climate impacts;
  - Changes in local and indigenous communities themselves through the adoption of modern lifestyles, which can lead to the discontinuation of intergenerational learning and abandonment of local and traditional practices
  - The ability and willingness of national and local governments to engage with local and indigenous communities and to appreciate and respect the body of traditional knowledge and practices. The different roles and responsibilities of the various actors in the collaboration need to be made clear and recognized by all involved;
  - The ability of time-bound adaptation projects and initiatives to recognize the relatively long time frame required to build relations, trust and a collaborative environment with local communities and holders of indigenous and traditional knowledge and practices;
  - The need to ensure predictable and tangible benefits for, and empowerment of, communities resulting from collaboration. Otherwise local and indigenous communities face the risk of their knowledge and practices being extracted without proper compensation, which can then lead to collaboration fatigue.

### *6.1ii) Lessons Learned*

353. National multi-stakeholder working groups have been effective in facilitating knowledge sharing across sectors on the role of ecosystems in adaptation and coordinating policy reviews and inputs. Inclusion of policy makers and experts from both climate and biodiversity disciplines has helped enhance awareness of biodiversity-climate links, facilitate discussion between focal points of multi-lateral agreements, and promote a more holistic approach to policy development. Where possible, existing working groups and knowledge platforms should be used and enhanced to avoid redundancy and improve cost-effectiveness (BirdLife International's submission to CBD).
354. REDD+ has been briefly discussed above in Section 5, 'Implementation' as a possible mechanism, with careful implementation, for integrating an ecosystem approach that meets not only mitigation, but also adaptation needs. The development and implementation of legal, social, environmental and accountability safeguards is critical to the success of REDD+. While many frameworks governing REDD+ contain safeguards and policies to address the rights of IPLs, there is often little oversight and accountability of these frameworks at the implementation stage (UNU 2013). Indigenous worldviews must be integrated into social safeguards and approaches to ensure meaningful and equitable

participation of IPLCs, and should be closely monitored through all phases of project development and implementation (UNU 2013).

355. Lessons learned identified from participants at the CBD Technical Workshop on EBA and Eco-DRR included the following:
- a) Traditional knowledge is an important part of the ecosystem approach, can complement science, and bridge gaps in information. Indigenous, traditional and local knowledge systems - and forms of analysis and documentation such as community mapping - can play a significant role in identifying and monitoring climatic, weather and biodiversity changes and impending natural hazards, similar to early warning systems
  - b) Effective EBA and Eco-DRR should consider the kind of support that communities need for adaptation and DRR (e.g. through needs assessments). Listening to the differentiated needs of indigenous peoples and local communities is necessary since interventions that do not consider needs, roles, aspirations, etc. can be detrimental to IPLCs livelihoods and cultures. Ensure free prior and informed consent and government and other institutional support, including resource mobilization, promotion for community-led initiatives, and respect for local forms of governance.
  - c) Further awareness is needed about the importance of processes of consultation and community engagement throughout all steps of the project, including from inception and planning. Creating involvement of communities can actually create ownership of processes that in turn can ensure the sustainability of the project in the long run.
  - d) It is important to understand the cosmovision of IPLCs when undertaking EBA and Eco-DRR, in order to realize the contributions they can make. IPLCs may be vulnerable to climate change impacts but are also important knowledge holders and rights holders.
  - e) Differences in terminologies related to EBA and Eco-DRR depend on different experiences and areas of work, but it is important that adaptation and DRR approaches integrate all three pillars in projects and strategies: social, environmental and economic, and not regard them as separate issues.

### **6.1iii) Opportunities**

356. As identified in Section 5, there are several tools that are available to facilitate participation of IPLCs that could be utilized to a greater extent.
357. An example of a participatory tool and process for understanding vulnerability and ecosystem services is a toolkit for assessing ecosystem services (TESSA), developed by BirdLife International. TESSA engages local communities in consultation, data collection, interpretation and verification. BirdLife International in Burundi worked with the Serukubeze community to assess their vulnerability and plan for adaptation using TESSA. The tool helped the community understand and communicate to decision makers their dependence upon ecosystems and the implications of different land use scenarios. Through this participatory process the community was empowered and mobilised to take collective and locally appropriate action to address their vulnerability (BirdLife International's submission to the CBD).

358. Participants at the UNFCCC NWP workshop on the use of indigenous and traditional knowledge and practices for adaptation identified several opportunities in using indigenous and traditional knowledge, addressed through sharing of lessons learned, good practices and tools at various stages of the adaptation policy process. Figure 14 provides a useful summary of this process that can be applied in implementing EBA and Eco-DRR activities (UNFCCC 2014).

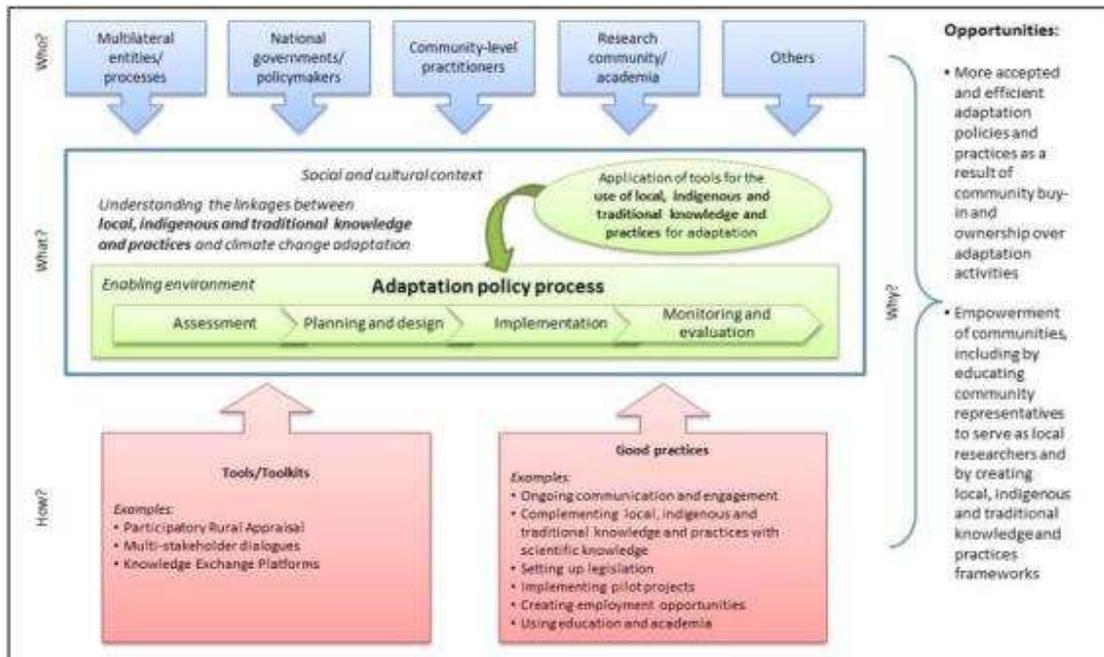


Figure 14: Opportunities in using indigenous and traditional knowledge and practices for adaptation through sharing of lessons learned, good practices and tools throughout the adaptation policy process (UNFCCC 2014)

## 6.2 Gender Mainstreaming: The role of gender in adaptation and DRR

359. There is growing international dialogue about the different ways that climate change can affect men, women and children, and recognition that gender perspectives need to be incorporated into adaptation solutions. When wood or water is scarce, women and children are most often venturing further out to look for these resources, leaving school and becoming exposed to potential violence. Women farmers are responsible for the majority of food production- yet are often barred from agricultural decision-making and have less access to land and resources (UNDP 2010).

360. Rural women in particular are responsible for half of the world's food production and produce between 60-80% of the food in most developing countries. In Africa, the share of women affected by climate-related crop changes could range from 48% in Burkina Faso to 73% in the Congo. Women are more likely than men to die during a disaster (UNDP 2010).

Poverty and inequality shape women's and men's vulnerability to disaster and the impacts of climate change, and their capacity to cope and recover in the post-disaster period.

Since women and men are affected differently by disaster and climate change, their different vulnerabilities and capacities must be analysed, and their gender-specific concerns and priorities addressed.

~ Oxfam 2010

361. However, women and girls are not only victims; they bring unique knowledge and capabilities to the adaptation and disaster risk reduction effort. Adaptation and DRR policies and programmes can be strengthened if contributions from both women and men are incorporated. Therefore, gender mainstreaming should be a significant aspect of the adaptation and disaster risk reduction planning and implementation process to ensure success and sustainability of policies, programmes and projects. The inclusion of all segments of society, men, women, children, minorities and ethnic groups are important at all stages of decision making (IUCN 2014).

362.

In addition to the Cancun Agreements, CBD COP decisions, and UNCCD Advocacy Policy Framework on Gender, the role of women has also been highlighted in the Sendai Framework for Disaster Risk Reduction 2015-2030, which emphasizes that “women and their participation are critical to effectively managing disaster risk and designing, resourcing and implementing gender-sensitive disaster risk reduction policies, plans and programmes.” It further calls for adequate capacity building measures to be taken to empower women for preparedness, and to build their capacity to secure alternate means of livelihood in post-disaster situations (UNGA 2015).

363. The review of Fifth National Reports and case studies indicated encouraging progress on the recognition that involvement of women and all sectors of society is important in planning processes. There were, however, few concrete examples of action on gender mainstreaming, particularly for adaptation and disaster risk reduction planning.

~ Indicative Statistics on Gender, Disasters and Climate Change (UNDP 2010)

364. Gambia’s Fifth National Report describes the National Policy for Advancement of Gambian Women mainstreams women into the national development process, across all sectors and setting goals and strategies. The objectives include enhancing and developing the productive capacities of women with a view to “increasing their contribution to household welfare and food security, in particular: reduce drudgery of rural women to enhance their quality of life, and increase women’s access to production resources and inputs and support services.”

365. The Women’s Bureau is an important institution that advises the government and is responsible for conducting data collection, research, analysis and dissemination of information, monitoring of women’s programmes and backstopping to other institutions. While these measures do not yet explicitly mention the role of gender considerations in adaptation to climate change and disaster risk reduction, they provide an important basis or starting point.

- During the 1991 cyclone disasters in Bangladesh, 90% of the 14,000 fatalities were women (Ikeda, 1995)
- Women, boys and girls are more than 14 times more likely than men to die during a disaster (Peterson, 2007)
- The majority of victims in Hurricane Katrina were African-American women and their children, a group likely to be poor, lack health care and earn low wages (Gault et al, 2005; Williams et al, 2006)
- In Hurricane Mitch, men suffered higher mortality rates because they took more risks trying to save themselves and their families (Bradshaw, 2004)

366.

#### **Case Study 20: Women adapting livelihood strategies in response to unpredictable rainfall in Uganda**

In Caicaoan, a village in Karamoja in north-eastern Uganda, the climate is changing in unpredictable ways. For three years the rain came late, and when it came, very little rain fell. But then 2007 saw the worst flooding in 35 years. Harvests were destroyed and grain stores stood empty. With men spending weeks away from home tending cattle, women were left caring for families and struggling to find alternative sources of income. Collecting and selling firewood was one option, but firewood became more and more scarce, and women had to travel further and further to find it, and to places that were less safe.

Deforestation and lack of water are two of the many problems that the local women's group in Caicaoan decided to address. They successfully planted evergreen and mango trees to replace those cut down for fuel and charcoal, and this reduced soil erosion and helped women earn an income. They also built a borehole so that the seven-hour round trip they used to make to collect water was reduced to 30 minutes. The work of the women's group has given women an important leadership role in finding sustainable livelihoods solutions for the community.

~ excerpted from 'Sisters on the Planet', Oxfam, 2007.

367. Several experiences with integrating gender considerations into adaptation strategies were discussed at the UNFCCC Nairobi Work Programme workshop in Bonn, Germany (April 2014), on the use of indigenous and traditional knowledge and practices for adaptation, and the application of gender-sensitive approaches and tools for understanding and assessing impacts.
368. For example, women were an important, and at times only, available source of information for a vulnerability assessment tool used in Swaziland in relation to food security. The information was conducted through household surveys, which served as a useful tool to collect gender-disaggregated vulnerability data (UNFCCC 2014).
369. The different roles in society, and different knowledge of natural resources, of men and women were also an important consideration in mangrove rehabilitation activities in Timor Leste. Because women were mainly responsible for collecting resources in coral reefs and mangroves while men were mostly fishing, they acquired more knowledge about mangroves. Women's involvement during participatory planning and monitoring and evaluation benefited the mangrove rehabilitation programme (UNFCCC 2014).

#### **6.2i) Challenges and Gaps**

370. As with integrating traditional knowledge and participation of IPLCs, there has been little information related to challenges and opportunities for gender mainstreaming into EBA and Eco-DRR activities in the

review of reports and literature. Participants at the UNFCCC workshop mentioned above and the CBD technical workshop provided several insights on challenges and opportunities.

371. Challenges identified related to:

- a) The limitations associated with social and cultural context and specificity of existing gender-sensitive approaches;
- b) The lack of political will for gender-sensitive adaptation policies and plans;
- c) Limited resources, including finance, technical and institutional capacities at all levels;
- d) Misconception about gender equality and perception that gender is a women's issue only, when gender refers to both men and women
- e) Lack of comprehensive and consistent application throughout the adaptation cycle
- f) Lack of understanding of the benefits of gender-sensitive adaptation actions; and
- g) Lack of gender-sensitive approaches in monitoring and evaluation

### *6.2ii) Lessons Learned*

372. Participants at the CBD Technical Workshop on EBA and Eco-DRR identified several lessons learned regarding gender mainstreaming in EBA and Eco-DRR measures:

- a) Different genders use and value ecosystems differently, an essential consideration for EBA and Eco-DRR activities, including assessing vulnerabilities and risks to climate change
- b) Gender mainstreaming should be a significant aspect of adaptation and disaster risk reduction planning and implementation process to ensure success and sustainability of policies, programmes and projects
- c) Challenges persist in the understanding on what gender is – there needs to be capacity building on understanding gender issues in order for EBA and Eco-DRR to be effective
- d) Even where there gender has been mainstreamed into climate adaptation policy, implementation is still challenging
- e) There is a need for capacity-building to understand gender issues for effective implementation of EBA and Eco-DRR initiatives; monitoring and evaluation of the impacts of gender mainstreaming; and associated budgeting/resource mobilization for these activities
- f) Successful examples of gender mainstreaming can be seen from grassroots women's organisations in the Americas where women's groups are now training local governments on how to reduce disaster risk and build partnerships with local governments – these models have been successful and are now being considered as policy options including at the regional level
- g) It is important to measure or evaluate the impacts of gender mainstreaming
- h) Gender budgeting/ resource mobilisation is needed for gender mainstreaming

### *6.2iii) Opportunities*

373. Gender-sensitive approaches and tools have been promoted for understanding and assessing impacts, vulnerability and adaptation to climate change, and “refer to methodologies and practices applied to ensure that both men and women's concerns, aspirations, opportunities and capacities are taken into

account in all climate change adaptation activities, including assessments, planning, implementation, monitoring and evaluation and technology development” (UNFCCC 2013). A gender-sensitive approach would allow women’s traditional knowledge to be used as an effective adaptation tool. For example, women in Hawaii used their knowledge of planting pandanus trees for coastal protection (UNFCCC2013).

374. A number of factors underline the need for gender-sensitive approaches and tools for adaptation, mostly relating to the difference between men and women in terms of their social roles and cultural specificities leading to different impacts of and vulnerabilities to climate change (see Figure 15).

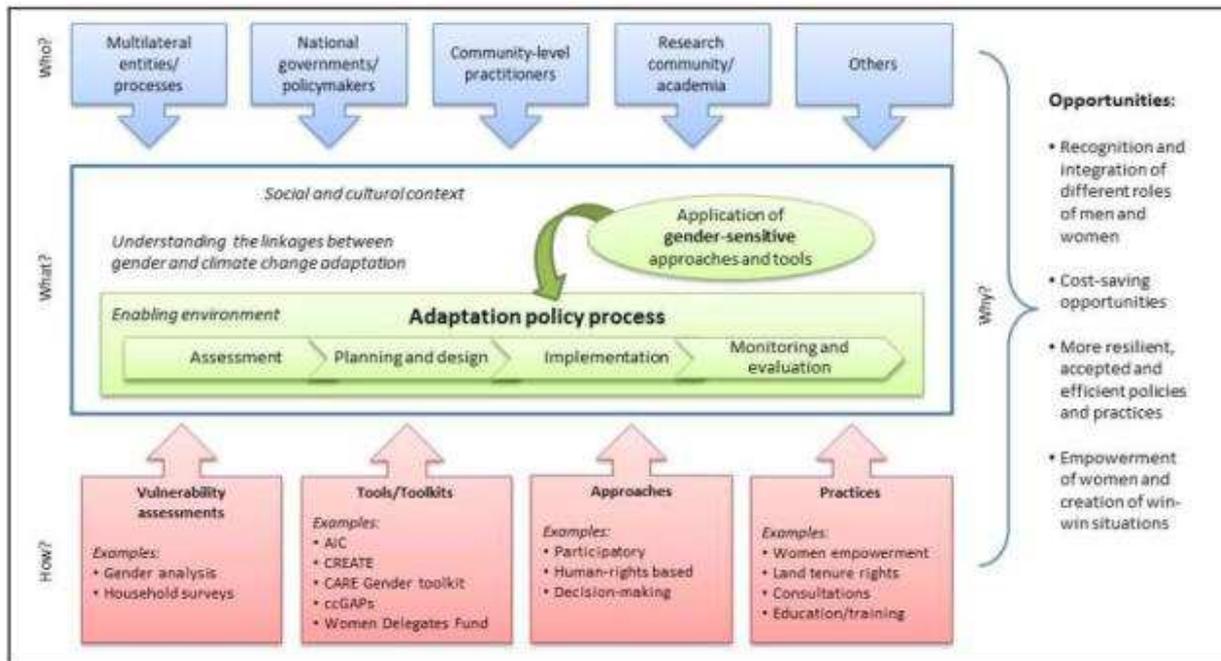


Figure 15: Opportunities related to the application of gender-sensitive approaches and tools for adaptation throughout the adaptation policy process. AIC = appreciate influence control, CREATE = Climate Resilience Evaluation for Adaptation through Empowerment, CARE = Cooperative for Assistance and Relief Everywhere, ccGAPs = climate change gender action plans (UNFCCC 2014)

### 6.3 Trade-offs and Thresholds/Limitations

375. Trade-offs may arise when ecosystems are managed to change the type of services provided by one ecosystem, and as a consequence affect the functioning of other ecosystem services. Some trade-offs are the result of deliberate decisions; others occur without knowledge or awareness they are taking place. Awareness of potential trade-offs when implementing EBA and Eco-DRR is critical in order to prevent maladaptation (Rodriguez et al. 2009).

376. Examples of trade-offs include the following:
- Using wetlands for coastal protection may require emphasis on silt accumulation and stabilization, possibly at the expense of wildlife values and recreation (BirdLife International 2009);
  - EBA measures in urban areas may be perceived as a trade-off between ecosystems and urban development needs (UNEP 2014);
  - The management of a forest for tree production may also affect water quality downstream or decrease the value of the land for recreation;
  - Restoration activities with a short-term focus on agricultural production can lead to the longer-term loss of soil quality (Rodriguez et al. 2006).
  - Protection forests to stabilize slopes may utilize species that result in a trade-off with recreational opportunities or other services
377. Trade-offs can also occur when setting targets and indicators for monitoring and evaluating EBA and Eco-DRR– for example, the best indicators may not be the most measurable, or particular goals may not attract funding, or appeal to policymakers (Mitchell et al., Overland Development Institute 2013).
378. In the review of Fifth National Reports and NBSAPs, trade-offs were rarely mentioned in relation to biodiversity conservation, EBA or DRR measures, suggesting that there has been limited experience to date of evaluating and considering potential trade-offs. Much of the broader literature contains examples of trade-offs encountered when evaluating ecosystem services in the context of broad conservation planning objectives, with fewer examples of trade-offs encountered or described in EBA and Eco-DRR implementation.
379. In the Great Green Wall Initiative, which aims to enhance resilience of West African and Sahelian countries, trade-offs occur between multiple uses such as demand for rich floodplains for grazing or crops, or woodlands’ value for fuelwood *versus* watershed function and protected areas (GEF 2011). The Great Green Wall Initiative aims to address these trade-offs by improving land use planning, such as at watershed scale or local levels (e.g., grazing reserves, conservation areas, etc.).
380. There has been an impetus to restore mangroves for habitat, biodiversity, and, particularly for coastal protection properties. In some cases this has led to some short-sighted planning – planting mangroves in areas not favourable for growth, such as on tidal mudflats (afforestation), using non-native species that weren’t suitable to the area, leading not only to a waste of resources but a loss of tidal mudflat ecosystem services. Even with the right species, mangrove afforestation on mudflats can favour the shoreline stabilization ecosystem services over tidal flat services. In some cases, as noted by participants at the CBD Technical Workshop on EBA and Eco-DRR, planting mangroves also displaced seagrasses – which also provides carbon sequestration and wave attenuation services, in addition to habitat for various species.
381. Trade-offs can also occur in making the choice between long and short-term benefits, as illustrated in the case study below.

#### Case Study 21: Trade-offs Between Short and Long-Term Benefits: Coffee production

Ecosystem services such as pollination, pest control, climate regulation, and nutrient sequestration are generally greater in shaded coffee farms, but many coffee-growing regions are removing shade trees from their management because of the significant up-front labor investment needed for their establishment (Jha et al. 2014).

Practices such as using cover crops can thus require farmers to make difficult trade-offs between the adaptation benefits they can provide in the longer term (enhanced resilience to climate change provisioning of essential ecosystem services) and the initial large investment needed to establish and maintain the cover crops.

Benefits in the long run of having shade trees include timber production, increasing the nutrient content on soils through fixing nitrogen or being more resilient to climate change. However, coffee yield is lower. Because coffee yields are typically assessed independently of yield from timber, other crops, or ecosystem services, it may be difficult for governments and conservation institutes to weigh the benefits of diversified farming approaches (Méndez et al. 2009).

#### 6.3i) Lessons Learned

382. The consideration of trade-offs should be present throughout the risk assessment, scenario planning, and adaptive management approaches for EBA and Eco-DRR implementation. In addition to monitoring the short-term provisions of services, managers should also monitor the long-term evolution of slowly changing variables. Policies can then be developed to take into account trade-offs at multiple spatial and temporal scales, and work to minimize the effects of ecosystem service trade-offs (Rodriguez et al. 2006).
383. Tools such as InVEST (Integrated Valuation of Environmental Services and Trade-offs) can assist decision-makers in identifying potential trade-offs in provisioning of ecosystem services under different scenarios.

#### **Thresholds and Limitations of EBA and Eco-DRR**

384. While EBA and Eco-DRR have been promoted as cost-effective, low-regrets measures that can yield multiple benefits, it is important to recognize the potential limitations of using ecosystem-based approaches for adaptation or DRR. Ecosystems are subject to climate change impacts, and therefore any intervention utilizing the ecosystem approach can be vulnerable to change, which should be accounted for when planning activities.
385. As emphasized, EBA and Eco-DRR should be considered within overall integrated adaptation or DRR strategies, as illustrated in the case study described below about protection forests in the Alps:

#### Case Study 22: Ecosystem-based approaches within an overall adaptation/DRR strategy in the Alps

Rising temperatures, shrinking glaciers and melting permafrost are exacerbating existing risks of avalanches, rockfalls, and floods, and presenting new risks such as glacial lake outburst floods in the Alps. The regional Platform on Natural Hazards of the Alpine Convention (PLANALP) develops approaches for the integrated reduction of natural hazards, identifies best practice and intensifies the cross-border exchange of knowledge and experience, cooperating closely with relevant international and national institutions.

PLANALP's strategy for adaptation to climate change includes integrated climate-proof risk management measures, such as the ecosystem-based approach of maintaining and improving the functionality of protection forests. This EBA approach is integrated within an overall adaptation and DRR strategy that includes other essential measures such as:

- Preparing for emergency intervention
- Reviewing the climate change fitness of existing structural protection measures
- Enhanced coordination between spatial planning and risk management
- Setting up and optimizing long-term monitoring and warning
- Establishing a risk culture and initiate risk dialogue
- Strengthening individual preparedness and precaution

## 7. GENERAL CONCLUSIONS

386. The compilation of activities from the wide variety of sources – Fifth National Reports, NBSAPs, NAPAs, submissions to the CBD, and case studies from organization portfolios – demonstrated that a variety of EBA measures are being widely implemented across the globe. This analysis is unique in that it enables the voices of countries to be heard in identifying challenges and early lessons learned in implementation. The compilation review also highlighted many EBA activities that, while not explicitly labelled as such, can be considered as Eco-DRR activities.
387. EBA can help people, communities, and ecosystems adapt to the impacts of climate change, and can have multiple benefits for biodiversity conservation, mitigation and disaster risk-reduction. EBA activities can also enhance the effectiveness of DRR strategies; for example, the restoration of marsh habitat that prolongs the longevity of coastal protection engineered structures.
388. However, while EBA and Eco-DRR have been demonstrated in some cases to be cost-effective, low-regrets, approaches to adaptation and disaster risk reduction, they also face challenges. The relative youth of many activities and programs make it difficult to quantify the full range of adaptation benefits achieved at this stage. Lack of financial, technical and human resources can impede assessments of risks and vulnerabilities. New tools and methodologies for evaluating the costs and benefits of EBA and Eco-DRR activities, and assessing the full range of benefits, both monetary and non-monetary, will inform the process of planning and choosing various adaptation options.
389. An integrated and concerted approach to implementing global policy frameworks such as CBD, UNFCCC, Sendai Framework and SDGs can ensure efficient use of human and financial resources, deliver tangible impacts on the ground, and help avoid conflicting and potentially maladaptive policies.
390. Conserving, restoring and sustainably managing ecosystems can deliver on a number of national and international development priorities and obligations, including enhancing people's resilience to climate change and disasters, supporting biodiversity, and protecting food, water and livelihood security especially of vulnerable populations.
391. EBA and Eco-DRR can be scaled up through effective mainstreaming into policy and practice. This needs to take place at multiple levels of policy making, planning, programming, budgeting, and implementation. Embedding EBA in long term visions and national development plans, for example, can provide an enabling framework for EBA implementation and direct funding towards EBA and Eco-DRR implementation.
392. A unique set of physical, environmental, and socioeconomic and conditions in each region or country means that the design of EBA and Eco-DRR activities should be highly context-specific, and should incorporate traditional and local knowledge. Implementation should include full participation of IPLCs, women, men, children, and stakeholders, as emphasized in the Cancun Agreements, CBD COP decisions, the Sendai Framework, and the recently adopted Sustainable Development Goals.

393. Recent experience shows the value of integrating EBA measures as soon as possible into DRR frameworks to ensure their uptake and funding (FAO 2014). Several entry points have been identified for integrating and mainstreaming EBA and Eco-DRR into biodiversity, development, and disaster risk reduction considerations, and other national planning processes.
394. Climate change adaptation and disaster risk reduction are inter-disciplinary, inter-sectoral processes. To address this intersection of disciplines and sectors, numerous cross-cutting tools have been developed to facilitate the implementation of EBA and Eco-DRR. Annex 4 provides a non-exhaustive list of such tools and resources for EBA and Eco-DRR, including communicating EBA and Eco-DRR, frameworks for assessing vulnerabilities, risks and impacts, networks and fora, case studies and databases, and training opportunities.

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## REFERENCES

### A. Adaptation and EBA

- Arnell NW. Climate change and global water resources: SRES emissions and socio-economic scenarios. *Global Environmental Change – Human and Policy Dimensions*, 2004, 14:31–52
- Andrade, A., Cordoba, R., Dave, R., Girot, P., Herrera-F, B., Munroe, R., et al. 2011. Draft principles and guidelines for integrating ecosystem-based approaches to adaptation in project and policy design. Turrialba: IUCN-CEM and CATIE. [url](#)
- Biggs, R., Schluter, M., Biggs, D., Bohensky, E.L., Silver, S.B., Cundill, G., Dakos, V., Daw, T.M., Evans, L.S., Kotschy, K., Leitch, A.M., Meek, C., Quinlan, A., Raudsepp-Hearne, C., Dobarts, M.D., Schoon, M.L., Schultz, L. and P.C. West. 2012. *Toward Principles for Enhancing the Resilience of Ecosystem Services*. Annual Review of Environment and Resources. DOI: 10.1146/annurev-environ-051211-123836
- BirdLife International (2009) *Partners with Nature: How healthy ecosystems are helping the world's most vulnerable adapt to climate change*.
- Beck, Michael.W. (ed). 2014. *Coasts at Risk: An Assessment of Coastal Risks and the Role of Environmental Solutions*. A joint publication of United Nations University - Institute for Environment and Human Security (UNU-EHS), The Nature Conservancy (TNC) and the Coastal Resources Center (CRC) at the University of Rhode Island Graduate School of Oceanography. [url](#)
- CBD. 2009. *Connecting biodiversity and climate change mitigation and adaptation: Report of the second ad hoc technical expert group on biodiversity and climate change*. Montreal, Canada: Technical Series No. 41. [url](#)
- CBD. 2014. *Promoting synergies in addressing biodiversity and climate change adaptation issues: linking National Adaptation Plans and National Biodiversity Strategies and Action Plans*. Note by the Executive Secretary.
- Chong, Joanne. 2014. *Ecosystem-Based Approaches to Climate Change Adaptation: Progress and Challenges*. *International Environmental Agreements: Politics, Law and Economics* 14, n. 4: 391–405. doi:10.1007/s10784-014-9242-9. [url](#)
- Colls, A., Ash, N., & Ikkala, N. 2009. *Ecosystem-based adaptation: A natural response to climate change*. Gland: IUCN. [url](#)
- Conservation International. 2015. *Integrating ecosystem-based adaptation into National Adaptation Plans & Ecosystem-based Adaptation Knowledge Exchange: Workshop Report* (Bonn, Germany, 7 June 2015).
- ETC/ACC 2010. *Guiding principles for adaptation to climate change in Europe*. European Topic on Air and Climate Change. ETC/ACC Technical Paper 2010/6. [url](#)
- GEF. 2011. *Sahel and West Africa WB/GEF Program in support of the Great Green Wall Initiative*. Note for Information to Council Members. [url](#)
- GEF. 2014. *Programming Strategy for Adaptation to Climate Change for the LCDF and the SCCF*. [url](#)
- Dudley, N., Stolton, S., Belokurov, A., Krueger, L., Lopoukhine, N., MacKinnon, K., et al. 2010. *Natural solutions: Protected areas helping people cope with climate change*. Gland: IUCN-WCPA, TNC, UNDP, WCS, The World Bank and WWF. [url](#)
- IPCC. 2013: *Summary for Policymakers*. In: *Climate Change 2013: The Physical Science Basis*. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y.
- IUCN 2014 *Ecosystem-based Adaptation: Building on No-Regret Adaptation Measures*. Technical paper, 20th session of the Conference of the Parties to the UNFCCC and the 10th session of the Conference of the Parties to the Kyoto Protocol, Lima, Peru, 1-12 December 2014. [url](#)
- Jha, S., C.M. Bacon, S.M. Philpott, V.E. Méndez, P. Läderach, R.A. Rice. 2014. *Shade coffee: update on a disappearing refuge for biodiversity*. *Bioscience*, 64 (5) (2014), pp. 416–428

- Méndez VE, Shapiro EN, Gilbert GS. 2009. Cooperative management and its effects on shade tree diversity, soil properties and ecosystem services of coffee plantations in western El Salvador. *Agroforestry Systems* 76: 111–126
- Midgley, G., Marais, S., Barnett, M. and K. Wågsæther. 2012. Biodiversity, climate change, and sustainable development – Harnessing synergies and celebrating successes. Final Technical Report. SANBI, Conservation South Africa, Indigo. [url](#)
- Munroe and Mant. 2014. UNEP-WCMC. UN-REDD Programme Info Brief. REDD+ and adaptation: Identifying complementary responses to climate change. [url](#)
- Munang, R., Thiaw, I., Alverson, K., Goumandakoye, M., Mebratu, D., & Liu, J. 2013. Using ecosystem-based adaptation actions to tackle food insecurity. *Environment: Science and Policy for Sustainable Development*, 55(1), 29–35. [url](#)
- Munroe, R., Doswald, N., Roe, D., Reid, H., Giuliani, A., Castelli, I., et al. 2011. Does EBA work? A review of the evidence on the effectiveness of ecosystem-based approaches to adaptation. BirdLife International, UNEP-WCMC, IIED and Cambridge University.
- Munroe et al. 2012. Review of the evidence base for ecosystem-based approaches for adaptation to climate change. *Environmental Evidence* 2012, 1:13 doi:10.1186/2047-2382-1-13
- Nkem, J., Munang, R., and Jallow, B.P. 2011. Lessons for Adaptation in Sub-Saharan Africa. Report of the Climate Change & Adaptation Development Programme (CC DARE). UNON Publishing Services Section, Nairobi, ISO 14001:2004-certified. [url](#)
- Rahman, M. (2014). Framing Ecosystem-based Adaptation to Climate Change: Applicability in the Coast of Bangladesh, Dhaka, Bangladesh: IUCN, x+43pp.
- Reid, H. 2011. Improving the evidence for ecosystem-based adaptation. IIED Opinion: Lessons from adaptation in practice. [url](#)
- Reid, H. 2015. Ecosystem- and community-based adaptation: learning from community-based natural resource management. *Climate and Development*, DOI: 10.1080/17565529.2015.1034233.
- Rodríguez, J. P., T. D. Beard, Jr., E. M. Bennett, G. S. Cumming, S. Cork, J. Agard, A. P. Dobson, and G. D. Peterson. 2006. Trade-offs across space, time, and ecosystem services. *Ecology and Society* 11(1): 28.
- Roman, C.T. and Burdick, D.M. (eds). 2012. Tidal Marsh Restoration: A Synthesis of Science and Management. Island Press, 432 pp. ISBN: 9781597265751 [url](#)
- Royal Society. 2015. Resilience to Extreme Weather.
- Rao N.S., Carruthers T.J.B., Anderson P., Sivo L., Saxby T., Durbin, T., Jungblut V., Hills T., Chape S. 2013. An economic analysis of ecosystem-based adaptation and engineering options for climate change adaptation in Lami Town, Republic of the Fiji Islands. A technical report by the Secretariat of the Pacific Regional Environment Programme. – Apia, Samoa : SPREP 2013978-982-04-0474-8 (online)
- Rizvi, A.R., Baig, S., Verdone, M. (2015) Ecosystems Based Adaptation: Knowledge Gaps in Making an Economic Case for Investing in Nature Based Solutions for Climate Change. Gland, Switzerland: IUCN. V + 48 pp.
- Rio Conventions 2012. The Rio Conventions Action on Adaptation. ISBN 92-9219-091-1
- Secretariat of the Convention on Biological Diversity, Global Mechanism of the United Nations Convention to Combat Desertification and OSLO consortium (2013). Valuing the biodiversity of dry and sub-humid lands. Technical Series No.71. Secretariat of the Convention on Biological Diversity, Montreal, 94 pages. [url](#)
- Secretariat of the Convention on Biological Diversity (2014) Global Biodiversity Outlook 4 — Summary and Conclusions. Montréal, 20 pages. [url](#)
- Rosenthal, A., Arkema, K., Verutes, G., Bood, N., Cantor, D., Fish, M., Griffin, R., and Panuncio, M., (2013). Identification and Valuation of Adaptation Options in Coastal-Marine Ecosystems: Test case from Placencia, Belize. The Natural Capital Project, Stanford University, World Wildlife Fund.
- TEEB. 2010. Mainstreaming the Economics of Nature: A Synthesis of the Approach, Conclusions and Recommendations of TEEB.

- The World Bank. 2010. Convenient solutions to an inconvenient truth: Ecosystem-based approaches to climate change. Washington DC: Report, The World Bank. [url](#)
- UNEP, UNDP and IUCN. 2014. Adapting to Climate Change in Mountain Ecosystems: A flagship programme of UNEP, UNDP and IUCN.
- UNEP 2012. Making Informed Adaptation Decisions. [url](#)
- UNDP-GEF. Issue No.1: Safeguarding MDG 1: Eradicate Extreme Poverty and Hunger - from Climate Change. [url](#)
- UNFCCC. 2011. Ecosystem-based approaches to adaptation: Compilation of information. 35th sess, Provisional Agenda Item 3, FCCC/SBSTA/2011/INF.8. [url](#)
- UNFCCC. 2014. Report on the meeting on available tools for the use of indigenous and traditional knowledge and practices for adaptation, needs of local and indigenous communities and the application of gender-sensitive approaches and tools for adaptation. FCCC/SBSTA/2014/INF.11.
- Watkiss, P., Downing, T., Dyszynski, J.: 2010 AdaptCost Project: Analysis of the Economic Costs of Climate Change Adaptation in Africa. UNEP, Nairobi.
- WHO and CBD. 2015. Connecting global priorities: biodiversity and human health: a state of knowledge review. ISBN 978 92 4 150853 7. [url](#)
- WWF. 2013. Operational Framework for Ecosystem-based Adaptation: Implementing and mainstreaming ecosystem-based adaptation responses in the Greater Mekong Sub-Region.
- Xia, V. Bex and P.M. Midgley (eds.)). Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Xu, Jianchu, and R. Edward Grumbine. 2014. Building Ecosystem Resilience for Climate Change Adaptation in the Asian Highlands. *Wiley Interdisciplinary Reviews: Climate Change* 5, n. 6 (1 Nov 2014): 709–18. doi:10.1002/wcc.302. [url](#)

## **B. Disaster Risk Reduction and Eco-DRR**

- Adger, W. Neil, Terry P. Hughes, Carl Folke, Stephen R. Carpenter, and Johan Rockström. 2005. Social-Ecological Resilience to Coastal Disasters». *Science* 309, n. 5737: 1036–39. doi:10.1126/science.1112122. [url](#)
- Brown, P., Daigneault, A., Gawith, D. 2014. Evaluating ecosystem-based adaptation for disaster risk reduction in Fiji. Landcare Research, University of South Pacific, 161 p. [url](#)
- ‘Disasters and Ecosystems - Open Online Course’. *iversity*. Accessed 19 June 2015. [url](#)
- Durst, P.B. 2015. Trees and forests contribute to recovery from the world’s most powerful typhoon in the Philippines. *Unasylva*
- Estrella, M. & N. Saalismaa 2013. Ecosystem-based Disaster Risk Reduction (Eco-DRR): An Overview, In: Renaud, F., Sudmeier-Rieux, K. and M. Estrella (eds.) *The role of ecosystem management in disaster risk reduction*. Tokyo: UNU Press
- European Environment Agency. 2015. Exploring nature-based solutions - the role of green infrastructure in mitigating the impacts of weather- and climate change-related natural hazards. ISSN 1725-2237, doi:10.2800/946387. [url](#)
- FAO 2015. Forests, trees and disasters. *Unasylva* 243/244 ISSN 0041-6436
- Gaillard, J.C., Ben Wisner, Djillali Benouar, Terry Cannon, Laurence Creton-Cazanave, Julie Dekens, Maureen Fordham, et al. 2010. Alternatives for Sustained Disaster Risk Reduction. *Geography and Environmental Studies Faculty Publications*. [url](#)
- Gupta, Anil.K. and Sreeja S. Nair. 2012. Ecosystem Approach to Disaster Risk Reduction. National Institute of Disaster Management, New Delhi. [url](#)
- Nehren, U., Sudmeier-Rieux, K., Sandholz, S., Estrella, M., Lomarda, M. and T. Guillén. 2014. *The Ecosystem-Based Disaster Risk Reduction Case Study and Exercise Source Book*, Geneva and Cologne: Partnership for Environment and Disaster Risk Reduction and Center for Natural Resources and Development.
- Oxfam. 2010. Gender, Disaster Risk Reduction, and Climate Change Adaptation: A Learning Companion. Oxfam Disaster Risk Reduction and Climate Change Adaptation Resources. [url](#)

- Renaud, Fabrice G., Karen Sudmeier-Rieux, and Marisol Estrella. 2013. *The Role of Ecosystems in Disaster Risk Reduction*. United Nations University Press. [url](#)
- Sandeeka Mannakkara Suzanne Wilkinson, (2014), "Re-conceptualising "Building Back Better" to improve post-disaster recovery", *International Journal of Managing Projects in Business*, Vol. 7 Iss 3 pp. 327 - 341  
Permanent link to this document: <http://dx.doi.org/10.1108/IJMPB-10-2013-0054>
- Scribner, M. and Herzer, L. 2015. *After the disaster: rebuilding communities*. Woodrow Wilson International Center for Scholars. ISBN 1-933549-75-0. [url](#)
- Sudmeier-Rieux, Karen. 2013. *Ecosystem Approach to Disaster Risk Reduction: Basic concepts and recommendations to governments, with a special focus on Europe*. Council of Europe, European and Mediterranean Major Hazards Agreement (EUR-OPA). [url](#)
- Sandeeka Mannakkara Suzanne Wilkinson, (2014), "Re-conceptualising "Building Back Better" to improve post-disaster recovery", *International Journal of Managing Projects in Business*, Vol. 7 Iss 3 pp. 327 - 341  
Permanent link to this document: <http://dx.doi.org/10.1108/IJMPB-10-2013-0054>
- UNEP FI. 2014. *Building disaster-resilient communities and economies: Part one of a research series by the UNEP FI Principles for Sustainable Insurance Initiative*. [url](#)
- UNDP. 2010. *Gender, Climate Change and Community-Based Adaptation*, UNDP, New York.
- UNDP. 2013. *Protecting Development From Disasters: UNDP's Support to the Hyogo Framework for Action*. Bureau for Crisis Prevention and Recovery, United Nations Development Programme. [url](#)
- United Nations. 2015. *Sendai Framework for Disaster Risk Reduction 2015-2030*. Third United Nations World Conference on Disaster Risk Reduction, Sendai, Japan. [url](#)
- UN General Assembly. 2015. *Sendai Framework for Disaster Risk Reduction 2015-2030*.
- UNFCCC. 2011. *Ecosystem-based approaches to adaptation: compilation of information*. Note by the secretariat (FCCC/SBSTA/2011/INF.8)
- UNISDR. 2015. *Global Assessment Report on Disaster Risk Reduction (GAR) 2015: Making Development Sustainable: The Future of Disaster Risk Management*. United Nations Office for Disaster Risk Reduction. [url](#)

### **C. EBA and Eco-DRR Linkages and Synergies**

- Birkmann, Jörn, and Korinna von Teichman. 2010. Integrating Disaster Risk Reduction and Climate Change Adaptation: Key Challenges—scales, Knowledge, and Norms. *Sustainability Science* 5, n.2(171–84). DOI:10.1007/s11625-010-0108-y. [url](#)
- Camille Buyck, and Murti, Rhadika. 2014. *Safe havens: Protected areas for disaster risk reduction and climate change adaptation*. Gland: IUCN. [url](#)
- Doswald, Nathalie, and Marisol Estrella. 2015. *Promoting ecosystems for disaster risk reduction and climate change adaptation: Opportunities for integration: Discussion Paper*. UNEP. [url](#)
- European Union. 2013. *Building a Green Infrastructure for Europe*. ISBN 978-92-79-33428-3. [url](#)
- IPPC. 2012. *Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation*. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change. Cambridge University Press. [url](#)
- Morgera, E. 2011. Far away, so close: A legal analysis of the increasing interactions between the Convention on Biological Diversity and climate change law. *Climate Law*, 2, 85.
- Munang, R., Thiaw, Ibrahim, Alverson, Keith, Liu, Jian, & Han, Zhen. 2013. The role of ecosystem services in climate change adaptation and disaster risk reduction. *Current Opinion in Environmental Sustainability*, 5(1), 47–52. [url](#)
- Noralene Uy, and Rajib Shaw. 2012. *The Role of Ecosystems in Climate Change Adaptation and Disaster Risk Reduction*. In *Ecosystem-Based Adaptation*, 12:41–59. Community, Environment and Disaster Risk Management 12. Emerald Group Publishing Limited.

- Reyers, Belinda, Jeanne L. Nel, Patrick J. O'Farrell, Nadia Sitas, and Deon C. Nel. Navigating Complexity through Knowledge Coproduction: Mainstreaming Ecosystem Services into Disaster Risk Reduction. *Proceedings of the National Academy of Sciences* 112, n. 24 (16 June 2015): 7362–68. doi:10.1073/pnas.1414374112. [url](#)
- Solecki, William, Robin Leichenko, and Karen O'Brien. 2011. Climate change adaptation strategies and disaster risk reduction in cities: connections, contentions, and synergies. *Current Opinion in Environmental Sustainability* 3, n. 3 : 135–41. doi:10.1016/j.cosust.2011.03.001. [url](#)
- Sudmeier-Rieux, Karen, Neville Ash, Radhika Murti. 2013. *Environmental Guidance Note for Disaster Risk Reduction: Healthy Ecosystems for Human Security and Climate Change Adaptation*. 2013 edition. Gland, Switzerland: IUCN, iii+34 pp. [url](#)
- UNEP and CUAS. 2015. Unit 4- Background materials to the MOOC: Disasters and Ecosystems: resilience in a changing climate, Principles and Challenges of Eco-DRR and EBA. Geneva and Cologne: United Nations Environmental Programme and Cologne University of Applied Sciences
- UNEP and CUAS. 2015. Unit 10. Background materials to the MOOC: Disasters and Ecosystems: Resilience in a Changing Climate, Linkages between Eco-DRR and EBA. Geneva and Cologne: United Nations Environmental Programme and Cologne University of Applied Sciences

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## Annex 1: EBA-Eco-DRR Activity Categories

**Table 6: Category of EBA activity, and examples of related Eco-DRR activities used in the framework for Reviewing Fifth National Reports and other materials**

EBA Activity Category	Brief Description	Examples of Eco-DRR activities related to the EBA category
A	Assessing vulnerabilities, hazards, risks, impacts	Using scenarios to forecast potential climate change impacts to people and ecosystems
B	Establishing and effectively managing ecosystems to ensure the continued delivery of the services ecosystems provide that increase resilience to climate change, for example through protected areas	Protection of forests to regulate water flows, prevent erosion, or prevent settlements from avalanches  Managing ecosystems to complement, protect and extend longevity of investments in hard infrastructure
C	Other area-based management, e.g. marine spatial planning, integrated coastal zone management (ICZM)	Implementing marine spatial planning to protect coral reefs, in order to provide wave attenuation and protect coastlines from storm surges
D	Ecosystem restoration	Coastal defense through protection or restoration of wetlands to reduce impacts of coastal erosion  Slope stabilization through indigenous grass plantation
E	Build adaptive capacity, capacity-building activities utilizing ecosystem approach	Training on marine and coastal resources conservation for communities
F	Work with practices that use appropriate species & technologies better adapted for climate change: conservation agriculture, agroforestry, evergreen agriculture, soil conservation	Improving water use efficiency Improvement to maintain ecosystem integrity and water security Crop diversification. to ensure food security and prevent food shortages and famine
G	Manage seasonal movements of people & livestock to better conserve ecosystem's services & biodiversity from climate impacts	National assessments of the health of pastoral lands to identify risks to livelihoods
H	Manage threats to biodiversity/resilience of ecosystems associated with climate change; e.g. managing spread of invasive alien species	Managing invasive alien species linked to land degradation and that threaten food security and water supplies
I	Economic analyses such as cost-benefit analysis, valuation of ecosystem services and natural capital	Valuation of the socio-economic value of corals and associated ecosystems
J	Natural Resource management (fisheries, forests)	Conservation and efficient use of forest biodiversity to safeguard livelihoods

## Annex 2: Aichi Biodiversity Targets and their relation to EBA and DRR

Table 7: Aichi Biodiversity Targets and their relation to EBA and disaster risk reduction, utilized in the Framework for Reviewing Fifth National Reports and other materials

Strategic Goal	Aichi Biodiversity Target	Relation to EBA and DRR
<b>B. Reduce direct pressures biodiversity and promote sustainable use</b>	<b>Target 5:</b> By 2020, the rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.	Forests and coastal vegetation can serve as a protective buffer from extreme events
	<b>Target 7:</b> By 2020 areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.	DRR is a core element of sustainability for forestry and agriculture; forests serve as a protective buffer from erosion and landslides
	<b>Target 10:</b> By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.	Coral reefs can be effective in protecting against coastal hazards, such as by reducing wave energy
<b>C: Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity</b>	<b>Target 11:</b> By 2020, at least 17 per cent of terrestrial and inland water areas, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscapes and seascapes.	Protection of ecosystems, which allows them to keep providing services that are important for adaptation and disaster risk reduction, even beyond the boundaries of the protected area
	<b>Target 13:</b> By 2020, the 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, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.	Reduces risks of climate change affecting food security and livelihoods
<b>D: Enhance the benefits to all from biodiversity and ecosystem services</b>	<b>Target 14:</b> By 2020, ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and well-being, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.	Ensures provisioning of essential ecosystem services, including those underpinning DRR
	<b>Target 15:</b> By 2020, ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, 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.	Resilient ecosystems are a key component of DRR, e.g. restoration of coastal vegetated ecosystems contributes to mitigation, adaptation and disaster risk reduction through shoreline stabilization

## ANNEX 3: OVERVIEW OF POLICIES, STRATEGIES & FRAMEWORKS RELATED TO EBA AND ECO-DRR

**Table 8: International policies, strategies and frameworks on adaptation, and linkages to EBA and Eco-DRR**

Agency/ Convention	Programme, Policy, Strategy or Framework	Description	Linkages to EBA and Eco-DRR
<b>UNFCCC</b>	Cancun Adaptation Framework (CAF) (2010)	Enhance action on adaptation, preparation of NAPs, invites parties to “build resilience of socio-economic and ecological systems”. CAF affirms that enhanced action on adaptation should account for vulnerable groups, communities and ecosystems, and should be based on the best available science and, as appropriate, traditional and indigenous knowledge, to integrate adaptation into policies	Reference to vulnerable groups, communities and ecosystems as targets for adaption action, including those vulnerable to climate-related hazards
<b>UNFCCC</b>	Nairobi Work Programme on impacts, vulnerability and adaptation to climate change	Aims to assist all countries, in particular developing countries, including least developed countries (LDCs) and small island developing States (SIDS), to improve their understanding and assessment of the impacts of climate change and to make informed decisions on practical adaptation actions and measures. At COP 19, ecosystems were included as a focus of the NWP.	Mechanism to enhance knowledge on EBA and Eco-DRR
<b>UNFCCC</b>	National Adaptation Plans (NAPs)	The national adaptation plan (NAP) process was established under the Cancun Adaptation Framework. It enables Parties to formulate and implement national adaptation plans (NAPs) as a means of identifying medium- and long-term adaptation needs and developing and implementing strategies and programmes to address those needs.	Entry point for mainstreaming the ecosystem-approach, including EBA and Eco-DRR
<b>UNFCCC</b>	National Adaptation Programmes of Action (NAPAs)	NAPAs provide a process for Least Developed Countries to identify priority activities that respond to their urgent and immediate needs to adapt to climate change – those for which further delay would increase vulnerability and/or costs at a later stage.	Entry point for mainstreaming the ecosystem-approach, including EBA and Eco-DRR
<b>CBD</b>	Decision X/, COP10	COP 10 (Nagoya) called for implementation of ecosystem-based approaches for adaptation, including sustainable management, conservation and restoration of ecosystems	Explicit mention of EBA and adaptation approaches that can include Eco-DRR measures
<b>CBD</b>	Strategic Plan for Biodiversity 2010-2020	The mission of the Strategic Plan is to “take effective and urgent action to halt the loss of biodiversity in order to ensure that by 2020 ecosystems are resilient and continue to provide essential services, thereby securing the planet’s variety of life, and contributing to human well-being, and poverty eradication.” Five strategic goals underpin twenty Aichi Biodiversity Targets to be achieved by 2015 or 2020.	Target 14 aims for safeguarding and restoration of ecosystems providing essential services; Target 15 aims for ecosystem restoration, contributing to mitigation & adaptation
<b>CMS</b>	Resolution 11.26, ‘Programme of Work on Climate Change and Migratory Species’	References the impacts of climate change on migratory species, including the impact on habitats and on local communities dependent on the ecosystem services provided by these species	EBA measures to conserve or restore these ecosystems will help people adapt to climate change
<b>Rio Conventions, Ramsar, other</b>	<i>The Hyderabad Call for a Concerted Effort on Ecosystem Restoration</i> was	Call to make a concerted and coordinated long-term efforts to mobilize resources and facilitate the implementation of ecosystem restoration activities on the ground for sustaining and Improving the health and	Ecosystem restoration builds resilience to impacts of climate change, and is

<b>organizations, and national governments</b>	launched at CBD COP11 and endorsed.	well-being of humans and all other species with whom we share the planet.	considered both an EBA and Eco-DRR activity
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**Table 9: International policies, strategies and frameworks on DRR, and linkages to EBA and Eco-DRR**

Agency/ Convention	Programme, Policy, Strategy or Framework	Description	Linkages to EBA and Eco-DRR
<b>UNISDR</b>	UN International Strategy for Disaster Reduction (ISDR)	A vision to enable all communities to become resilient to the effects of natural, technological and environmental hazards, reducing the compound risks they pose to social and economic vulnerabilities within modern societies, and to proceed from protection against hazards to the management of risk through the integration of risk prevention into sustainable development.	Sustainable development is linked to resilience of people and ecosystems, which can be addressed through EBA and Eco-DRR measures
<b>Intergovernmental</b>	Final Declaration of the High Level Meeting on National Drought Policy (2013)	Calls on all the governments around the world to develop and implement national drought policies, and notes the need to create synergies between drought relief measures and the preparedness, mitigation and adaptation actions for long term resilience.	Drought risk is closely linked to ecosystem degradation, which can be mitigated via conservation and restoration
<b>UNCCD</b>	Advocacy Policy Framework on drought adopted by COP 11 (Windhoek) Decision 9/COP.11	Urges Parties to develop and implement national drought management policies, Invites the WMO, FAO and others, to collaborate with the UNCCD towards assisting country Parties	As above
<b>UN General Assembly</b>	Sustainable Development Goal 13: Take urgent action to combat climate change and its impacts	Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries. Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning. Promote mechanisms for raising capacity for effective climate change-related planning and management in least developed countries and small island developing States, including focusing on women, youth and local and marginalized communities	Explicit linkages of resilient socio-ecological systems to adaptation and DRR
	Sustainable Development Goal 11: Make cities inclusive, safe, resilient and sustainable	By 2030, significantly reduce the number of deaths and the number of people affected and substantially decrease the direct economic losses relative to global gross domestic product caused by disasters, including water-related disasters, with a focus on protecting the poor and people in vulnerable situations By 2020, 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 for Disaster Risk Reduction 2015-2030, holistic disaster risk management at all levels	Mention of policies on adaptation with holistic DRR, which can include EBA and Eco-DRR measures
<b>CBD</b>	COP 12 (Pyeongchang) adopted Dec. XII/20 on EBA and Eco-DRR	COP12 promoted EBA and Eco-DRR in Pyeongchang	Explicitly mentions EBA and Eco-DRR
<b>UN General Assembly</b>	Sendai Framework for Disaster Risk Reduction 2015-2030	Outlines seven global targets to be achieved over the next 15 years, prioritizing 'ecosystem-based approaches...to build resilience and reduce disaster risk'. It was endorsed by the UN General Assembly following the 2015 Third UN World Conference on Disaster Risk Reduction.	Explicitly mentions ecosystem-based approaches, which applies to both EBA and Eco-DRR

<b>Ramsar Convention</b>	COP12 (Punta del Este) adopted Resolution XII.13 on Wetlands and DRR	Emphasizes 'importance of conserving, restoring and wise use of wetlands for disaster risk reduction'	Conservation, restoration and wise use of wetlands encompass elements of EBA and Eco-DRR
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## ANNEX 4: TOOLS AND RESOURCES FOR EBA AND ECO-DRR

### Assessment Frameworks

#### Assessing Ecosystem Services

##### **The Toolkit for Ecosystem Service Site-based Assessment (TESSA)**

Piloted in Protected Areas, TESSA guides non-specialists through relatively accessible 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. <http://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.

<http://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 GI 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 stabilisation by ecosystems. Several case studies at the European level outline the screening process and also summarize recent estimates of the economic value of GI.

<http://www.eea.europa.eu/publications/exploring-nature-based-solutions-2014>

#### Assessing Risks

**CRiSTAL- Community-Based Risk Screening Tool – Adaptation & Livelihoods;** a tool designed to help project planners and managers integrate climate change adaptation and risk reduction into community-level projects. Developed by IISD, SEI and IUCN

<https://www.iisd.org/cristaltool/>

**Climate Vulnerability and Capacity Analysis Handbook**, developed by CARE, which assesses hazard impacts on each of the five categories of livelihood resources and provides a framework for community-based adaptation,

[http://www.careclimatechange.org/index.php?option=com\\_content&view=article&id=25&Itemid=30](http://www.careclimatechange.org/index.php?option=com_content&view=article&id=25&Itemid=30)

#### **CEDRA - The Climate change and Environmental Degradation Risk and Adaptation**

Analyses risks posed by climate change and environmental degradation and supports NGOs in understanding communities' experiences of environmental change (Tearfund)

[http://tilz.tearfund.org/en/themes/environment\\_and\\_climate/cedra/](http://tilz.tearfund.org/en/themes/environment_and_climate/cedra/)

#### **Risk and Vulnerability Assessment Methodology Development Project (RiVAMP) in Jamaica**

This training manual was developed by UNEP to provide instruction on how to implement a methodology that helps to quantify the role of ecosystems in DRR and CCA, based on a pilot project implemented in Jamaica from 2009-2010.

[http://www.grid.unep.ch/products/3\\_Reports/RiVAMP\\_Training\\_2012.pdf](http://www.grid.unep.ch/products/3_Reports/RiVAMP_Training_2012.pdf)

#### **Integrated Strategic Environmental Assessment in Sri Lanka**

UNEP and UNDP collaborated together to modify the existing Strategic Environmental Assessment (SEA) used for sustainable development planning. The new version, Integrated Strategic Environmental Assessment (ISEA), includes more disaster sensitivities into the analysis framework of SEAs. This tool was tested in Sri Lanka's Northern Province, which helped to map out the distribution of space and resources available for development with minimum environment and disaster constraints. This tool can enable other countries to promote integrated area development that is both sustainable and disaster-resilient.

<http://www.unep.org/disastersandconflicts/Introduction/DisasterRiskReduction/Capacitydevelopmentandtechnicalassistance/ISEAinSriLanka/tabid/105928/Default.aspx>

## **Other Planning & Implementation Tools**

#### **Climate-Smart Agriculture (CSA) Sourcebook**

The sourcebook, developed by FAO, elaborates the concept of CSA and demonstrate its potential, as well as limitations. It aims to help decision makers at a number of levels (including political administrators and natural resource managers) to understand 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.

<http://www.fao.org/3/a-i3325e.pdf>

#### **Traditional Knowledge & Climate Science Toolkit**

This toolkit provides access to articles, videos and various other resources that will assist indigenous peoples, local communities, policy makers and other stakeholders in accessing research on climate change adaptation and mitigation. The toolkit is an initiative of the United Nations University's Traditional Knowledge Initiative (UNU-TKI). It is available in English, French, Spanish, Russian and Portuguese.

### **Gender, Climate Change and Community-Based Adaptation**

Guidebook for designing and implementing gender-sensitive community-based adaptation programmes and projects.

[http://www.undp.org/content/dam/aplaws/publication/en/publications/environment-energy/www-ee-library/climate-change/gender-climate-change-and-community-based-adaptation-guidebook-/Gender%20Climate%20Change%20and%20Community%20Based%20Adaptation%20\(2\).pdf](http://www.undp.org/content/dam/aplaws/publication/en/publications/environment-energy/www-ee-library/climate-change/gender-climate-change-and-community-based-adaptation-guidebook-/Gender%20Climate%20Change%20and%20Community%20Based%20Adaptation%20(2).pdf)

### **Exploring nature-based solutions: The role of green infrastructure in mitigating the impacts of weather- and climate change-related natural hazards**

Published by the European Environment Agency in September 2015, this report focuses on certain types of extreme events and natural hazards at European scale that will be very likely amplified by ongoing climate change, i.e. 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.

<http://www.eea.europa.eu/publications/exploring-nature-based-solutions-2014>

## **Resources on valuation of EBA and Eco-DRR activities**

Brown et al. Evaluating Ecosystem-based Adaptation for Disaster Risk Reduction in Fiji.

[http://www.landcareresearch.co.nz/\\_data/assets/pdf\\_file/0004/77341/Fiji\\_disaster\\_risk\\_reduction.pdf](http://www.landcareresearch.co.nz/_data/assets/pdf_file/0004/77341/Fiji_disaster_risk_reduction.pdf)

Buncle et al. 2013. Cost-Benefit Analysis for Natural Resource Management in the Pacific.

<http://www.undp-alm.org/sites/default/files/downloads/cost-benefit-analysis-for-natural-resource-management-in-the-pacific-a-guide.pdf>

Bynoe et al. 2014. The use of Benefit-Cost Analysis to Assess Adaptation and Mitigation Interventions in the Caribbean: Case Studies. <http://dms.caribbeanclimate.bz/M-Files/openfile.aspx?objtype=0&docid=6062>

Frontier Economics. 2013. The Economics of Climate Resilience: Appraising flood management initiatives – a case study. Report prepared for DEFRA and the Devolved Administrations.

<http://randd.defra.gov.uk/Default.aspx?Module=More&Location=None&ProjectID=18016>

## **Networks and Fora**

- WIN- World Indigenous Network – a network that brings together indigenous peoples and local communities (ILCs), land and sea managers. WIN has published a [case study compendium](#) detailing best practices learned from 20 ILCs.
- NBSAP forum: the NBSAP Forum was established in 2012 by UNDP, UNEP and the CBD Secretariat to provide a platform for connecting practitioners and those working on developing and updating NBSAPs. the NBSAP Forum was established in 2012 by UNDP, UNEP and the CBD

Secretariat to provide a platform for connecting practitioners and those working on developing and updating NBSAPs

- BES-NET, a web portal which aims to provide an interactive capacity-building tool for scientists, policy-makers and local scale implementers in support of the Intergovernmental Science-Policy Platform for Biodiversity and Ecosystem Services (IPBES)
- CDKN Climate & Development Knowledge Network <http://cdkn.org/> The Climate and Development Knowledge Network supports decision-makers in designing and delivering climate compatible development by combining research, advisory services and knowledge management in support of locally owned and managed policy processes, working in partnership with decision-makers in the public, private and non-governmental sectors nationally, regionally and globally.
- ReliefWeb <http://reliefweb.int/> provides reliable disaster and crisis updates and analysis to humanitarians, so they can make informed decisions and plan effective assistance. ReliefWeb has been the leading online source for reliable and timely humanitarian information on global crises and disasters since 1996. ReliefWeb is a specialized digital service of the United Nations Office for the Coordination of Humanitarian Affairs (OCHA).

## Case Studies & Databases

- CBD Climate Change Adaptation Database: The database provides web-based guidance on the integration of biodiversity within adaptation planning. It gathers information tools and case studies from a number of relevant partners. <https://adaptation.cbd.int/default.shtml>
- UNFCCC EBA Database: This database on ecosystem-based approaches to adaptation intends to provide supplemental information to [FCCC/SBSTA/2011/INF.8](https://unfccc.int/ebas/), that was mandated by the SBSTA at its thirty-fourth session in the context of the Nairobi work programme. [unfccc.int/adaptation/nairobi\\_work\\_programme/knowledge\\_resources\\_and\\_publications/items/6227.php](http://unfccc.int/adaptation/nairobi_work_programme/knowledge_resources_and_publications/items/6227.php)
- The Integrated Drought Management (IDM) Programme, led by the World Meteorological Organization and Global Water Partnership, provides policy and management guidance by sharing scientific information, knowledge and best practices for IDM, including an extensive library of resources: <http://www.droughtmanagement.info/find/library/>
- The Panorama Initiative is an IUCN-led effort to collate case studies that showcase how protected areas provide solutions to some of the world's key challenges, including climate change. The online platform allows practitioners to share their stories and to learn about how others have tackled problems drawing on protected area solutions across the globe. [www.panorama.solutions](http://www.panorama.solutions)
- Case Study Sourcebook on Eco-DRR (2014): *The Ecosystem-based Disaster Risk Reduction: case study and exercise source book*, PEDRR, CNRD, 2014. Developed as a supplementary teaching and training resource for PEDRR's Master's Course on Eco-DRR, this source book analyses seven case studies to stimulate discussions on why investing in ecosystems management can be an effective measure to reduce disasters risks. [http://postconflict.unep.ch/publications/DRR\\_CASE\\_STUDIES\\_&\\_EXERCISES.pdf](http://postconflict.unep.ch/publications/DRR_CASE_STUDIES_&_EXERCISES.pdf)

## Training

### **National training**

In order to develop national capacities to address environmental sustainability, support livelihoods and cope with climate change, PEDRR has developed national trainings geared for policymakers, programme managers, and practitioners. It seeks to facilitate a multi-sectoral approach to disaster risk reduction and disaster risk management, working across different sectors related to natural resources management, disaster management, climate change, urban planning, etc. The overall aim of the national training is to promote institutional change towards integrating ecosystem-based disaster risk reduction into development planning at national and sub-national levels.

<http://pedrr.org/activities/national-training/>

**The Green Recovery and Reconstruction Toolkit (GRRT)** is a training program designed to increase awareness and knowledge of environmentally sustainable disaster response approaches. The GRRT is made of ten modules which are designed to be delivered in a one-day training workshop. Each GRRT module package includes a trainer's guide; training materials for a workshop; PowerPoint slides; a technical content paper that provides background information for the training; and additional resources for further study. The GRRT is a partnership between the American Red Cross and the World Wildlife Fund (WWF), and involved experts from the International Federation of the Red Cross and Red Crescent Societies, Oxfam, World Vision, RedR, United Nations Environment Programme, International Union for Conservation of Nature, CARE, Danish Refugee Council, U.S. Agency for International Development, Save the Children, Sphere, and Tearfund among others. <http://green-recovery.org/>

### **Graduate Course on Disasters, Environment and Risk Reduction**

In collaboration with the Center for Natural Resources and Development (CNRD), a global university network, PEDRR developed a masters course related to understanding disaster risk reduction and resilience, ecosystems management tools for disaster risk reduction, climate change and ecosystem-based adaptation as well as ecological engineering. The main guiding philosophy of this Course is "learning by doing", combining theory with a lot of practice, whether through examples and case study analysis, learning games, field trips, student presentations, role play exercises, individual research, group assignments and other interactive teaching methods.

<http://pedrr.org/activities/graduate-course/>

### **MOOC on Disasters and Ecosystems: Resilience in a Changing Climate**

In order to make knowledge on Eco-DRR more accessible, UNEP together with the CNRD network and the Global Universities Partnership on Environment for Sustainability (GUPES) developed a Massive Open Online Course (MOOC) on Disasters and Ecosystems, based on the Master's course. Course materials are based on videos, case studies, quizzes and optional assignments. It is split into two tracks: the leadership track which provides an introduction to Eco-DRR, and the expert track which provides a deeper understanding of the topic. The MOOC has over 11,500 students enrolled from 183 countries, and is being hosted through the Iversity platform.

<https://iversity.org/en/courses/disasters-and-ecosystems-resilience-in-a-changing-climate>

### **WWF Adapt**

WWF Adapt provides a wide range of learning tools that help conservation, development and humanitarian professionals better understand climate change adaptation, resilience-building and multi-hazard disaster risk reduction and their relationships to the natural environment.

<http://wwfadapt.org/>

**Regional Training Manual on Disaster Risk Reduction for Coastal Zone Managers (in collaboration with ADPC)**

This training manual was prepared by ADPC in collaboration with UNEP and it aims to build capacity of government officials, NGOs, academia and other entities to include DRR into coastal zone management. This training helps coastal zone managers to improve local resilience as well as emphasising the role of ecosystems to reduce disasters.

[http://www.unep.org/disastersandconflicts/portals/155/disastersandconflicts/docs/drr\\_training/AIDCO\\_Regional\\_Training\\_Manual.pdf](http://www.unep.org/disastersandconflicts/portals/155/disastersandconflicts/docs/drr_training/AIDCO_Regional_Training_Manual.pdf)

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## ANNEX 5: MEMBERS OF THE TECHNICAL REFERENCE GROUP ON EBA AND ECO-DRR

	Organization	Representatives
1	UNDP	Ms. Caroline Petersen Technical Specialist for Ecosystems and Biodiversity UNDP New York, USA
2	UNEP	Ms. Musonda Mumba Ecosystem Based Adaptation (EBA) Flagship Programme Coordinator UNEP Nairobi, Kenya  Ms. Nancy Soi Associate Programme Officer Climate Change Adaptation Unit (CCAU) Division of Environmental Policy Implementation United Nations Environment Programme Nairobi, Kenya
3	IUCN	Ms. Dorothée Herr Marine Programme Officer Global Marine and Polar Programme IUCN Bonn/Berlin, Germany  Mr. Ali Raza Rizvi Programme Manager, Ecosystem Based Adaptation Global Ecosystem Management Programme IUCN Washington D.C.
4	BirdLife International	Ms. Melanie Heath Director of Science, Policy & Information BirdLife International Cambridge, UK  Mr. Edward Perry Global Climate Change Policy Coordinator BirdLife International
5	UNFCCC	Ms. Rojina Manandhar Programme Officer Impacts, Vulnerability and Risks Adaptation Programme UNFCCC Bonn, Germany
6	Conservation International	Ms. Sarshen Scorgie Director for Policy and Fiscal Instruments Conservation South Africa Centre for Biodiversity, Kirstenbosch Gardens Cape Town, South Africa
7	FAO	Mr. Reuben Sessa Natural Resources Officer FAO

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8	UNISDR	Mr. Glenn Dolcemascolo Climate Change Coordinator UN Office for Disaster Risk Reduction- UNISDR
9	UNEP Disasters and Conflicts/ PEDDR	Ms. Marisol Estrella Project Coordinator Disaster Risk Reduction United Nations Environment Programme (UNEP) Geneva, Switzerland
10	CMS	Mr. Borja Heredia Head, Avian Species Team Convention on the Conservation of Migratory Species of Wild Animals (CMS) Bonn, Germany
11	Ramsar	Ms. Ania Grobicki Deputy Secretary General Ramsar Convention Gland, Switzerland
12	WWF	Mr. Shaun Martin Senior Director, Climate Change Adaptation WWF Washington D.C., USA
13	WMO	Mr. Robert Stefanski Chief Agricultural Meteorology Division World Meteorological Organization (WMO) Geneva, Switzerland
15	CTCN	Mr. Jason Spensley Climate Technology Manager UNFCCC Climate Technology Centre and Network United Nations Environment Programme UN City, Copenhagen, Denmark
16	TNC	Ms. Krista Singleton-Cambage The Nature Conservancy Arlington, United States of America

## **ANNEX 6: PARTICIPANTS OF THE CBD TECHNICAL WORKSHOP ON EBA AND ECO-DRR**

### **LIST OF PARTICIPANTS**

**Technical workshop on ecosystem-based approaches to climate change adaptation and disaster risk reduction**

**Sandton, Johannesburg, South Africa, 28 September - 2 October 2015**

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## **ANNEX 7: COMPILATION REVIEW**

The compilation of EBA and Eco-DRR experiences, activities, and targets from the Fifth National Reports, NBSAPs, submissions to the CBD, portfolio reviews, and the broader literature are available as a Microsoft Excel database, available for download at this [link](#).