



# Southern Africa's Dryland Forests and Climate Change Adaptation

## RECOMMENDATIONS

- Climate change adaptation must be the objective underpinning all future development planning, and investment in EbA (ie, the maintenance and restoration of ecological infrastructures) must be the foundation of all adaptation policy implementation.
- Natural forests ('natural capital') must be full-cost accounted in terms of biodiversity, ecosystem service, and mitigation and adaptation contribution, recognising the unique and more vulnerable nature of dryland forests.
- Implementation policy must aim to create, restore and maintain connectivity and corridors between areas of dryland forests, expanding these areas into a 'complete landscape' to enable climate-driven species responses, resilience and continued provision of ecosystem services.
- Incentivising and enabling community-based management of local ecosystems to build local ownership, adaptive capacity, 'citizen-science' monitoring, and resilience to climate change is required; and given the rate of environmental change, significant investments in IT infrastructure for real-time data gathering and monitoring are imperative.

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## EXECUTIVE SUMMARY

The interior of Southern Africa, encompassing significant areas of drylands, will be severely impacted by climate change. The region rapidly needs to implement proactive adaptation policies to pre-empt the worst of these impacts. This requires a clear focus on the unique yet vulnerable attributes of dryland forests as integral to wide-ranging ecosystems providing a variety of socio-economic benefits and services. These dryland forests are, however, already severely degraded from competing land uses and from over-use. To maintain and enhance their contribution to climate change adaptation requires implementing policies that incorporate full-cost accounting of natural capital; investment in restoration of degraded systems; enhancing connectivity for biodiversity responses as climate envelopes move; real-time research and monitoring; and incentivising and enabling community-based management to build local adaptive capacity and resilience to climate change. Specific guidance on the need to deliver livelihood benefits beyond climate change adaptation is crucial.

## CLIMATE CHANGE IMPACTS IN SOUTHERN AFRICA

Climate trends in Southern Africa show a clear pattern of rising temperatures, with statistically significant changes in rainfall.<sup>2</sup> The interior, the area that largely encompasses dryland forests as its dominant natural vegetation cover, faces temperature increases of up to 3°C by mid-century and 6°C by 2100.<sup>3</sup> The effects of these changes are already being felt and biodiversity has responded with significant recorded shifts in species ranges. Most species, however, 'will not be able to keep pace with the velocity of climate change' and will suffer severe reductions in range.<sup>4</sup> Broadly speaking, climatic warming will result in fewer growing days (due to lower soil moisture availability), more fires, the

spread of invasive alien species and increasing disease outbreaks as pests expand their range. More frequent extreme weather will include increased droughts and more extreme rainfall events, the effects of which on soil erosion, infrastructure damage and reduced water retention will be exacerbated by a decline in vegetation cover. Overall, dryland people and ecosystems in Southern Africa are extremely vulnerable to climate change.<sup>5</sup>

Most climate change responses in the forest sector in Southern Africa so far have focused on mitigation. Despite recent progress in defining adaptation strategies for forests and rangelands, dryland forests have not been accorded the attention that their unique yet vulnerable attributes and important potential contribution demands. Despite the recognition that forests can play a key role in adaptation, existing regional policies and national strategies do not yet adequately reflect the diverse needs of these ecosystems and the people who depend on them. In terms of adaptation, non-timber forest products in particular constitute important safety nets and are used to diversify income as part of adaptive strategies.<sup>6</sup> Although current policies lack focused adaptation strategies for dryland forests, adaptation initiatives exist through which to establish the required regional and national policy focus.<sup>7</sup>

Successful adaptation requires a transformative redirection of development planning into investment in ecological infrastructures, that is, in the landscape and biodiversity buffers that will nurture biotic responses, attenuate the impact of extreme events, maintain soil productivity, and sequester carbon. Implemented through local governance systems, this can help create income streams in the form of payment for ecosystem services (PES) to local communities. PES is already proving a valuable alternative livelihood, especially where agriculture is no longer viable.<sup>8</sup> The best adaptation strategies are those that form part of a wider consideration of cumulative socio-economic benefits, going beyond responses to climate change, rather than simple sectoral, stand-alone investments.

Southern Africa is undergoing rapid transformation in terms of land use, most importantly through population and agricultural growth, urbanisation and the extractive industries. Swathes of formerly intact natural vegetation have been – and are still being – converted to agriculture, towns and mines, in a haphazard fashion. Large tracts of dryland forest

are logged for timber and wood-fuel or simply cleared for other land uses, including opening up previously inaccessible areas for extractive purposes.<sup>9</sup> Biotic adaptation through migration in response to climate drivers is severely compromised by such landscape fragmentation.

## ADAPTATION OF DRYLAND FORESTS TO CLIMATE CHANGE

Southern Africa's dryland forests are broadly defined as those woodlands dominated by tree species in the sub-family *Ceasalpinoidea* that make up the Miombo and Kalahari Woodland biomes. The former predominate in Malawi, Mozambique, Tanzania, Zambia, Zimbabwe and much of Angola and the south-east of the Democratic Republic of Congo; the latter cover large parts of northern Namibia, southern Angola, northern Botswana, north-western Zimbabwe and western Zambia.<sup>10</sup>

These dryland forests are, and will be, severely impacted by climate change.<sup>11</sup> Adaptation requires a complete transformation of dryland forestry management. Integrated development planning using climate change projections as the basis for all decision making is imperative. Forests cannot be managed without consideration of all those other sectors previously regarded as competing for access to land, water and other resources but now increasingly recognised as dependent on the kind of natural capital and ecosystems services provided by dryland forests, including carbon sequestration. Secondly, adaptation requires a clear application of the precautionary principle to pre-empt unintended negative consequences of activities in other sectors that compromise ecosystem services. For example, the invasion by alien timber species is expected to increase with climate change, making adaptation more difficult and costly.

The plant communities that comprise dryland forests – and other biomes – are already responding to climatic signals, yet individual species are not reacting in equal ways, thus creating a new mix of species at any given location. It is not yet known how this 're-mixing' will play out.<sup>12</sup> Real-time monitoring of changes is necessary to understand which species are best able to adapt, taking into account their ability to disperse, to cross barriers such as roads, agricultural monocultures and urban areas, and the response by their respective pollinators and seed dispersal vectors. Adaptation will

also need to focus on 'clearing' migration paths in order to enable optimum biodiversity responses. This requires a 'complete landscape' approach, much broader than the limited concept of 'escape corridors' linking key forest reserves.

At present SADC forestry policies are largely sector-based, which hampers the shift to the integrated, cross-sectoral approach that is necessary on both regional and national scales. The Protocol on Forestry<sup>13</sup> remains the overarching policy framework within which member states co-operate to protect, manage and utilise their forests, and the Forestry Strategy provides an implementation framework to 'promote the active protection, management and sustainable use of forest resources ... in order to enjoy the multiple benefits of forests in perpetuity'. These documents make it clear that member states are committed to sustainable management of their forests and in particular the Strategy recognises the importance of forests to the region, noting that their values 'far exceed timber and are in themselves important enough to warrant [their] management and protection'. Nevertheless, neither provides sufficient specific adaptation guidance on managing the more vulnerable dryland forests. For this, far greater investment is required in national and regional information technology (IT) and data gathering infrastructures, institutions and human resources – essentially in 'real-time', using remote sensing<sup>14</sup> – as well as building local communities' capacity to conduct 'citizen science' monitoring.

Importantly for cross-sectoral adaptation planning, the Forestry Strategy 'fully recognizes the principles contained in the SADC Biodiversity Strategy', which emphasises that 'about 66% of citizens live in rural areas where they depend on natural resources for survival. This underlines the overriding importance of biological resources in southern Africa.' In return, the Biodiversity Strategy,<sup>15</sup> in recognising the severe implications of climate change and the need for adaptation, stresses that this 'underscores the need to maintain as much forest cover as possible'. In reality this means expanding ecological infrastructures to enable Ecosystem-based Adaptation (EbA),<sup>16</sup> and is evidenced by growing recognition of the importance of 'trees outside forests', for example those found on homesteads, degraded lands and in mixed agricultural systems. Existing successes in local tree-planting need to be replicated, expanded, and further incentivised: 'protection and sustainable

use needs to be decentralized and equitable for it to be effective'.<sup>17</sup> Specific adaptation guidance for dryland forests is, however, missing.

## THE ROLE OF DRYLAND FORESTS IN ASSISTING ADAPTATION TO CLIMATE CHANGE

Successful adaptation must simultaneously achieve synergies along with socio-economic benefits and biodiversity and ecosystem conservation.<sup>18</sup> Life-supporting ecosystem services are best provided by intact, fully functioning ecological infrastructures. Maintaining and enhancing the provision of ecosystem services will be vital to enable local livelihoods and limit urban migration. An estimated 100 million people currently rely on Miombo woodlands as a source of energy. Agro-forestry (ie, combining trees and shrubs with crops or livestock) has been proven to reduce crop vulnerability to climate variations.<sup>19</sup>

Local communities will need help if they are to understand the velocity of climate change, gather and analyse relevant local information on biodiversity change, and from the outset 'own' adaptation plans to 'grow' ecological infrastructures. For dryland forests this will include planning and planting tree, medicinal plant and fodder species nurseries to meet community needs. Successful adaptation will include seed dispersal and planting up, expanding and maintaining dryland forest patches and connectivity, 'farming' pollinators, combating disease vectors and unplanned fires (for which a detailed regional programme has been developed) and encouraging the use of more drought-tolerant varieties. Intact dryland forests play a vital part in enhancing local community and ecosystem resilience. Their effects include disaster risk reduction from extreme storm events; improving water retention for longer flows and prevention of soil erosion; ameliorating the scarcity of fodder for livestock; and providing a source of building materials for destroyed infrastructure.

## POLICY IMPLICATIONS FOR SADC

The extent and pace of land use and climate change demands a revision of current policies concerning natural resources in general and the vulnerable dryland forests in particular. Policies cannot remain sector specific but must instead become more integrated.

Short-term economic prioritisation is to be avoided if these ecosystems are to continue providing life-sustaining services and non-market benefits.

Deforestation in the SADC region is a major concern, with annual net forest loss in the period 2005–2010 recorded at 1.8 million ha annually.<sup>20</sup> Adaptation policies must be linked to climate change mitigation measures addressing such a level of loss, and expedite the adoption of international climate finance programmes that could facilitate the adaptation of dryland forests and associated local communities to climate change by reducing pressures on these resources, enhancing connectivity and increasing resilience. It is imperative that specific guidance is offered on integrating adaptation with mitigation through an approach that combines socio-economic needs and ecosystem function.

Establishing fully functional ecological infrastructures as the foundation of adaptation objectives is critical to reducing system vulnerability and enhancing livelihoods. Incorporating local communities into decision-making and the subsequent management of local resources is the simplest, most cost-effective and necessary policy change. Development planning thus far has involved the use and conversion of ecosystems without accounting for this natural capital, an approach that has resulted in the loss of necessary ecosystem services and compromised the ability of communities to sustain themselves. Future development policies must ensure full-cost accounting of natural capital, in the form of both existing and investment capital: this means strengthening ecological infrastructures for continued delivery of vital ecosystem services in the face of increasingly volatile and extreme events and of rapidly changing landscapes and biota. 'Increasingly, restoration of terrestrial, inland water and marine ecosystems will be needed to re-establish ecosystem functioning and the provision of invaluable life-support services.'<sup>21</sup>

## ENDNOTES

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