



# **Resilient Ecosystems and Disaster Risk Reduction: Opportunities for Coastal Cities in Africa**

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# Executive summary

Natural disasters are a threat to both natural and human systems. As a result of climate change, extreme weather events are expected to become more frequent. As climate change will continue having devastating effects on African coastal cities, it is necessary to adapt to such impacts. Healthy ecosystems enable this by reducing the physical exposure of people and cities to natural hazards and providing services essential for helping people and cities adapt to the impacts of climate change, while reducing disaster risks. Climate-resilient ecosystems, therefore, have an important role to play in climate adaptation and disaster risk reduction, particularly in African coastal cities and developing countries.

## Introduction

Climate change is increasing the frequency and intensity of climate-related hazards. The growing incidence and severity of disasters such as tropical cyclones, floods and landslides are leaving more people vulnerable each year, particularly the poor and marginalised. This results in more deaths and injuries, as well as more property and economic losses. Human vulnerability to natural hazards is exacerbated by ongoing environmental degradation,<sup>1</sup> high population densities in exposed areas, and lacking or ineffective government policies.<sup>2</sup> This is particularly true in African coastal cities, where both population growth and human vulnerability are high, and the climate risk is even more pronounced.

African coastal cities need to adapt to climate change and reduce the risks faced by their people. The Intergovernmental Panel on Climate Change's (IPCC) *Fifth Assessment Report* notes that 'successful adaptation will depend on the ability to allow and facilitate natural systems to adjust to a changing climate, thus maintaining the ecosystem services on which all life depends'.<sup>3</sup> This emphasises the fact that ecosystems and biodiversity provide services essential for helping people adapt to the impacts of climate change, and reduce disaster risks.<sup>4</sup> Ecosystem restoration and sustainable management of natural resources can, therefore, play a critical role in enhancing people's ability to prevent, cope with and recover from disasters. This is particularly true for the most vulnerable in society, who are often most dependent on natural resources for their livelihoods.<sup>5</sup>

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- 1 Environmental degradation reduces the capacity of these ecosystems to provide important services to communities such as food, firewood, medicines and protection from natural hazards. It also greatly reduces a landscape's ability to sequester carbon – a crucial element in climate change mitigation.
  - 2 International Union for Conservation of Nature, 'Environment and Disasters', <https://www.iucn.org/theme/ecosystem-management/our-work/environment-and-disasters>.
  - 3 Intergovernmental Panel on Climate Change, *Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* (Cambridge and New York: Cambridge University Press, 2014).
  - 4 Convention on Biological Diversity, *Guidelines for Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction*, January 2018, <https://www.cbd.int/sbstta/sbstta-22-sbi-2/EbA-Eco-DRR-Guidelines-en.pdf>.
  - 5 IUCN, 'Environment and Disasters'.

## Decision makers in African coastal cities need to recognise the role of resilient ecosystems in supporting people and cities to prepare for, cope with and recover from climate-induced disasters

Decision makers need to ensure that African coastal cities and their people are resilient to climate impacts and less vulnerable to disaster risk. They also have to recognise the role of ecosystems in supporting cities and people to prepare for, cope with and recover from climate-induced disasters. This requires a holistic understanding of climate-induced disasters and their impacts, current and future human livelihood needs, and the biophysical requirements of resilient ecosystems. A systematic understanding of climate change and the advantages offered by ecosystems will ensure that African countries can exploit the multiple opportunities provided by ecosystems for climate adaptation and disaster risk management. This policy insight examines the opportunities provided by ecosystems in climate-induced disaster risk, particularly in vulnerable and resource-scarce African countries.

## The role of ecosystems in disaster risk reduction

Ecosystems and their services play an important role in climate change adaptation (CCA) and disaster risk reduction (DRR). This is because healthy ecosystems are able to reduce the physical exposure of people and their assets to natural hazards by acting as buffers and/or protective barriers and reducing vulnerability through the provision of food, water, shelter and other important ecosystem services.<sup>6</sup> For instance, healthy ecosystems such as wetlands, forests and coastal areas, including mangroves and sand dunes, not only reduce vulnerability to hazards by supporting livelihoods but also act as physical barriers that reduce the impact of hazards.<sup>7</sup> Therefore, functioning ecosystems provide a suite of services that regulate and alleviate the effects of natural disasters.<sup>8</sup>

Figure 1 sets out five reasons why ecosystems are central to DRR.<sup>9</sup> However, their capacity to provide these services may be undermined by climate change or hazard impacts.<sup>10</sup> It is therefore critical that ecosystems are managed effectively to ensure that they continue to

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6 Fabrice G Renaud, Karen Sudmeier-Rieux and Estrella Marisol, *The Role of Ecosystems in Disaster Risk Reduction* (Tokyo: UNU Press, 2013).

7 IUCN, 'Environment and Disasters'.

8 South African National Biodiversity Institute and Department of Environmental Affairs, *Strategic Framework and Overarching Implementation Plan for Ecosystem-Based Adaptation (EbA) in South Africa 2016–2021* (Pretoria: SANBI and DEA, 2018).

9 IUCN, 'Five Reasons Why Ecosystems Are Central to Disaster Risk Reduction', <https://www.iucn.org/theme/ecosystem-management/our-work/environment-and-disasters/about-ecosystem-based-disaster-risk-reduction-eco-drr/five-reasons-why-ecosystems-are-central-disaster-risk-reduction>.

10 UN Environment, *Promoting Ecosystems For Disaster Risk Reduction and Climate Change Adaptation* (Discussion Paper, 2015), <https://europa.eu/capacity4dev/unep/document/discussion-paper-promoting-ecosystems-disaster-risk-reduction-and-climate-change-adaptation>.

provide ecosystem services, as the degradation of ecosystems – such as forests, wetlands, coastal and marine systems and drylands – is a major driver of disaster risk and a key component of disaster vulnerability.<sup>11</sup>

**Figure 1** Why ecosystems are central to climate change adaptation and disaster risk reduction

- 1 Healthy and diverse ecosystems are more resilient to extreme weather events
- 2 Ecosystems (such as wetlands, forests and coastal systems) can provide cost-effective natural buffers against natural events and the impacts of climate change
- 3 Ecosystem degradation reduces the ability of natural ecosystems to sequester carbon, while also increasing the incidence and impact of climate change and climate-related disasters
- 4 Human well-being depends on ecosystems that provide multiple livelihood benefits. Ecosystems also increase the resilience of vulnerable people to withstand, cope with and recover from disasters resulting from climate hazard events such as floods, droughts and hurricanes
- 5 Human activities, such as competition over scarce natural resources, cause further environmental degradation and other impacts similar to effects of natural hazards. Environmental management and ecosystem conservation is, therefore, essential to both decrease the risk of conflict and allow post-conflict recovery

Source: UN Environment, 'Ecosystem-based Disaster Risk Reduction', <https://www.unenvironment.org/explore-topics/disasters-conflicts/what-we-do/risk-reduction/ecosystem-based-disaster-risk>

## Nature-based solutions: Ecosystem-based adaption and ecosystem-based disaster risk reduction

In developing countries where people are vulnerable to climate impacts, resilient ecosystems can promote DRR and CCA. Resilient ecosystems enable developing countries, particularly coastal cities, to reap multiple benefits and to leverage multiple levers required for climate-resilient and sustainable socio-economic development. Therefore, nature-based

<sup>11</sup> UN Environment, 'Ecosystem-based Disaster Risk Reduction', <https://www.unenvironment.org/explore-topics/disasters-conflicts/what-we-do/risk-reduction/ecosystem-based-disaster-risk>.

solutions help people and cities prepare for, cope with, and recover from climate impacts and disasters. Common approaches include ecosystem-based approaches (EbA) to climate change adaptation and ecosystem-based approaches to disaster risk reduction (Eco-DRR).

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#### BOX 1 EBA

**EbA** is the use of biodiversity and ecosystem services to help people adapt to the impacts of climate change. EbA uses the sustainable management, conservation and restoration of ecosystems to provide services that enable people to adapt to the impacts 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. EbA is most effective when appropriately integrated into broader adaptation and development strategies.

#### BOX 1 ECO-DRR

**Eco-DRR** is the sustainable management, conservation and restoration of ecosystems to provide services that reduce disaster risk by mitigating hazards and increasing livelihood resilience. Eco-DRR advocates sustainable ecosystem management as a strategy to reduce exposure and vulnerability, through hazard mitigation or regulation (when feasible), as well as enhancement of livelihood capacities and resilience. Eco-DRR builds on ecosystem management principles, strategies and tools in order to maximise ecosystem services for risk reduction.

Sources: Convention on Biological Diversity, *Guidelines for Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction*, January 2018, <https://www.cbd.int/sbstta/sbstta-22-sbi-2/EbA-Eco-DRR-Guidelines-en.pdf>; South African National Biodiversity Institute and Department of Environmental Affairs, *Strategic Framework and Overarching Implementation Plan for Ecosystem-Based Adaptation (EbA) in South Africa 2016–2021* (Pretoria: SANBI and DEA, 2018)

There are many commonalities between EbA and Eco-DRR, including the use of an ecosystem-based approach, the assessment of vulnerability and the involvement of local communities.<sup>12</sup> Both Eco-DRR and EbA emphasise the importance of ecosystems in effective CCA and DRR measures and build on other practices, such as conservation

<sup>12</sup> SANBI and DEA, *Strategic Framework and Overarching Implementation*.

and ecosystem restoration that seek to increase the resilience of ecosystems.<sup>13</sup> However, EbA does not address geophysical disasters that are unrelated to climate change (eg, earthquakes), nor does it cover other aspects of DRR such as preparedness and response planning.<sup>14</sup> Many EBA projects focus more on the conservation of biodiversity and ecosystem services and impacts of long-term climate change than do most Eco-DRR projects, which is owing to EbA's conservation roots. On the other hand, Eco-DRR includes components such as early warning, preparedness and contingency planning, response, recovery and reconstruction, which are not typically included in EbA.<sup>15</sup> There are still many opportunities for EbA to be considered as part of Eco-DRR strategies.<sup>16</sup>

In recent years, EbA and Eco-DRR have gained increasing attention in risk management. This is because they provide multiple benefits for people, ecosystems and biodiversity, enable planning for CCA and DRR over longer time scales, are cost-effective compared to traditional engineered infrastructure, and emphasise community participation and the use of traditional and local knowledge systems.<sup>17</sup> (Box 2 shows how Eco-DRR has proven to be an effective DRR tool.)

## BOX 2 ECO-DRR POLICY AND PRACTICE

Resilient ecosystems are an important tool in planning for DRR.<sup>a</sup> Increasingly, countries are integrating ecosystem-based approaches into national plans and strategies to reduce the risk of climate impacts and hazards.<sup>b</sup> Various case studies have shown that ecosystems can be used for such purposes. For example, forests provide flood and landslide regulation services, a phenomenon that is harnessed in watershed management programmes. Coastal mangroves have been shown to protect adjacent areas from storm surges.<sup>c</sup> Examples of Eco-DRR policy and project implementation include:

- In Eden District Municipality, South Africa, a pilot study, in collaboration with the insurance industry, explored current and future risks from flooding, storm surges and other disasters.<sup>d</sup> The study recommended the restoration and protection of key ecosystems such as wetlands and dunes to pro-actively manage disaster risk.<sup>e</sup>
- UN Environment's Eco-DRR project in the Lukaya River catchment (Democratic Republic of Congo) aims to strengthen the community's capacity to maximise ecosystem service benefits provided by the catchment, including its potential to mitigate floods and water pollution.<sup>f</sup>

13 CBD, *Guidelines for Ecosystem-based Approaches*.

14 SANBI and DEA, *Strategic Framework and Overarching Implementation*.

15 UN Environment, *Promoting Ecosystems for Disaster Risk Reduction*.

16 SANBI and DEA, *Strategic Framework and Overarching Implementation*.

17 CBD, *Guidelines for Ecosystem-based Approaches*.

- In South Africa, the policy framework linked to disaster management, including the National Disaster Management Act and the Policy Framework for Disaster Risk Management provides numerous opportunities for the adoption of EbA as a response measure.<sup>9</sup>
- In the Msimbazi Basin, Dar es Salaam the Tanzania Urban Resilience Programme was established with the aim of supporting flood mitigation efforts. The programme promotes nature-based interventions by using a holistic and integrated approach to rehabilitation and building urban resilience.<sup>h</sup>

a SANBI and DEA, *Strategic Framework and Overarching Implementation*.

b CBD, *Guidelines for Ecosystem-based Approaches*.

c UN Environment, *Promoting Ecosystems for Disaster Risk Reduction*.

d SANBI and DEA, *Strategic Framework and Overarching Implementation*.

e SANBI and DEA, *Strategic Framework and Overarching Implementation*.

f UN Environment, *Promoting Ecosystems for Disaster Risk Reduction*.

g SANBI and DEA, *Strategic Framework and Overarching Implementation*.

h Siyasanga Sauka, *Climate Resilience in Developing Cities: Msimbazi Basin, Dar es Salaam* (Policy Insights 72, South African Institute for International Affairs, Johannesburg, July 2019).

## EbA and Eco-DRR: Policy landscape

### International policy landscape

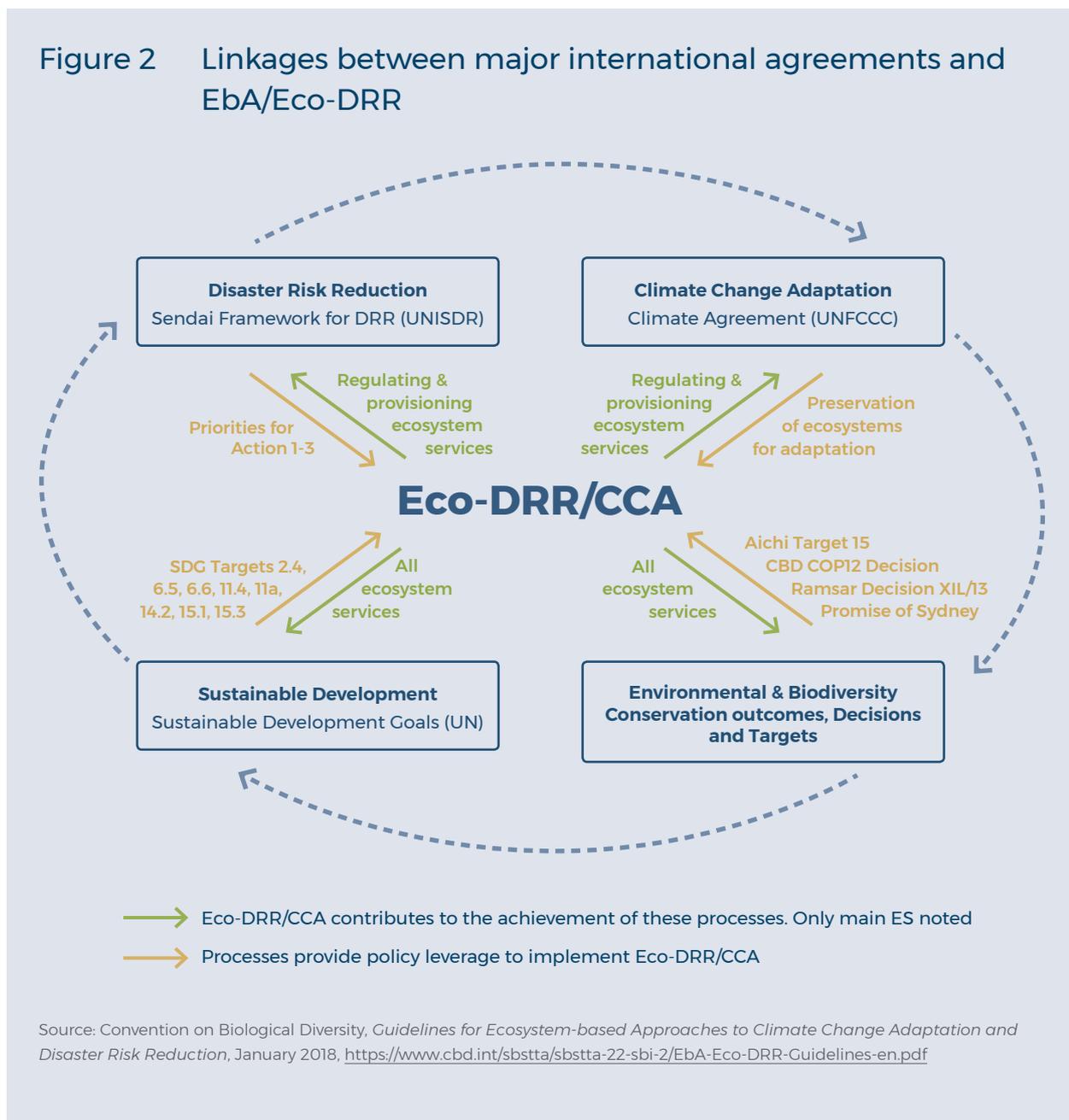
Major international agreements such as the Paris Agreement and the Sustainable Development Goals (SDGs) have called for enhancing the resilience of ecosystems and societies to the impacts of climate change and disaster risk. Increasingly, countries are integrating ecosystem-based approaches into national plans and strategies to reduce the risk of climate impacts and hazards. Support for EbA and Eco-DRR has been embedded in major agreements and taken up by the international arena in other ways in recent years. 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, prioritising ‘ecosystem-based approaches to build resilience and reduce disaster risk’.<sup>18</sup>

EbA and Eco-DRR have strong policy support within the framework of the SDGs, the Strategic Plan for Biodiversity 2011–2020 under the Convention on Biological Diversity

<sup>18</sup> CBD, *Guidelines for Ecosystem-based Approaches*.

(CBD), and the Paris Agreement under the UN Framework Convention on Climate Change.<sup>19</sup> Additional key policy support is provided under the Ramsar Convention, the UN Convention to Combat Desertification, and UN General Assembly resolutions. Figure 2 illustrates the linkages between major international agreements and EbA/Eco-DRR.

**Figure 2** Linkages between major international agreements and EbA/Eco-DRR



## Regional and continental policy landscape

Policy is an important enabling factor for both biodiversity conservation and DRR. In Africa, regional policies that link biodiversity conservation, resilient ecosystems and DRR

<sup>19</sup> CBD, *Guidelines for Ecosystem-based Approaches*.

are virtually non-existent. The continent does have regional initiatives and cooperation agreements in place for dealing with DRR and, since 2003, has made significant strides towards implementing DRR measures, leading to the development of the African Regional Strategy for Disaster Risk Reduction in 2005.<sup>20</sup>

Policy is an important enabling factor for both biodiversity conservation and DRR. In Africa, regional policies that link biodiversity conservation, resilient ecosystems and DRR are virtually non-existent

Existing regional strategies include the Disaster Risk Reduction and Management Strategy (2012–2016) of the East African Community (EAC), the Disaster Risk Management Strategy in West Africa and the Sahel (2011–2013), and ECOWAS's Policy for Disaster Risk Reduction (2006). SADC has not developed a protocol on disaster risk reduction or management, despite the region's vulnerability to climate-induced disasters. It has, however, established a Disaster Risk Reduction Unit responsible for coordinating regional preparedness and response programmes for trans-boundary hazards and disasters, and inaugurated the SADC Regional Platform for Disaster Risk Reduction in 2011. While SADC has not developed a protocol on disaster risk reduction or management, the multi-disciplinary nature of its disaster risk management tools means that several SADC protocols are relevant.<sup>21</sup>

The aforementioned DRR strategies and policies generally do not explicitly link DRR with ecosystem health, even though key regional documents such as those of SADC (2016)<sup>22</sup> and the Intergovernmental Authority on Development (2013)<sup>23</sup> recognise the need to make such linkages. Further emphasising the need to include the promotion of resilient ecosystems in DRR strategies/policies, the EAC's Disaster Risk Reduction and Management Strategy acknowledges that the EAC partner states share many terrestrial and aquatic trans-boundary systems and ecosystems and calls for a concerted effort to protect and conserve these in view of increasing environmental disasters.<sup>24</sup> This will ensure that the region can respond effectively to climate-induced disasters.

20 IUCN, *Regional Assessment on Ecosystem-based Disaster Risk Reduction and Biodiversity in Eastern and Southern Africa*, 2016, [https://www.iucn.org/sites/dev/files/content/documents/eastern\\_and\\_southern\\_africa\\_regional\\_assessment.pdf](https://www.iucn.org/sites/dev/files/content/documents/eastern_and_southern_africa_regional_assessment.pdf).

21 SADC, 'Disaster Risk Management', <https://www.sadc.int/themes/disaster-risk-management/>.

22 SADC, *Outcomes of the Ministerial Workshop on Food Security and Poverty Eradication*, 'Theme: Towards a Poverty Free and Food Secure Future' (Gaborone: SADC, 16 May 2016).

23 Intergovernmental Authority on Development, *IGAD's Regional Perspective on Disaster Risk Reduction*, 2013, <http://dspace.iau.edu.sd/bitstream/123456789/810/1/keflem.pdf>.

24 IUCN, Regional Assessment.

## Evidence-based research enables effective implementation, strategies and policies

To enable effective implementation, it is critical that EbA and Eco-DRR are understood holistically, as this will enable effective policy, governance and strategic interventions. Reports such as the IPCC's [‘Special Report on Extreme Events’](#) and [‘Fifth Assessment Report’](#), the International Union for Conservation of Nature's (IUCN) [‘Regional Assessment on Ecosystem-based Disaster Risk Reduction and Biodiversity in Eastern and Southern Africa’](#), as well as the UN Economic Commission for Africa's [‘Assessment Report on Mainstreaming and Implementing Disaster Risk Reduction and Management in Africa’](#), highlight the risks faced by African coastal cities, and explore the opportunities provided by resilient ecosystems.

To enable effective implementation, it is critical that EbA and Eco-disaster risk reduction are understood holistically, as this will enable effective policy, governance and strategic interventions

Added to this, documents such as the IUCN's [‘Ecosystems, Livelihoods and Disasters: An integrated Approach to Disaster Risk Management’](#) and the CBD's [‘Guidelines for Ecosystem-based Approaches to Climate Change Adaptation and Disaster Risk Reduction’](#) provide useful guidance to support and enable effective design and implementation of EbA and Eco-DRR. These documents also give recommendations on making DRR strategies more effective, and strengthen the capacity of African policymakers to mainstream natural disaster risk reduction into national and regional development policies and strategies.

## Limitations of and opportunities for Eco-DRR

Ecosystem management is a well-tested component of sustainable development that is being revisited because of its inherent ‘win-win’ and ‘no-regrets’ appeal to address rising disaster and climate change issues. It is one of the few approaches that can influence all elements of the disaster risk equation; it can mitigate hazards, reduce exposure and vulnerabilities, and increase the resilience of exposed communities. Yet uptake of EbA and DRR is slow despite various success stories.<sup>25</sup>

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25 Renaud, Sudmeier-Rieux and Marisol, *The Role of Ecosystems in Disaster Risk Reduction*.

The IUCN’s *Regional Assessment on Ecosystem-based Disaster Risk Reduction and Biodiversity in Eastern and Southern Africa* reviews the challenges of and opportunities for mainstreaming EbA and Eco-DRR in Africa (see Table 1). These challenges are classified as institutional (national, regional and international), governance, economic resources, and knowledge and capacity. The challenges – and the failure to maximise opportunities – is more pronounced in developing countries, where development challenges are multi-faceted and resources are scarce.

TABLE 1 OPPORTUNITIES AND CONSTRAINTS		
AREA	OPPORTUNITIES	CONSTRAINTS
<b>Governance</b>	Implementing successful Eco-DRR requires that issues of governance be addressed, at the localised community level to national level.	Bad, poor and weak governance is one of the greatest threats to sustainable development and ecosystem management.
<b>Institutional</b>	<p>The field of Eco-DRR is increasingly accepted by multilateral donors and international institutions such as the CBD, the UN Office for Disaster Risk Reduction and UN Environment. Eco-DRR addresses key areas of the Aichi biodiversity targets, the Sendai Framework and Climate Change Protocols.</p> <p>Increasingly, Eco-DRR is being incorporated into national environmental strategies, plans and policies. Local environmental and development non-governmental organisations (NGOs) are incorporating Eco-DRR into their activities.</p>	<p>There remains a considerable disconnect between international conventions and planning to activities at local levels. Funding is not sufficiently localised and often tied up in cumbersome bureaucratic processes.</p> <p>Cross-sectorial integration at national government level is hard to achieve. Eco-DRR is yet to be considered a national developmental priority and is therefore understaffed and underfunded. Local NGOs are highly dependent on external donor funding, which is project rather than process based and only available for limited periods of time.</p>
<b>Natural Capital</b>	Despite rapid changes in the past 20 years, the overall natural capital of ecosystem services remains comparatively high.	Changes are occurring and increasingly driven by poverty and population growth or migration.
<b>Knowledge and Capacity</b>	As Eco-DRR approaches become more widely accepted and incorporated into developmental and conservation activities, there is an opportunity to increase knowledge dissemination (both formal and traditional) and capacity development at all levels. An important opportunity to train the next generation of government officials, field practitioners and academic researchers is currently developing.	Funding for knowledge and capacity development remains a low priority. Tertiary training is poorly catered for in this sector and academic research relies on donor funding and external academic institutions primarily located in the developed North.
<b>Economic</b>	As the cost of responding to disasters and humanitarian crises increases, Eco-DRR approaches offer a long-term cost-effective response to preventing and recovering from disasters.	The increasing number of disasters means that there is still a great emphasis on response and recovery activities. Attracting funding from state and external sources remains a considerable challenge.

Source: International Union for Conservation, *Regional Assessment on Ecosystem-based Disaster Risk Reduction and Biodiversity in Eastern and Southern Africa*, 2016, [https://www.iucn.org/sites/dev/files/content/documents/eastern\\_and\\_southern\\_africa\\_regional\\_assessment.pdf](https://www.iucn.org/sites/dev/files/content/documents/eastern_and_southern_africa_regional_assessment.pdf)

# Recommendations

The impacts of climate change on society are occurring earlier and more often than predicted.<sup>26</sup> The possibility of increased disaster risk is one of the most concerning and potentially costly impacts of climate change.<sup>27</sup> To manage and reduce these risks and help African countries, particularly coastal cities, adapt to climate change, it is critical that nature-based solutions are explored and the benefits that EbA and Eco-DRR can provide are maximised.

However, as discussed above, the mainstreaming of EbA and Eco-DRR requires African countries to address several challenges and explore several opportunities. Below are recommendations that should be considered in the pursuit of mainstreaming EbA and Eco-DRR in African countries.

- EbA and Eco-DRR are often not as highly valued as engineering options, as it takes several years for the benefits to be realised. This means that nature-based solutions tend not to be prioritised during the strategic planning and budget planning process. It is critical that decision makers are educated about the multiple benefits provided by nature-based solutions. This will ensure that such solutions are prioritised or implemented in conjunction with engineering approaches.
- In most countries, ecosystem/environmental management, DRR and CCA work independently from each other. As development issues and disasters are intricately linked, especially in developing countries, DRR should be handled holistically and systematically, in collaboration with multiple sectors and various stakeholders.
- Development that ignores environmental aspects increases the risk of disaster, and the deterioration of environmental sustainability is a primary factor in increased physical and socio-economic vulnerability.<sup>28</sup> Therefore, the governance of EbA and Eco-DRR requires strategies and policies that rely on resilient ecosystems, as this is the backbone of a climate-resilient society.
- There are poor science-policy interactions on EbA and Eco-DRR, which have led to unclear and often contradictory scientific information on the role and advantages of ecosystems.<sup>29</sup> Additionally, there is still a gap between policy development and implementation. The objective of the Draft EbA and Eco-DRR guidelines is to support and enable the design and implementation of EbA and Eco-DRR strategies as part of an overall CCA or DRR strategy.<sup>30</sup> Such guidance documents, in combination with scientific

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26 IPCC, *Summary for Policymakers: A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change* (Cambridge and New York: Cambridge University Press, 2012).

27 DEA and SANBI, *Climate Change Adaptation: Disaster Risk Reduction and Management*, Adaptation Scenarios Factsheet 3 no. 7, <https://www.sanbi.org/wp-content/uploads/2018/04/Itas-factsheet-7.pdf>.

28 IUCN, *Regional Assessment*.

29 Renaud, Sudmeier-Rieux and Marisol, *The Role of Ecosystems in Disaster Risk Reduction*.

30 CBD, *Guidelines for Ecosystem-based Approaches*.

knowledge products, should be used to expand the knowledge and capacity of decision makers, and so ensure the mainstreaming and implementation of EbA and Eco-DRR.

Successful implementation of the above recommendations will help countries reap the benefits of nature-based solutions to climate change. By mainstreaming nature-based solutions, countries will be able to meet their sustainable development priorities while also adapting to climate change.

# Author

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is a Researcher at SAIIA. She holds a BSc, BSc (Hons) and MSc in Geography. Over more than 10 years, she has focused mainly on research and analysis in the climate change, natural resource management and environmental sustainability spheres in both the public and private sector. Siya has also worked extensively on minimising climate impacts and building climate resilience in natural, socio-economic and development contexts. More recently, she has become interested in the integration of data and information for effective decision-making in climate adaptation, particularly in developing countries.

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# About SAIIA

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SAIIA's policy insights are situation analysis papers intended for policymakers, whether in government or business. They are designed to bridge the space between policy briefings and occasional papers.

## Cover image

The Praia Move area, Beira, Mozambique on March 24, 2019 after Cyclone Idai smashed into Mozambique's coast unleashing hurricane-force wind and rain that flooded swathes of the country (Wikus de Wet/AFP via Getty Images)

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