

# Joining the puzzle pieces: Reconceptualising ecosystem-based adaptation in South Africa within the current natural resource management and adaptation context

*Aronson, J., Shackleton, S., and Sikutshwa, L. (2019, March)*

## Key Policy Messages

- EbA offers a response to climate change that has multiple co-benefits for people and biodiversity, contributing to sustainable development. Promoting wide, cross-sectoral implementation of EbA is an important mandate of the Department of Environmental Affairs.
- EbA could best be mainstreamed and implemented in South Africa by recognising the opportunities for integrating it into existing natural resource management and climate change response programmes, thus ensuring a coordinated approach at national and local levels.
- Flexible boundaries are needed to allow for adaptation of the EbA concept to specific contexts, avoiding top-down prescriptions of what 'qualifies' as EbA and isolating it from other related approaches.
- EbA is essentially a concept that opens the door to greater climate resilience and to new funding streams, and, since existing programmes can be fine-tuned to incorporate its principles, it should be seen as such rather than as a new independent strategy that becomes a burden for implementers.

## Introduction

There is increasing recognition that human resilience and adaptation to climate change in the Anthropocene depend critically on the integrity of ecosystems<sup>1,2</sup>. Well-functioning ecosystems provide natural solutions and ecosystem services that build resilience and help society adapt to the adverse impacts of climate change<sup>3</sup>. An emerging approach to address adaptation challenges using natural solutions is ecosystem-based adaptation (EbA) - the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change<sup>4</sup>.

South Africa's climate change and biodiversity policy context provides support for a coordinated EbA programme<sup>5</sup>. To facilitate this, guidelines for EbA were published in 2017<sup>6</sup>, along with a strategic framework and overarching implementation plan for the period 2016 - 2021<sup>5</sup>. The vision of this programme is that EbA is implemented as part of South Africa's overall climate change adaptation strategy in support of a long-term, just transition to a climate-resilient economy and society<sup>5</sup>. While there is support for EbA in South Africa and increasing implementation<sup>7</sup>, there remains confusion about what EbA is<sup>8</sup> and, more specifically, how it relates to other natural resource management and climate change adaptation approaches. Fundamentally, a key question is what makes a programme 'EbA' as opposed to being community-based adaptation (CbA), landscape-based disaster risk reduction (DRR) or rehabilitation of ecological infrastructure? Or, conversely how could the latter approaches be repurposed to become more "EbA-like"?

**In this policy brief we clarify what EbA is and suggest how it can be aligned with existing climate change and natural resource management approaches in South Africa.**

## Box 1

### What is Ecosystem-based Adaptation

EbA is an approach for addressing climate change impacts, focusing on the benefits humans derive from biodiversity and ecosystem services, and how these benefits can be utilized in the face of climate change<sup>1</sup>. EbA is an approach to sustainable development that contributes to three outcomes: socio-economic benefits, climate change adaptation and ecological benefits<sup>3</sup>. These co-benefits of EbA can contribute towards a broader set of socio-economic and development goals, including job creation, poverty reduction and rural/peri-urban development<sup>3</sup>.

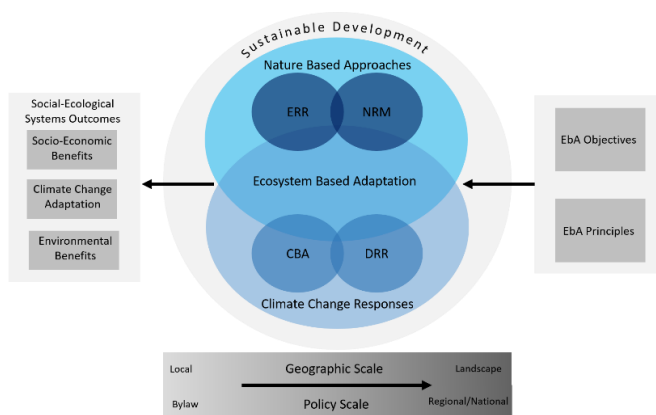
### How does EbA relate to existing approaches with similar objectives?

South Africa has numerous environmental policies acknowledging the importance of natural ecosystems and their management for sustainable development. This includes support for EbA<sup>5,6</sup> in addition to other nature-based approaches such as natural resource management [e.g. community-based natural resource management (CBNRM); integrated natural resource management (INRM); catchment management (CM)] and environmental rehabilitation and restoration (ERR) programmes. Ecosystem-based adaptation is often labelled as a 'buzzword' so it is important to relate it to already existing approaches to avoid conceptual fatigue.

The intersection of the three spheres that contribute to EbA (Box 1) is what makes EbA different to CbA, CBNRM, or ERR, which focus only on integrating two of the three spheres (Table 1). Despite this, there is still considerable conceptual overlap between these varying approaches making the distinction unclear in practice.

For example, CbA is a climate change adaptation response that aims to empower people to plan and cope with climate change at a local level. It is similar to EbA in that they are both participatory, people-centred approaches. However CbA has mostly been supported by development practitioners, while EbA, by environmental/conservation practitioners<sup>9</sup>. A key difference between them is that EbA solutions are focused on ecosystems and ecosystem services whereas CbA includes a wider range of adaptation options, not always with a defined ecological context. On the ground however, they are often indistinguishable from each other.

Another climate change response, particularly when applied to extreme hydro-meteorological events, is Disaster Risk Reduction (DRR). DRR aims to prevent and reduce climate related (but also non-climate related) disaster risk, build resilience and contribute to sustainable development. Some DRR efforts are linked with EbA such as those using landscape approaches which integrate ecosystem management and restoration into DRR. For example, regulating ecosystem services provided by wetlands (or other ecological infrastructure such as coastal dunes) can help absorb flood shocks while provisioning ecosystem services support community livelihoods<sup>10</sup>. In this way, functioning ecosystems already provide a range of services that regulate and alleviate the effects of natural hazards<sup>11</sup>. The major differences between EbA and DRR is that EbA excludes disasters that are unrelated to climate change (e.g. geophysical hazards), and also takes account of slow changes in climate. In addition, EbA generally does not cover the disaster management related aspects of DRR such as preparedness and response planning.



**Figure 1: EbA is a nexus approach between NRM or nature-based approaches and climate change responses. The objectives and principles of EbA could be used to modify both sets of approaches so that environmental and socio-economic co-benefits are considered within a sustainable development framework. Geographic and policy scales are also important considerations to ensure efficient and effective EbA projects.**

## Box 2

### Ecosystem-based Adaptation Principles<sup>6</sup>

1. EbA interventions support resilient and functional ecosystems that ensure and enhance ecosystem services.
2. EbA interventions support people in adapting to climate change and climate variability.
3. EbA interventions are participatory, inclusive, and transparent.
4. EbA interventions are knowledge and evidence-based as informed by the best available science and robust indigenous and local knowledge.
5. EbA interventions are contextualised within broader national and regional policy and landscape processes and are designed to be scalable and replicable.
6. EbA interventions strive to be integrative and to promote transdisciplinarity and multi-sectorality throughout the project lifecycle.
7. EbA strives to achieve co-benefits and synergistic outcomes.

While climate adaptation responses such as CbA and DRR are limited in the extent to which they consider ecosystems and ecosystem services, NRM and ERR can be limited in the extent to which they incorporate forward looking planning in relation to climate change, and especially human adaptation to new climate risks.

For example, CBNRM and INRM projects focus on the use, management and governance of natural resources to promote human well-being. In the case of CBNRM, this management is typically undertaken by local communities. Unlike EbA projects however, CBNRM and INRM projects do not include explicit considerations toward climate change adaptation. However, this is shifting with increased recognition of the importance of linking climate change vulnerability to CBNRM projects<sup>12</sup>. Similarly, some ERR or ecological infrastructure (EI) programmes, such as Working for Water, couple social and environmental benefits without stated climate change adaptation goals and objectives.

Many of the approaches discussed above are already implemented in South Africa through several programmes that fulfil some criteria and principles of EbA (Table 1). These include the Biodiversity Stewardship programme, LandCare and the Expanded Public Works programme. The Expanded Public Works programme, which includes a suite of job creation and NRM “Working for” programmes such as Working for Water and Working for Wetlands, is particularly relevant to EbA.

The Expanded Public Works programmes could be used to raise the profile of EbA because they already support EbA-relevant principles (Box 2) and activities and have demonstrated that they have already been partially using EbA approaches<sup>8</sup>. Small modifications to these well-established programmes might therefore assist in mainstreaming EbA (Table 1). EbA offers an opportunity to unify nature-based approaches and climate change responses to ensure multiple co-benefits across a range of scales, contributing towards longer term resilience (Figure 1). Thus, it is not so much the term itself that is the issue, but rather that the effective merging of climate change responses with approaches that maintain and enhance ecosystem services will result in more resilient pathways going forward into an uncertain future.

Table 1: Nature-based approaches and climate change responses related to ecosystem-based adaptation

	Approach	Summary	Related Programme or Project	Modification to align with EbA
NATURE-BASED APPROACH	Environmental Rehabilitation and Restoration (ERR) and Ecological Infrastructure (EI), including blue, grey and natural	ERR is the process of assisting the recovery of ecological infrastructure (EI) that has been degraded, damaged, or destroyed. EI refers to naturally functioning ecosystems or biodiversity that delivers valuable services to people.	Expanded Public Works Programmes e.g. Working for Water	Socio-economic and environmental benefits may already be present but consideration of 'future-proofing' these programmes is needed <sup>6</sup> to ensure they are climate-adapted <sup>13</sup> .  Requires explicit consideration of climate change at the highest level of programme planning. Reframing these projects within the context of EbA will provide opportunities for existing elements to meet EbA requirements; making them more robust to climate change uncertainty, and potentially unlocking additional funding opportunities <sup>6</sup> .
	Integrated Natural Resource Management (INRM) and Community-based natural resource management (CBNRM)	NRM aims to manage natural resources in a systematic way, including multiple aspects of natural resource use to address certain objections such as poverty alleviation, food security, disaster risk reduction and climate change. With CBNRM, management is typically undertaken by local communities.	Biodiversity Stewardship programme  Department of Water Affairs and Forestry, Participatory Forest Management	Some NRM projects operate at small scales and are implemented over short time periods, whereas EbA is more effective at larger scales (e.g. catchment or landscape) <sup>7</sup> . Projects may need longer time scales to meet climate change adaptation goals.
CLIMATE RESPONSE	Disaster risk reduction (DRR)	Aimed at preventing new, and reducing existing, disaster risk and managing residual risk.	Landscape-based DRR	Socio-economic and climate change adaptation benefits may already be present in these interventions. They need to more explicitly bring in the ecosystem component, i.e. use biodiversity and ecological infrastructure to buffer climate impacts (rather than only engineered solutions) and as a safety net for recovery (see Ref. 15 for example).
	Community-based adaptation (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 <sup>9</sup> .	eThekweni Municipality 'Climate Smart Communities' project <sup>14</sup>	

## Key Challenges for EbA Implementation

Several challenges to EbA implementation have been identified and need to be considered to expand EbA and merge it with existing, related programmes of work in South Africa. Some of these include:

1. EbA requires collaboration across multiple sectors, government departments and administrative or geographic scales<sup>7,16</sup>. This is a challenge given current governance structures and a lack of intergovernmental planning, engagement and implementation ('silo' phenomenon). Further, planning and development of EbA, as well as finding ways to integrate it with related approaches, at a provincial or municipal level requires sustained capacity for several years (e.g. 5 to 8), but there is often a lack of human capacity to drive EbA and these time scales are incongruent with standard political or electoral cycles<sup>7,16</sup>.
2. There are financial constraints hindering EbA implementation, including uncertainty about how best to fund EbA programmes, a lack of specific funds for EbA projects, and a lack of capital and operational funding across government scales in South Africa to design and implement EbA<sup>16</sup>. However, donor funding is increasing, and South Africa's Expanded Public Works Programme model may be an additional funding mechanism<sup>17</sup>. Finding ways to integrate the "missing" EbA components into existing programmes may also help to save costs and may attract investors concerned with, for example, sustainable water supply or flood risk reduction.

3. There is a lack of research consolidating the evidence-base for EbA. This has created uncertainty regarding its effectiveness compared to other approaches, and prevented the generation of clear questions on EbA for researchers and practitioners to address<sup>17,18</sup>. More research is needed that is guided by those required to implement EbA. A significant knowledge gap relates to better understanding of the capacity of ecosystems to continue providing adaptation benefits under a changing climate<sup>19</sup>. There is often a lack of incorporation of biological understanding and good data on ecosystem threats especially for provisioning ecosystem services that people depend on (e.g. fuelwood in rural South Africa). EbA is not possible if the very ecosystems that underlie this approach to adaptation are at risk from climate change or high levels of utilisation.

4. An additional key constraint is the confusion around the concept of EbA, and what is required for a programme to qualify as EbA, which limits the monitoring and evaluation of EbA and attempts to measure its effectiveness<sup>19</sup>. Any EbA monitoring and evaluation framework needs to be flexible and not too top down allowing for the realignment of existing work under the EbA banner. A generic framework for assessing EbA effectiveness has recently been developed<sup>16</sup>.

5. Greater consideration is needed on how to deal with complexity in EbA systems, such as feedback loops between social and ecological elements and on engaging a diversity of stakeholders across different sectors and scales, and ensuring socio-economic and risk related benefits.

### Box 3

#### Case Study – Environmental Rehabilitation and Restoration Programmes

Founded in 1995, Working for Water was the first government-led public works programme with a specific focus on ERR. It was developed to address two political priorities: job creation and water security. Following on its success, several other programmes have been developed including Working for Wetlands, Working on Fire, Working for Land and Working for the Coast, all aiming to maintain, rehabilitate or restore natural landscapes and provide employment opportunities and downstream benefits for people. For example, Working for Water creates work opportunities through the removal of invasive alien plant species from infested landscapes.

The core ideologies of South Africa's environmental public employment programmes overlap with the some of the cornerstones of EbA; contributing to socio-economic development, and supporting resilient and functional ecosystems. However, the programmes do not explicitly incorporate climate change risk projections and associated adaptation as a core aim. Leveraging the success of these programmes, and by intentionally including climate change considerations, may help to promote EbA and support South Africa's vision for EbA in contributing to its overall climate change adaptation strategy.

Modifying the "Working for" programmes, or other NRM programmes with no or limited climate change adaptation goals, to align with EbA requires climate change risk and vulnerability to be central to programme planning<sup>6,8</sup>. This may require undertaking climate change vulnerability assessments which could help to climate proof these programmes<sup>6</sup>. Information about current and projected climate change also needs to be integrated into the planning and implementation of these programmes.

For example, invasion of ecosystems by woody alien plants could increase with climate change<sup>20</sup> which could overburden some Expanded Public Works programmes in terms of funding and capacity constraints. Well documented impacts of alien plants such as fire risks<sup>21</sup>, biodiversity loss<sup>22</sup> and water loss<sup>22,23</sup> might increase with further invasion. In the water stressed Western and Eastern Cape, the latter is particularly concerning given projections for a drier climate in future<sup>24</sup>. The need to manage a potentially increasing problem presents an opportunity for programme expansion, creating additional employment opportunities and promoting socio-economic development if funding and capacity constraints can be overcome. Other co-benefits include improved ecosystem services and water management which in turn contributes to adaptation to the predicted drier climate. Modifying the Expanded Public Works programmes to align with EbA would also link them more closely with DRR and CbA initiatives (Figure 1). For example, using a landscape-based DRR approach may contribute to reducing disaster risk management efforts needed to control and recover from severe fires and droughts associated with impacts of alien plants.

Reframing these programmes within the context of EbA will provide opportunities for existing elements of these programmes to meet EbA requirements; making them more robust to the uncertainty associated with climate change, and potentially unlocking additional funding opportunities<sup>6</sup>. During this process of aligning more closely with EbA, existing, non-EbA programmes must ensure they adhere to EbA safeguards<sup>6</sup> to avoid adverse outcomes or maladaptation. An additional aspect that needs to be considered is the scale at which existing programmes currently operate. EbA is more efficient and effective at the catchment or landscape scale, whereas some Expanded Public Works programme can be isolated within the broader landscape and relatively short-term<sup>7</sup>. This may require scaling up of these nature-based approaches, and implementing these over longer time scales, to maximise their potential in realising EbA principles.

## Conclusion

At its core, EbA aims to use biodiversity and ecosystem services to help communities become more resilient and adaptable to climate change impacts. It is an approach to sustainable development that offers multiple co-benefits, differentiating it from similar climate change and nature-based approaches. By building on already existing approaches, including successful NRM programmes in South Africa, EbA has the potential to support South Africa's overall climate change adaptation and development strategy.

However, there are limits and challenges to EbA implementation<sup>14</sup>. With complex sustainability challenges, there is no single best approach and it is important to identify the context and particular development challenge, and then consider the spectrum of adaptation options available. Increasingly, multi-pronged approaches are advocated. EbA should thus form part of a broader adaptation strategy by integrating it into decision making, planning and implementation from local to national levels through engagement of multiple stakeholders and through looking for opportunities to work with and build on what we already have.



**Clearing of alien invasive vegetation by Working for Water is an intervention that is aligned with EbA goals. Leveraging the success of programmes such as these can help to mainstream EbA implementation in South Africa.** Pic: Alana Rebelo

## References

1. Munang R, Thiaw I, Alverson K, Mumba M, Liu J, Rivington M. Climate change and Ecosystem-based Adaptation: a new pragmatic approach to buffering climate change impacts. *Curr Opin Environ Sustain*. 2013; 5(1):67-71.
2. Campbell A, Kapos V, Scharlemann JPW, Bubb P, Chenery A, Coad L, et al. Review of the literature on the links between biodiversity and climate change: Impacts, Adaptation and Mitigation: Secretariat of the Convention on Biological Diversity; 2009. Available from: <https://www.cbd.int/doc/publications/cbd-ts-42-en.pdf>
3. Midgley G, Marais S, Barnett M, Wågsæther K. Biodiversity, climate change and sustainable development – harnessing synergies and celebrating successes; 2012. Available from: [http://siteresources.worldbank.org/INTBIODIVERSITY/Resources/Biodiversity\\_Climate\\_Change\\_and\\_Sustainable\\_Development\\_Harnessing\\_Synergies\\_and\\_Celebrating\\_Successes.pdf](http://siteresources.worldbank.org/INTBIODIVERSITY/Resources/Biodiversity_Climate_Change_and_Sustainable_Development_Harnessing_Synergies_and_Celebrating_Successes.pdf)
4. Secretariat of the Convention on Biological Diversity. Connecting biodiversity and climate change mitigation and adaptation: report of the second ad hoc technical expert group on biodiversity and climate change. Montreal, Technical Series No. 41; 2009. Available from: <https://www.cbd.int/doc/publications/cbd-ts-41-en.pdf>
5. Department of Environmental Affairs and South African National Biodiversity Institute. Strategic framework and overarching implementation plan for ecosystem-based adaptation (EbA) in South Africa: 2016 – 2021. Department of Environmental Affairs, Pretoria, South Africa; 2016.
6. Department of Environmental Affairs and South African National Biodiversity Institute. Guidelines for ecosystem-based adaptation (EbA) in South Africa. Department of Environmental Affairs, Pretoria, South Africa; 2017.
7. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH. Entry points for mainstreaming ecosystem-based adaptation. The case of South Africa; 2018.
8. Pasquini L, Cowling RM. Opportunities and challenges for mainstreaming ecosystem-based adaptation in local government: evidence from the Western Cape, South Africa. *Environ Dev Sustainability*. 2015; 17(5):1121-40.
9. Reid H. Ecosystem- and community-based adaptation: learning from community-based natural resource management. *Clim Dev*. 2016; 8(1):4-9.
10. CARE Netherlands and Wetlands International. A landscape approach for disaster risk reduction in 7 steps; 2017. Available from: [https://careclimatechange.org/wp-content/uploads/2018/05/CARE\\_WI-A-Landscape-Approach-for-DRR-in-7-Steps-1.pdf](https://careclimatechange.org/wp-content/uploads/2018/05/CARE_WI-A-Landscape-Approach-for-DRR-in-7-Steps-1.pdf)
11. Nel JL, Le Maitre DC, Nel DC, Reyers B, Archibald S, van Wilgen BW, et al. Natural Hazards in a Changing World: A Case for Ecosystem-Based Management. *PLoS one*. 2014; 9(5):e95942.
12. Chishakwe N, Murray L, Chambwera M. Building climate change adaptation on community experiences: Lessons from community-based natural resource management in southern Africa; 2012. Available from: <http://pubs.iied.org/pdfs/10030IIED>.

13. Neshhöver C, Assmuth T, Irvine KN, Rusch GM, Waylen KA, Delbaere B, et al. The science, policy and practice of nature-based solutions: An interdisciplinary perspective. *Sci Total Environ*. 2017; 579:1215-27.

14. Roberts D, Boon R, Diederichs N, Douwes E, Govender N, McInnes A, et al. Exploring ecosystem-based adaptation in Durban, South Africa: "learning-by-doing" at the local government coal face. *Environment and Urbanization*. 2012; 24(1):167-95.

15. Golder Associates. Community-based Adaptation to Climate Change in Durban – Final Report. Report Number: 11977-10286-9; 2011. Available from: [http://www.durban.gov.za/City\\_Services/development\\_planning\\_management/environmental\\_planning\\_climate\\_protection/Publications/Documents/FINAL\\_Community\\_Based\\_Adaptation\\_Report.pdf](http://www.durban.gov.za/City_Services/development_planning_management/environmental_planning_climate_protection/Publications/Documents/FINAL_Community_Based_Adaptation_Report.pdf)

16. Reid H, Bourne A, Muller H, Podvin K, Scorgie S, Orindi V, et al. Chapter 16 - A Framework for Assessing the Effectiveness of Ecosystem-Based Approaches to Adaptation. In: Zommers Z, Alverson K, editors. *Resilience*; Elsevier; 2018. p. 207-16.

17. Reid H, Scorgie S, Halcyone M, Bourne A. Ecosystem-based approaches to adaptation: strengthening the evidence and informing policy. Research results from the Climate Resilient Livestock Production on Communal Lands project, South Africa; 2018. Available from: <http://pubs.iied.org/17622IIED>.

18. Doswald N, Munroe R, Roe D, Giuliani A, Castelli I, Stephens J, et al. Effectiveness of ecosystem-based approaches for adaptation: review of the evidence-base. *Clim Dev*. 2014; 6(2):185-201.

19. Nalau J, Becken S, Mackey B. Ecosystem-based Adaptation: A review of the constraints. *Environ Sci Policy*. 2018; 89:357-64.

20. Richardson DM, Van Wilgen BW. Invasive alien plants in South Africa: how well do we understand the ecological impacts? *S Afr J Sci*. 2004; 100(1-2):45-52.

21. van Wilgen BW, Forsyth GG, Prins P. The management of fire-adapted ecosystems in an urban setting: the case of Table Mountain National Park, South Africa. *Ecology and Society*. 2012; 17(1).

22. van Wilgen BW, Reyers B, Le Maitre DC, Richardson DM, Schonegevel L. A biome-scale assessment of the impact of invasive alien plants on ecosystem services in South Africa. *J Environ Manage*. 2008; 89(4):336-349.

23. Le Maitre DC, Forsyth GG, Dzikiti S, Gush MB. Estimates of the impacts of invasive alien plants on water flows in South Africa. *Water SA*. 2016; 42(4):659-72.

24. Department of Environmental Affairs. Long-Term adaptation scenarios flagship research programme (LTAS) for South Africa. Climate trends and scenarios for South Africa. Pretoria, South Africa; 2013.



**Contact:**  
Sheona Shackleton  
[sheona.shackleton@uct.ac.za](mailto:sheona.shackleton@uct.ac.za)