

BIOME-LEVEL IMPLEMENTATION PLANS FOR THE **BIODIVERSITY AND ECOSYSTEMS SECTOR CLIMATE CHANGE ADAPTATION STRATEGY**



**forestry, fisheries
& the environment**

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BIOME-LEVEL IMPLEMENTATION
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**BIODIVERSITY AND ECOSYSTEMS
SECTOR CLIMATE CHANGE
ADAPTATION STRATEGY**

JULY 2024

Jane Turpie, Gwyn Letley and Johanna Bruhl

Preface and acknowledgements



The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH is supporting the Department of Forestry, Fisheries and the Environment (DFFE) in developing a biome-focused **Implementation Plan for the Adaptation Strategy for South Africa's Biodiversity and Ecosystems Sector** (also referred to as the Biodiversity Adaptation Strategy), and to develop a **Strategy and Implementation Plan for EbA**. This is part of its Climate Support Programme to support the DFFE in developing climate change policies and implementation plans for the biodiversity and ecosystems sector. Anchor Environmental Consultants was commissioned to undertake these two activities, which were conducted in parallel with the expectation that this will allow the plans to capitalise on their mutual synergies and achieve more efficient outcomes.

This consolidated final report follows from a consultative process in all nine provinces on the initial draft biome-level implementation plans and proposed governance arrangements. The final national implementation plan is accompanied by a socio-economic impact analysis.

The authors are grateful to the project steering committee members and to the stakeholders who provided valuable insights during one-on-one meetings. We are also grateful to the numerous stakeholders who attended workshops in each of the nine provinces and for the feedback provided.

Jane Turpie, Gwyn Letley and Johanna Bruhl

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Abbreviations and acronyms

ARC	Agricultural Research Council
ARDFS	Department of Agriculture and Rural Development Free State
BES	Biodiversity and Ecosystems Sector
BotSoc	Botanical Society of South Africa
CBA	Critical Biodiversity Area
CBD	Convention on Biological Diversity
CCVAAS	Climate Change Vulnerability Assessment and Adaptation Strategy
 CMA	Catchment Management Agency
CSA	Conservation South Africa
CSIR	Council for Scientific and Industrial Research
DAEARDLR	Department of Agriculture, Environmental Affairs, Rural Development & Land Reform
DALRRD	Department of Agriculture, Land Reform and Rural Development
DBSA	Development Bank of Southern Africa
DEA	Department of Environmental Affairs (now DFFE)
DEFF	Department of Environment, Forestry and Fisheries (now DFFE)
DFFE	Department of Forestry, Fisheries and the Environment
DPME	Department of Planning, Monitoring and Evaluation
DRDAR	Eastern Cape Department of Rural Development and Agrarian Reform
DTIC	Department of Trade, Industry and Competition
DWS	Department of Water and Sanitation
EbA	Ecosystem-based Adaptation
ECPTA	Eastern Cape Parks and Tourism Agency
ESA	Ecological Support Areas
EWI	Endangered Wildlife Trust
FPA	Fire Protection Agency
GBF	Global Biodiversity Framework
GCTWF	Greater Cape Town Water Fund
GDARD	Gauteng Department of Agriculture and Rural Development
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
H4H	Herding for Health Initiative
IAPs	Invasive Alien Plants
IOCB	Indian Ocean Coastal Belt
IPCC	Intergovernmental Panel on Climate Change
KZNDARD	KZN Department of Agriculture and Rural Development
LDARD	Limpopo Department of Agriculture and Rural Development
LTAS	Long Term Adaptation Scenarios
MBSP	Mpumalanga Biodiversity Sector Plan
MTPA	Mpumalanga Tourism and Parks Agency
MTSF	Medium Term Strategic Framework
Nbs	Nature-based Solutions

NbS/A/O/I/M	Nature-based Approaches/Options/Interventions/Measures
NBSAP	National Biodiversity Strategy and Action Plan
NCCAS	National Climate Change Adaptation Strategy
NCCRP	National Climate Change Response Policy
NDC	Nationally Determined Contribution
NDP	National Development Plan
NWDARD	North West Department of Agriculture and Rural Development
OECSs	Other Effective Conservation Measures
PPF	Peace Parks Foundation
SAEON	South African Environmental Observation Network
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SAWS	South African Weather Service
SEIA	Socio-Economic Impact Assessment
Stats SA	Statistics South Africa
SWPN	Strategic Water Partners Network
UNFCCC	United Nations Framework Convention on Climate Change
WBLU	Wildlife-based land uses
WUA	Water User Association
WWF-SA	World Wide Fund for Nature South Africa

1. Introduction

Background and rationale

Biodiversity is under threat from a range of proximate pressures, including land use change, overexploitation, hydrological alteration, invasive alien species and pollution. In recent years, a relatively new threat – climate change – has entered the arena and has now become a significant, growing threat that has contributed to what is now being referred to as a global biodiversity crisis. All of these threats not only exacerbate one another, but are growing exponentially, driven by growth in population and consumption. The potential demise of biodiversity is not only an ethical issue – because of society's enduring dependence on functioning and productive ecosystems and the services they supply – but also an economic development issue and, for some, a survival issue. Moreover, intact biodiversity helps to buffer people from the effects of droughts, storms and heat on infrastructure, services, homes and livelihoods. Conversely, biodiversity loss leaves people more exposed to these impacts.

South Africa recognises these threats and has made efforts to consider (a) how we can achieve our biodiversity conservation obligations under climate change, (b) how we can strategically restore and maintain ecosystem health in areas that might improve the resilience of communities that are particularly exposed and vulnerable to climate change effects, and (c) how we can restore and maintain ecosystem health to contribute to the mitigation of greenhouse gas emissions. The first focuses on maintaining sufficiently large and interconnected, representative, healthy natural ecosystems to ensure the continued existence of species, ecosystems and the capacity to supply ecosystem services into perpetuity. The second focuses on managing nature to enhance people's resilience to climate change impacts and can be referred to as ecosystem-based adaptation (EbA), while the third focuses on how ecosystem management can help to reduce atmospheric carbon dioxide and can be referred to as ecosystem-based mitigation (EbM). These three components are strongly interconnected, but while the overall mechanisms for achieving them are likely to be similar, the spatial priorities for each of these objectives will differ to an extent. For example, biodiversity protection goals will include remote areas, while providing certain valuable ecosystem services will tend to prioritise the conservation of natural systems that are closer to farming areas and urban centres.

South Africa has considered these three areas concerning management of biodiversity under climate change:

- A strategy for dealing with climate change threats to biodiversity was developed under the recently revised ***Biodiversity and Ecosystems Sector Climate Change Vulnerability Assessment and Adaptation Strategy*** (Turpie et al., 2021);
- The process of identifying priority areas and actions for managing ecosystems in the interests of increasing human resilience was planned out in the ***Strategic Framework and Overarching Implementation Plan for Ecosystem-based Adaptation in South Africa 2016-2021*** (DEA & SANBI, 2016) and the ***EbA Action Plan and Priority Mapping*** report in 2019 (DEFF, 2019); and
- EbM is included as part of the country's **Intended Nationally Determined Contribution (INDC)** to reducing global carbon emissions (RSA, 2016).

These climate-focused strategies, developed as part of the country's obligations under the United Nations Framework Convention on Climate Change (UNFCCC), overlap in scope with the country's existing obligations for biodiversity conservation and ecosystem restoration under the UN Convention for Biological Diversity (UNCBD) and the UN Convention on Combating Desertification (UNCCD), the targets for which are outlined in the National Biodiversity Strategy and Action Plan (Government of South Africa, 2015 – due to be updated to accommodate the Post-2020 Global Biodiversity Framework targets), and the specified Land Degradation Neutrality targets, respectively.

The importance of climate change adaptation planning in the Biodiversity and Ecosystems Sector was initially recognised in the **National Climate Change Response Policy (NCCRP)** (South African Government, 2011; Table 1). This was followed by a high-level Biome Vulnerability Assessment by the then Department of Environmental Affairs (DEA) in 2012, which was further developed in the **Long-Term Adaptation Scenarios (LTAS 2013) Flagship Research Programme for South Africa** (Department of Environmental Affairs, 2013a, 2013b). In 2014, the DEA published the **Biodiversity Sector Climate Change Response Strategy** (DEA, 2014), which included mitigating threats in important biodiversity areas, increasing knowledge of ecosystem values, identifying areas of importance for ecosystem-based adaptation (EbA), integrating climate change data into management plans, expanding and enhancing the protected area network and its connectivity, improving management of biodiversity both *in situ* and *ex situ*, and enhancing monitoring and research. The report highlighted a lack of comprehensive assessments of climate change impacts on ecosystems and ecosystem services. The **Climate Change Adaptation Plans for South African Biomes** (Department of Environmental Affairs, 2015) reviewed the threats to biodiversity in each terrestrial biome and proposed some adaptive measures, including spatial planning, resource management, restoration, and conservation estate expansion.

During the same period, South Africa produced three important documents on EbA, which emphasised people-centred approaches to achieving biodiversity conservation goals (Table 1). The **Strategic Framework and Overarching Implementation Plan for Ecosystem-based Adaptation in South Africa 2016-2021** (DEA & SANBI, 2016) provided a roadmap for five years and was accompanied by **EbA Guidelines** (DEA, 2018a) in 2017, and an **EbA Action Plan and Priority Mapping** report in 2019 (DEFF, 2019). The latter identified priority areas for EbA based on anticipated climate-induced vulnerability and the potential to reduce it through ecosystem-based approaches. To do this, critical regions for water supply, tourism, rangelands, biodiversity, and carbon were mapped in relation to demand and risks, using predicted changes in Southern African biome extent as a measure of climate change risk to local municipal ecosystems. The main drivers of ecosystem degradation, appropriate responses, and implementing agents were identified for each priority area.

The **National Climate Change Adaptation Strategy (NCCAS)** was approved by Cabinet in August 2020 (DFFE, 2020a). This ten-year plan promotes the integration of climate change adaptation response across all sectors, including the Biodiversity and Ecosystems Sector. It describes nine sets of interventions to: 1) increase human and ecosystem resilience, 2) develop monitoring systems for key sectors and areas, 3) develop a comprehensive vulnerability and resilience framework, 4) mainstream the responses into sectoral planning, 5) support technological developments, 6) raise capacity and awareness, 7) establish integrated governance and legislative processes, 8) raise financing, and 9) develop monitoring and evaluation of adaptation actions. However, the details and locations of these actions are not provided. The NCCAS promotes sustainable agriculture, climate-smart natural resource management and restoration, protection and conservation of the most vulnerable ecosystems, and addressing invasive species.

These are expanded on in the **Biodiversity and Ecosystems Sector Climate Change Vulnerability Assessment and Adaptation Strategy** (Biodiversity Adaptation Strategy; DFFE, 2023), which updated the previous assessments and strategy documents based on more recent estimates of climate change and impacts on vegetation. The focus of the biodiversity adaptation strategy was to develop a strategy to maximise the

persistence of South Africa's terrestrial and freshwater biodiversity under climate change, focusing on how this would vary across the different biomes. However, no detailed implementation plans for improving biodiversity resilience have been prepared to date.

TABLE 1: Key documents relating to this study. In column three are the acronyms or shortened titles used in this report for easier readability. Those in light grey have been superseded by more recent documents. Those marked with an asterisk are in the process of being revised.

YEAR OF PUBLICATION	DOCUMENT NAME	ABBREVIATION
2011	National Climate Change Response Policy	NCCRP
2012	Vulnerability Assessment of the Nine South African Biomes	Biome Vulnerability Assessment
2013	Long Term Adaptation Scenarios (LTAS) Flagship Research Programme for South Africa	LTAS
2014	Biodiversity Sector Climate Change Response Strategy	Biodiversity Response Strategy
2015	National Biodiversity Strategy and Action Plan 2015-2025	NBSAP
2015	Climate Change Adaptation Plans for South African Biomes	Biome Adaptation Plans
2016	Strategic Framework and Overarching Implementation Plan for Ecosystem-based Adaptation in South Africa 2016-2021	EbA Strategy*
2017	Guidelines for Ecosystem-based Adaptation in South Africa	EbA Guidelines
2019	Ecosystem-based Adaptation Action Plan and Priority Mapping	EbA Action Plan*
2020	National Climate Change Adaptation Strategy	NCCAS
2021	Biodiversity and Ecosystems Sector Climate Change Vulnerability Assessment and Adaptation Strategy	Biodiversity Adaptation Strategy

Biome-level targets and provincial-level implementation

The biodiversity adaptation targets for the terrestrial and freshwater realms are set out at the level of biomes, because these form natural groupings in terms of types of biodiversity, threats, conservation targets and conservation measures. While their definition has varied over time, the current official classification recognises nine terrestrial biomes: Albany Thicket, Desert, Forest, Fynbos, Grassland, Indian Ocean Coastal Belt, Nama-Karoo, Succulent Karoo, and Savanna (Figure 1, Table 2). Rivers and wetlands are included in the respective biomes in this document (some being incorporated in the 'azonal vegetation' class shown on the map). It is important to note that while these biomes are projected to shift considerably over the period 2020 to 2100 (Higgins *et al.*, n.d.; Turpie *et al.*, 2021), negligible change is expected to have taken place over the next ten years, and therefore it is deemed acceptable to plan the activities over this period (2025-2034) within the current boundaries.

Although the plans are biome-focused, their implementation will be by national and provincial institutions, in particular the provincial departments and authorities responsible for conservation. Therefore, it is important to recognise that the targets for each biome will be the joint responsibility of multiple provinces, and vice versa.

The relationship between biomes and provinces is summarised in Table 2. A third of the country falls within the Savanna biome, which covers just under 395 000 km². Most of this biome falls within the provinces of Limpopo, Northern Cape and North West. The Grassland biome covers close to 332 000 km² (28%) of South Africa, mostly within the Free State, the Eastern Cape, KwaZulu-Natal and Mpumalanga. The Nama-Karoo covers just under 250 000 km² of the country, mostly in the Northern Cape (74%) and the Eastern Cape (12%). The Succulent Karoo, which covers 7% of South Africa, is found in the Northern Cape and Western Cape. Fynbos covers just 7% of South Africa and is found mostly within the Western Cape, as well as in the Eastern Cape and Northern Cape. The remaining biomes, Indian Ocean Coastal Belt (78% in KwaZulu-Natal), desert (100% in the Northern Cape) and forest (patches scattered across the country), make up less than 3% of the South African mainland. Thus, most provinces contain a variety of biomes, with the highest diversity being in the Eastern Cape, Northern Cape and Western Cape (Table 2).

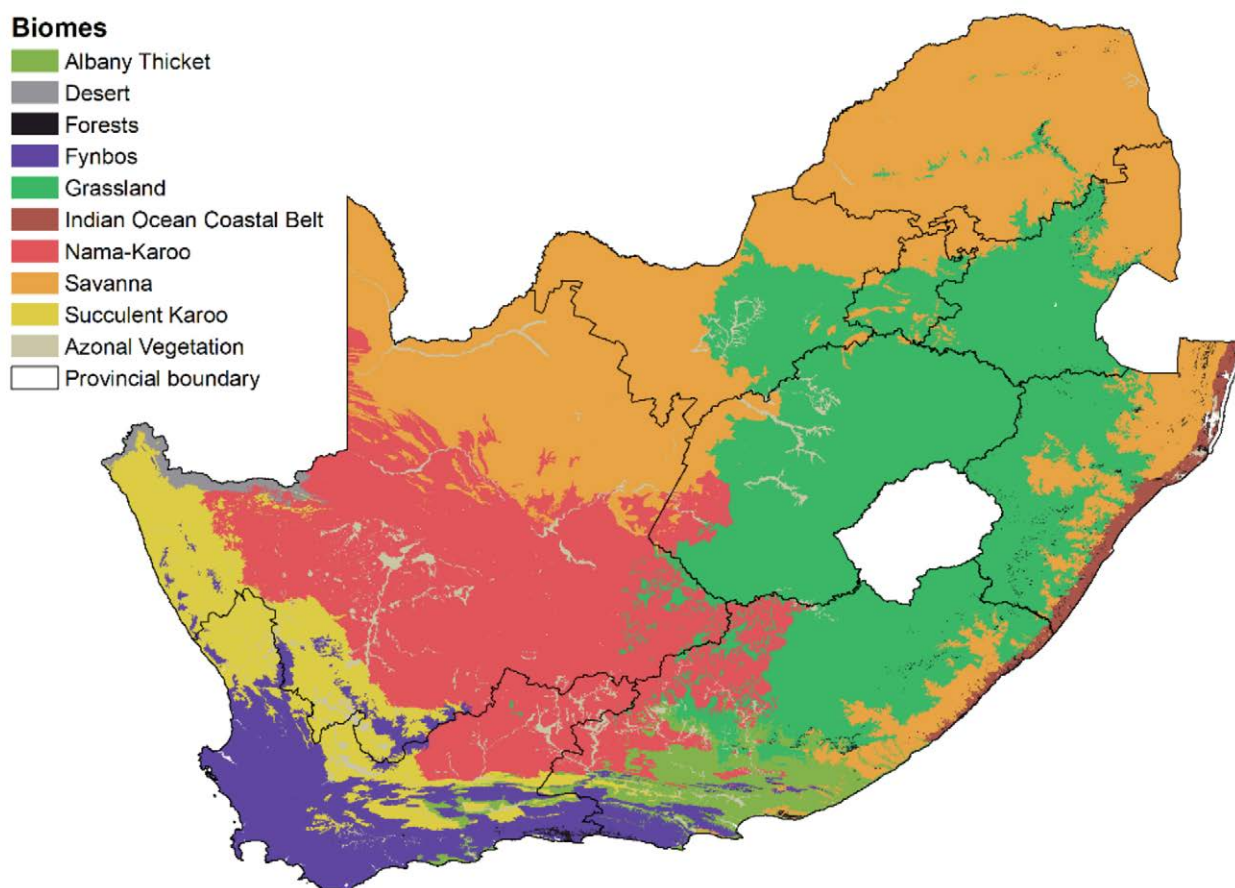


FIGURE 1: Biomes of the South African mainland. Data Source: SANBI, 2018[a or b?].

TABLE 2: The extent (in km²) of each biome within each province. IOCB = Indian Ocean Coastal Belt.

PROVINCE	FOREST	SAVANNA	GRASSLAND	IOCB	SUCCULENT KAROO	NAMA-KAROO	ALBANY THICKET	FYNBOS	DESERT
Eastern Cape	1 312	17 197	70 304	2 576	1 740	29 231	31 780	10 363	-
Free State	6	8 875	109 798	-	-	7 893	-	-	-
Gauteng	-	6 055	12 123	-	-	-	-	-	-
KwaZulu-Natal	2 077	30 120	50 819	9 116	-	-	-	-	-
Limpopo	261	120 970	3 903	-	-	-	-	-	-
Mpumalanga	403	26 787	49 292	-	-	-	-	-	-
Northern Cape	3	111 541	4 139	-	48 654	184 765	-	6 472	6 263
North West	6	72 558	30 325	-	-	-	-	-	-
Western Cape	641	-	148	-	27 813	27 462	3 527	64 818	-

Governance

The governance arrangement for meeting biome-level targets was based on a review of the existing government structures as well as experiences of multi-stakeholder governance of biome-, ecosystem- or catchment-level conservation programmes in South Africa, such as the Cape Action Plan for the Environment (C.A.P.E.). Potential options were tabled and debated during the stakeholder process. Two options were considered: (a) provincial-focused governance that makes use of existing government structures (see Box 1), or (b) biome-focused governance that involves setting up new structures to coordinate actions across provinces. It was generally agreed that the plans would be more efficiently executed through existing structures, which will also allow alignment with existing mandates. This outcome requires specific allocation of biome-level targets across provinces, which has been incorporated as one of the first steps in implementation of the overall plan.

The governance structure needs to ensure effective engagement of existing players and clearly define roles and responsibilities. It needs to align with existing structures in the provinces and to ensure that there is no fragmentation of functions, for example that agriculture and environmental concerns are not addressed in isolation by different governmental departments. It needs to be ensured that there is intergovernmental and cross-sectoral interaction.

There are already a number of environmental management forums at provincial and district levels that meet regularly, such as quarterly. There are also existing forums that are focused on certain biomes or groups of biomes, such as the Fynbos Forum. These hold much expertise and institutional memory. In addition, SANBI has an existing structure focusing on biodiversity stewardship and DWS has one on interdepartmental inland water ecosystems which also involves NGOs. There are also species-specific groups, such as the Pelargonium Working Group (for sustainable harvesting of this species), which consists of members of DFFE, TRAFFIC, local communities, and various other stakeholders. The Western Cape stakeholders emphasised that in the Western Cape, nature conservation is part of the provincial authorities' responsibility and that they would want to continue driving this process.

Existing governmental working groups should be used to ensure government's constant engagement, including the Deputy Director General (DDG). It was proposed that the chairperson of Working Group 1 could become the convenor of the biome adaptation plans.

However, stakeholders did raise concerns that a provincial level governance structure for the implementation plan could run the risk of becoming too politically focused, emphasising economic development and job creation while losing the biodiversity and conservation focus. Continuous involvement of high-level government also needs to ensure that the biome-level plans are included in the Medium-Term Strategy Framework (MTSF) by the Department of Planning, Monitoring, and Evaluation (DPME), which will increase accountability and encourage action.

BOX 1: COOPERATIVE GOVERNANCE IN THE BIODIVERSITY SECTOR

The management and conservation of biodiversity transcends national, provincial and local government and cuts across many sectors. It is critical that the three spheres of government work together and support each other in achieving shared objectives. Intergovernmental structures are important for supporting cooperative governance across the three governmental spheres and across sectors. Those that are relevant to the biodiversity sector are briefly described below.

At the national level, the **President's Coordinating Council (PCC)** is the main coordinating body, which consists of the President, the Deputy President, key Ministers, Provincial Premiers and the South African Local Government Association (SALGA) (ETU, 2022). The PCC oversees the implementation of national policies and legislation, and ensures that national, provincial and local strategies and plans are well aligned. The **National Council of Provinces (NCOP)** represents the nine provinces and local government (through SALGA) in Parliament to ensure that they have a direct link and say in the national sphere of government (ETU, 2022).

Thematically, coordination in government takes place through executive and technical committees and working groups as mandated by the Intergovernmental Relations Framework Act (Act 13 of 2005). At the national level, each government department has an intergovernmental forum called **Minister and Members of Executive Councils (MEC) Committee (MINMEC)**, which is the structure set up to coordinate and facilitate cooperative governance between the national ministers and their respective counterparts at the provincial level (Government of South Africa, 2015; ETU, 2022). The environmental MINMEC comprises the Minister and Deputy Minister of DFFE, the Director-General of DFFE, and the provincial MECs for the environment. These meetings take place on a quarterly basis.

MINMECs are supported by **Ministerial Technical Committees (MINTECs)** that also meet quarterly. The MINTEC for the Environment facilitates coordination between DFFE, statutory bodies and provincial environmental departments, comprising the Director-General of DFFE (the Chair), CEOs of public entities and environmental authorities (e.g. SANBI and SANParks), and the heads of the provincial departments responsible for environmental management and biodiversity conservation. MINTEC considers all matters that require a MINMEC decision and agrees at a technical level before tabling them for consideration by MINMEC.

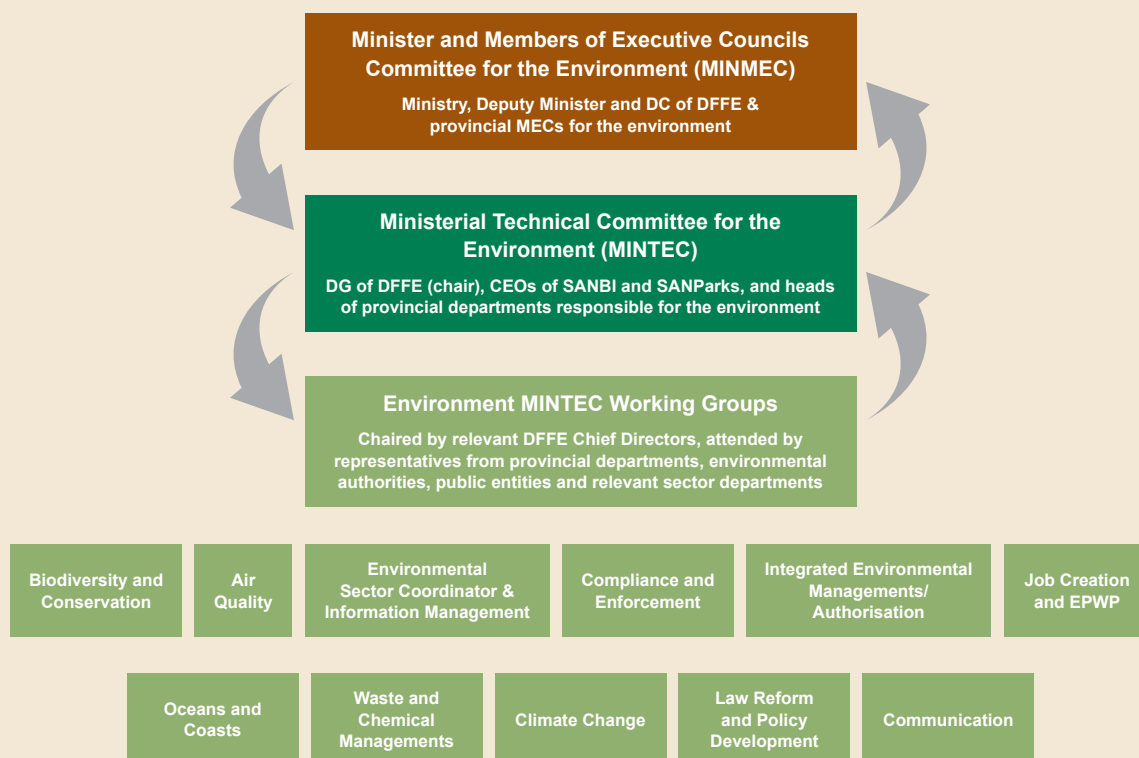


FIGURE 2: Mechanisms that ensure cooperative governance with the environment sector.

MINTECs are supported by Working Groups. The **Environment MINTEC Working Groups** are attended by representatives from concurrent provincial departments, environmental authorities, public entities and relevant sector departments. The working group meetings precede MINTEC meetings and are chaired by the relevant Chief Directors in DFFE (who lead the DFFE Branches). The working groups discuss issues that affect the sector and make recommendations to MINTEC and MINMEC. There are 11 Environment MINTEC Working Groups. Of particular relevance to this plan are **Working Group 1: Biodiversity and Conservation** and **Working Group 10: Climate Change**.

At the provincial level, the Premier is responsible for the coordination between national, provincial and local government in the province. This is achieved through the **Premier's Inter-governmental Forum (PIF)**, which consists of the Premier, provincial and local government MECs, and metropolitan and district mayors (ETU, 2022). The objective of the PIF is to ensure coordination and alignment of provincial and municipal development planning and the implementation of national and provincial policy and legislation.

Other interdepartmental and cross-sectoral collaborations include the **Committee on Environmental Coordination (CEC)**, which promotes the integration and coordination of environmental issues and environmental management across different sectoral departments and different spheres of government. The **Interdepartmental Committee on Inland Water Ecosystems** was established in 2011 and convenes twice a year by DWS to bring together all departments and authorities relevant to the management of freshwater ecosystems, including DFFE, SANBI and SANParks. The **South African Mining and Biodiversity Forum (SAMBf)**, which brings together stakeholders from industry, conservation organisations and government, aims to improve biodiversity conservation and management in the mining industry.

Logical framework

The implementation plans are developed using a logical framework (logframe) which provides a structured approach to design, plan, monitor and evaluate the programmes. Through a logframe, the project's objectives, outcomes, outputs and activities are defined (Figure 3; World Bank, 2000; DFID, 2011). The process of preparing the implementation plans involved comprehensive desk reviews of relevant documents and consultation with government stakeholders, research institutions, non-governmental organisations and cooperative networks regarding governance arrangements (see Appendix 2 for stakeholders consulted).

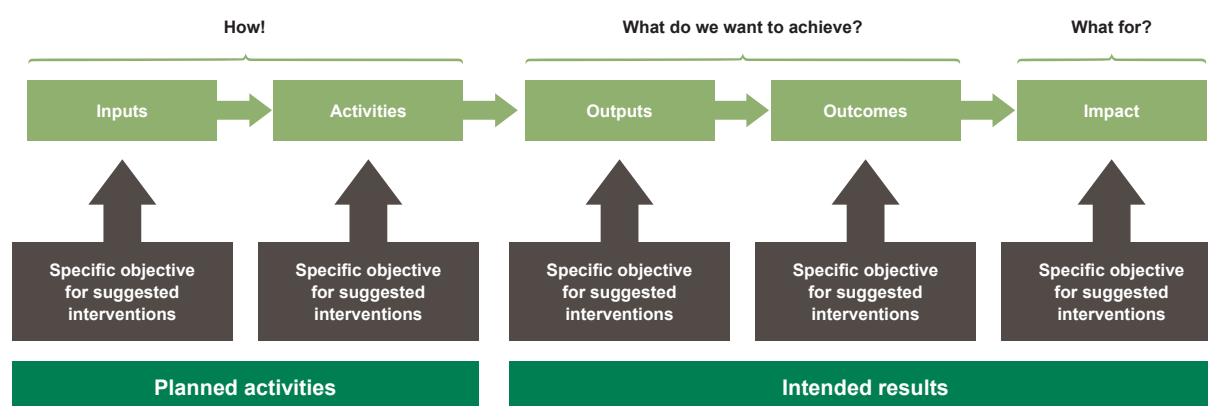


FIGURE 3: Results chain showing the link between inputs, activities and outputs with outcomes and a desired overall objective (or long-term goal).

Objectives, outcomes, outputs and activities are defined as follows:

- The **objectives** are the overall long-term goals that the suggested interventions contribute towards achieving (World Bank, 2000; DFID, 2011). Objectives are not only achieved through the specific interventions suggested here but also through other programmes and initiatives running in parallel with the adaptation plan.
- **Outcomes** are specific objectives for the suggested interventions and take their expected impact into account (World Bank, 2000; DFID, 2011). They identify what will change, and ongoing monitoring of progress with respect to outcome milestones should be done.
- **Outputs** are specific, direct deliverables and tangible results, and provide the conditions necessary to achieve the outcome.
- **Activities** are defined to achieve each output, and are supported with inputs such as human and financial resources (World Bank, 2000).

Linked to the activities, the plans identify the responsible actors, targets and potential sources of sustainable finance that could be leveraged to support ongoing implementation and will provide recommendations with regards to potential options identified.

The extent of the activities required for each biome was guided by the Biodiversity Adaptation Strategy report as well as the best available quantitative information and information from existing strategies and plans with overlapping mandates.

The objectives, outcomes, outputs and activities to be carried out were derived from the overarching principles and key measures suggested and described in detail in the Biodiversity Adaptation Strategy. The actions that need to be taken vary in emphasis and may differ slightly from biome to biome (see Table 4). However, given that the many actors (e.g. provincial authorities) would need to be involved with multiple biomes and that plans need to be consolidated and coordinated nationally, it was deemed important to ensure that the plans for each biome followed a similar structure. The suggested adaptation responses in the Biodiversity Adaptation Strategy report were therefore arranged into a generic structure of objectives, outcomes, outputs and activities, as outlined in the next section.

Targets, costing and financing options

Each of the activities and outputs of the plan is designed to achieve a specified target. Setting of targets has financial implications. In this plan, the overall targets are guided by existing related targets where applicable, as well as setting new targets where required. A high-level costing is provided for the overall activities, but it should be noted that much of this will be able to be met from existing budgets where these are already in alignment. Given that existing government funding will likely need to be augmented, some suggestions of potential alternative funding options are provided.

2. Biome-level vulnerability assessment and adaptation strategy: Synopsis

Biome-level vulnerability assessment

Southern Africa is considered to be a climate change hotspot with variable changes over the next century depending on the shared socio-economic pathway (SSP) trajectory. The SSPs are possible major future global development and governance scenarios that would lead to different challenges for adaptation and mitigation. The latest climate models (CMIP6, 2020) show generally:

- Continuous and increasing warming across the region of between 0.04°C (SSP1) and 0.68°C (SSP5) per decade, with highest increases in the central arid and semi-arid regions over Namibia, Botswana and north-western South Africa.
- A decrease in precipitation by between 2.4% and 5.4% in the near (long)-term period (2030-2100) under SSP1 and 5, respectively, with greatest decreases along the west coast of South Africa and the Namibian coastline and slight increases in the eastern interior.

Mean annual temperature is likely to increase by between 2 and 6°C by the final third of the century under SSP5 (Figure 4), with the mean temperature for the country rising from around 17.7 to 22.4°C (Figure 4). Mean annual precipitation shows small declines along South Africa's west coast and south-western regions with a slight increase in the eastern interior by 2071-2100 (Figure 4). The mean precipitation for the country is likely to increase but only slightly. Under SSP5, biomes are predicted to experience significant increases in overall mean annual temperature by ca. 2085, ranging from 3.6°C in the Fynbos and IOCB biomes to 5.1°C in the Savanna biome (Table 3). Mean annual precipitation is projected to decrease the most in the

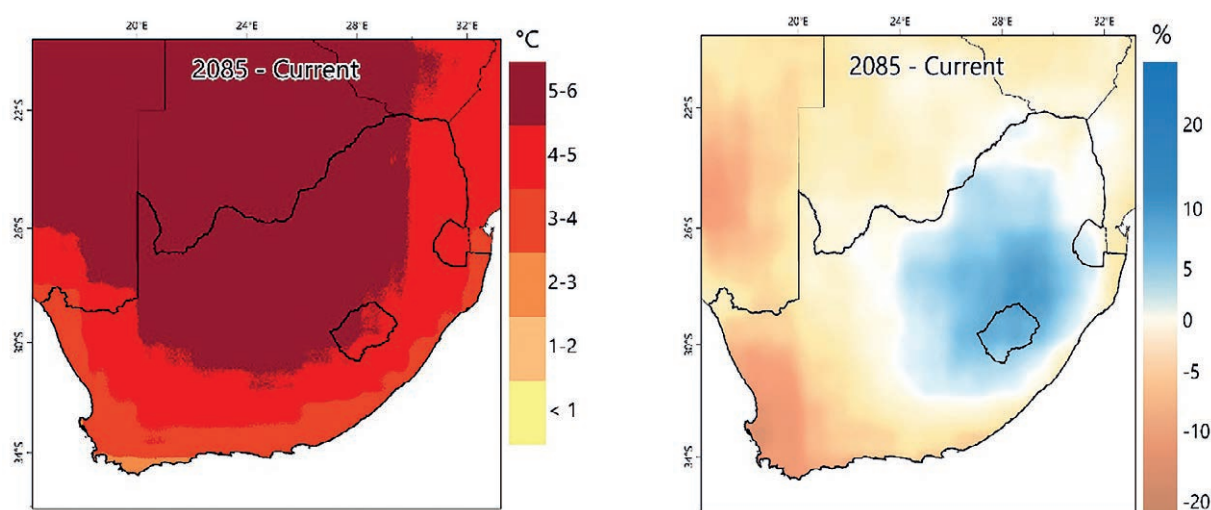


FIGURE 4: Anomalies for mean annual temperature (left) and mean annual precipitation (right) for the 2071-2100 time period under SSP5-8.5.

Fynbos and Succulent Karoo biomes, by 7% and 9% respectively. Only the Nama-Karoo and Grassland are predicted to experience an overall increase, with Grassland having the greatest overall increase of 9%. These changes will alter the structure, composition, and spatial configuration of South Africa's ecosystems as we know them today, and the suitability of current land uses that themselves have knock on effects for biodiversity at any scale.

TABLE 3: Possible changes in mean annual temperature and mean annual precipitation across South Africa's terrestrial biomes between current/ambient conditions, 2041–2070 (ca. 2055) and 2071–2100 (ca. 2085), and the anomalies between current/ambient conditions and ca. 2085, all under SSP5-8.5.

BIOME	MEAN ANNUAL TEMPERATURE (°C)				MEAN ANNUAL PRECIPITATION (MM)			
	CURRENT/ AMBIENT	2041- 2070	2071- 2100	ANOMALY	CURRENT/ AMBIENT	2041- 2070	2071- 2100	ANOMALY
Albany Thicket	17.5	19.6	21.3	3.8	470	461	454	-3%
Desert	19.6	22.0	23.8	4.2	72	70	70	-3%
Forests	18.4	20.3	22.0	3.6	935	920	916	-2%
Fynbos	15.8	17.9	19.4	3.6	566	538	516	-9%
Grassland	15.6	18.3	20.5	4.9	714	726	736	3%
IOCB	20.8	22.8	24.4	3.6	1 040	1 012	1 011	-3%
Nama-Karoo	17.7	20.5	22.6	4.9	245	247	246	0%
Savanna	19.7	22.6	24.9	5.1	514	518	514	0%
Succulent Karoo	17.1	19.4	21.1	4.0	230	218	213	-7%

While previous studies have estimated shifts in biomes using climate-envelope modelling, which effectively treats a biome as a species or singular entity, the analysis undertaken for the Biodiversity Adaptation Strategy was based on modelled shifts in the distributions of about 3 600 plant species (Figure 5). Species distributions were used to characterise environmental preferences of the main plant functional types based on their responses to climate system variables (such as temperature, radiation, soil moisture and CO₂), which, when grouped, can be used to distinguish vegetation groupings at various scales. Biome shift projections emerge as the cumulative response of all species belonging to each functional type to predicted climate shifts. The method handled novel environmental conditions poorly accounted for by bioclimatic modelling, as well as areas that may not be climatically *preferable* but are still *tolerable* by certain species. The results were used to derive vegetation change scores and overall vulnerability across the country, taking existing land cover and protected areas into account.

Although the worst case SSPs yield higher rates of change, there was little difference between results under different SSPs in the latter half of the century. Based on the results of this assessment, the changes in vegetation and biomes as we know them today could be substantial, especially over the northern and north-western parts of the country (Figure 6). The Grassland biome also faces potentially widescale changes, especially on the interface with the Savanna biome. The winter rainfall regions remain the most stable, with lower exposure to climate change than previously predicted. This concurs with findings from the LTAS report.

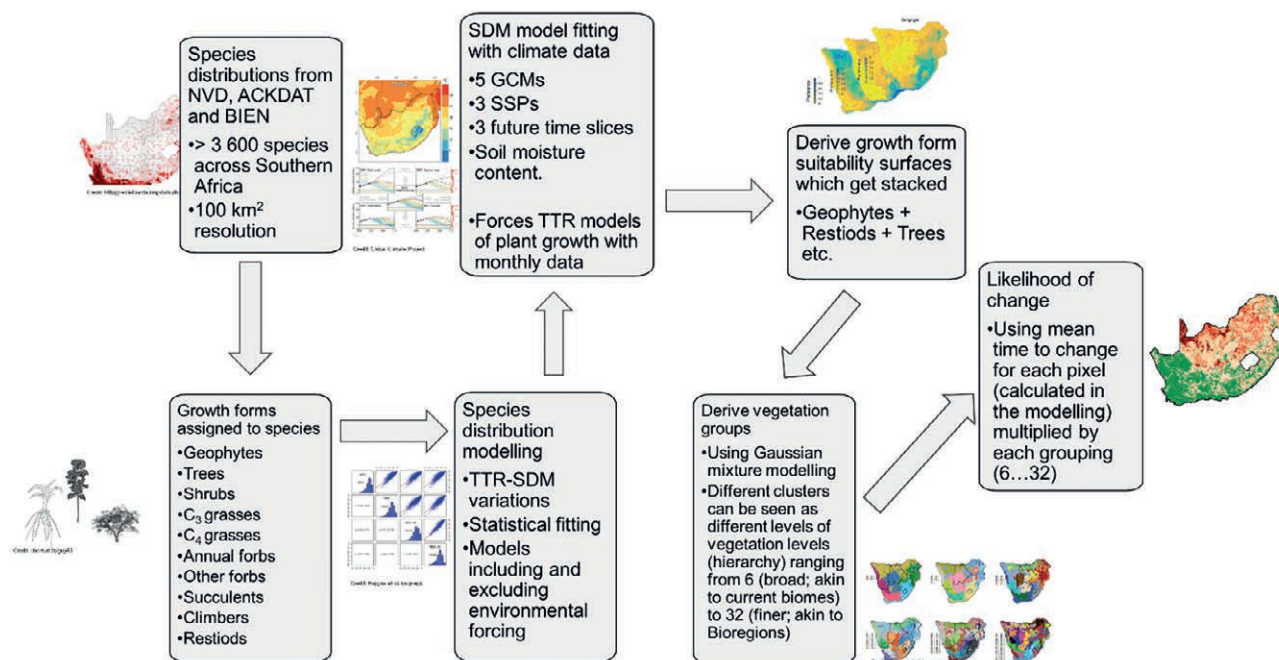


FIGURE 5: Summarised overview of the methodology to derive biome vulnerability to inform the Biodiversity Adaptation Strategy.

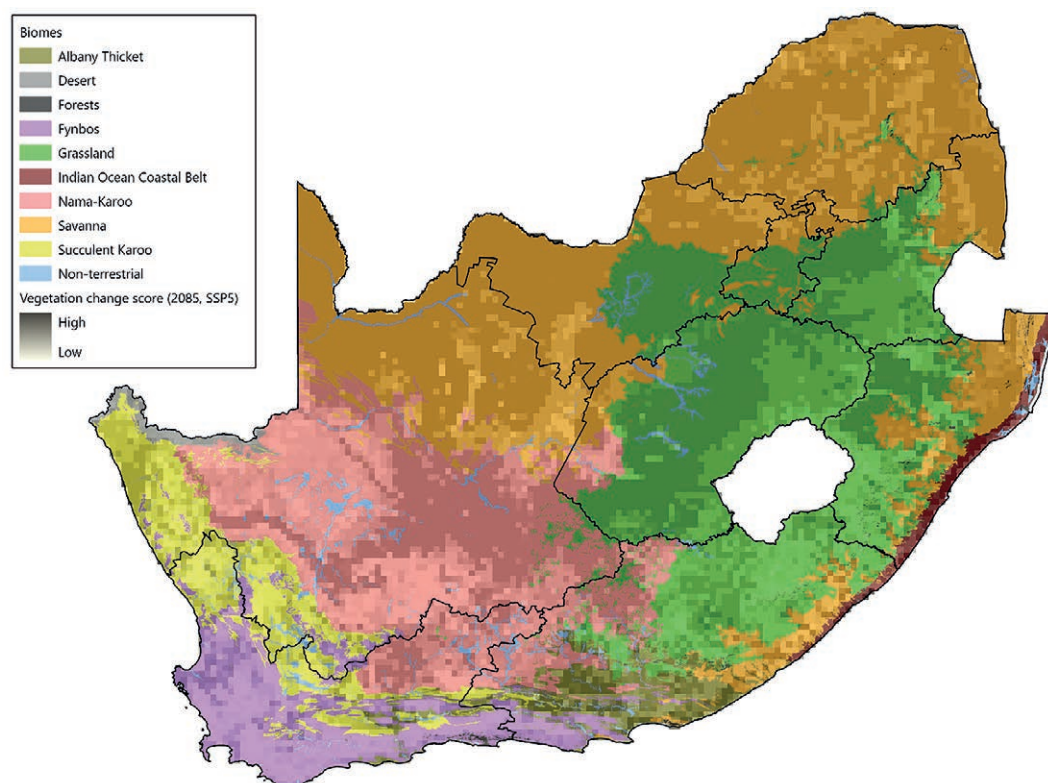


FIGURE 6: Relative expected vegetation change across South Africa's terrestrial biomes. Darker shades indicate higher potential vegetation change, while lighter shades indicate less potential vegetation change and higher resilience or stability. Source: Turpie *et al.*, 2021.

Most of the natural land area outside protected areas is rangeland, used for livestock or wildlife. Climate and vegetation changes are expected to decrease suitability for domestic livestock, both in the west, where aridity will be a problem, and in the central interior and east, where bush encroachment will be a problem. This may favour a shift to wildlife-based land use, which will potentially alleviate pressure on biodiversity. Suitable areas for crops will tend to shift eastward, which may increase pressure for land conversion on the eastern edge. Suitable area for plantation forestry will increase in the Grassland biome, while climate change will also improve conditions for sugar cane in the IOCB. The newly favourable areas will likely be prioritised for agriculture over conservation. Reduced rainfall may reduce the pressure of conversion for fruit and grain crops in the Western Cape.

Biomes with the highest predicted extent of change and the lowest extent of protection are the most vulnerable. Based on expected vegetation change, current land cover and protected areas, the proportion of the current remaining natural or near-natural area likely to undergo at least some change in vegetation characteristics ranges from 45% for the Desert biome to 100% for the Savanna biome. The relative levels of vulnerability of the different biomes are summarised in Figure 7. Some of the districts with the highest vulnerability index scores are: Waterberg and Vhembe (Limpopo); Nkangala and Ehlanzeni (Mpumalanga); Dr Ruth Segomotsi Mompati and Ngaka Modiri Molema (North West); all of Gauteng Province; Xhariep and Fezile Dabi (Free State); Pixley ke Seme and ZF Mgcawu (Northern Cape); the majority of KwaZulu-Natal, Central Karoo and West Coast (Western Cape); and Sarah Baartman, Buffalo City, Amathole and Chris Hani (Eastern Cape).

For protected areas, the greatest shifts in vegetation were expected for the Albany Thicket, IOCB, Nama-Karoo and Savanna biomes. Of the larger protected areas, the Kalahari Gemsbok National Park, Kruger National Park and Mapungubwe Cultural Landscape exhibit some of the highest vegetation change scores. Others such as the uKhahlamba Drakensberg Park, Richtersveld National Park and Garden Route have relatively low scores. Protected areas play an important role in reducing overall biome vulnerability, although their capacity to do so diminishes under the extreme conditions expected after 2070.

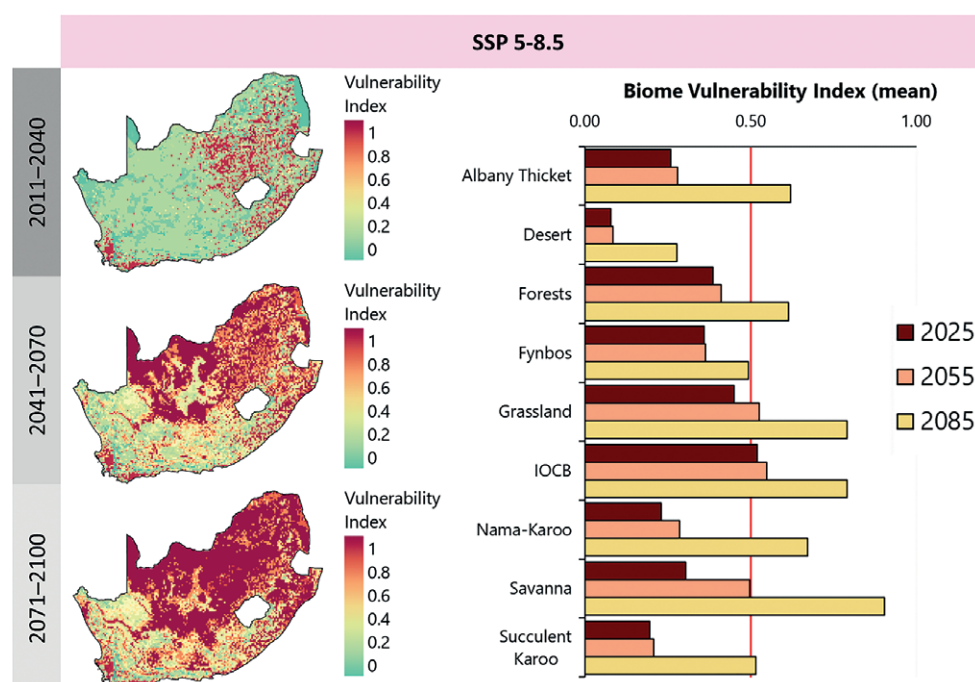


FIGURE 7: The vulnerability index for change of vegetation under SSP5-8.5 for the periods 2011–2040, 2041–2070 and 2071–2100 (left) and the biome vulnerability index (mean vulnerability index per biome) for each time period’s median year.

Biodiversity adaptation strategy

Developing effective strategies to adapt to climate change requires careful consideration of where and how to prioritise conservation efforts, considering potential shifts in species and habitats. Selecting the most suitable conservation model, based on factors such as cost-effectiveness and likelihood of success, is crucial. Such an approach helps to identify spatial priorities for conservation efforts under changing climatic conditions. These interventions should enhance biodiversity, be financially feasible, and have a high chance of success, regardless of the eventual climate outcome. A strategic approach is necessary to balance spatially targeted priorities with broad-scale, cost-effective measures, given limited resources and uncertainties.

Reducing biome-level vulnerability to the impacts of a changing climate can be achieved by expanding and enhancing protection in each biome and restoring and maintaining ecosystem health outside of protected areas. As described in the Biodiversity Adaptation Strategy (Turpie *et al.*, 2021), increasing biome resilience under climate change requires:

- 1.** Strengthening the system of protected and conservation areas;¹
- 2.** Strengthening and targeting measures outside protected and conservation areas;
- 3.** Increasing management efficiency, including through use of incentive measures; and
- 4.** Ensuring that a range of enabling factors are in place.

A summary of adaptation measures has been provided for each of South Africa's nine terrestrial biomes through the development of the Biodiversity Adaptation Strategy. Within each biome, vegetation change varies, resulting in different levels of overall vulnerability (as illustrated in Figure 7). To reduce vulnerability and enhance adaptive capacity, recommendations are made for expanding protected areas and improving land use and management practices outside of protected areas. Details from the Biodiversity Adaptation Strategy regarding the key implementing stakeholders, districts, and suggested timeframe for implementation, as well as the relative emphasis on various adaptation options, are presented in Table 4 and Table 5.

In regions with low probability of vegetation change, the primary objective is to strengthen the protected area network by expanding it for greater continuity. In contrast, in areas where significant changes in vegetation are expected, the focus should be on creating connectivity within the landscape by linking existing protected areas and avoiding the loss of natural habitats as much as possible.

Where ecosystem resilience and adaptation to change can be managed, highest priority should be given to protected area network expansion. In cases where this is not possible, alternative measures such as enabling other effective conservation measures (OECMs),² for example Biosphere Reserves, lower-level stewardship sites, and sustainable rangeland management, should be employed to support biodiversity.

¹ Protected areas refer to areas with strict formal protection. Conservation areas are areas of land which are not formally protected by law but informally protected by the current owners and users and managed for biodiversity conservation.

² Other effective conservation measure (OECM) can be defined as 'a geographically defined area other than a Protected Area, which is governed and managed in ways that achieve positive and sustained long-term outcomes for the in-situ conservation of biodiversity, with associated ecosystem functions and services and where applicable, cultural, spiritual, socio-economic, and other locally relevant values' (CBD in Decision 14/8).

TABLE 4: Summary of the adaptation priorities for South Africa's biomes. The size of each circle represents the relative importance of each option for the biome. Source: Turpie *et al.*, 2021.

			BIOMES								
ADAPTATION OUTCOMES	ADAPTATION THEME	ADAPTATION OPTIONS	ALBANY THICKET	DESERT	FOREST	FYNBOS	GRASS-LAND	INDIAN OCEAN COASTAL BELT	NAMA-KAROO	SAVANNA	SUCCULENT KAROO
Optimised protected area network	Area-based conservation	Expand PAs and mainstream OECMs									
Healthy, resilient natural ecosystems supporting biodiversity outside of the protected area network	Land use	Switch to WBLU									
	Large-scale ecosystem management	Fire management									
		Improve livestock management									
	Resource use	Sustainable harvesting management									
		Water use management									
	Restoration, rehabilitation and degradation avoidance	Bush encroachment management									
		Invasive species management									
		Restore eroded/degraded land									

TABLE 5: Summary of the priority districts for implementation. Source: Turpie *et al.*, 2021.

BIOME	KEY DISTRICTS	BIOME	KEY DISTRICTS
Albany Thicket	Amathole Garden Route Sarah Baartman	Indian Ocean Coastal Belt	OR Tambo Ugu uMkhanyakude
Forest**	Amathole Ehlanzeni Garden Route OR Tambo Sarah Baartman uMkhanyakude	Grassland	Chris Hani Gert Sibande Joe Gqabi Lejweleputswa Thabo Mofutsanyane Xhariep
Fynbos	Cape Winelands Garden Route Sarah Baartman West Coast	Savanna	John Taolo Gaetsewe Vhembe Waterberg, Dr Ruth Segomotsi Mompoti ZF Mgcawu
Nama-Karoo	Central Karoo Namakwa Pixley ka Seme ZF Mgcawu	Succulent Karoo	Namakwa West Coast
		Desert	Namakwa

*** XXX

3. Overall objectives and budget of the biome-level plans

This document lays out a series of adaptive implementation plans for each of South Africa's nine biomes. All of these plans are connected by the same overarching structure of objectives, outcomes and outputs, although the outcomes and outputs are included to varying extents in each biome. These are outlined below and are repeated along with biome-specific information in each of the biome-level plans.

Objectives

The three overarching objectives of the biome-level implementation plans and the rationale for each are as follows:

- 1. A climate-smart system of protected and conservation areas:** An expanded, connected, effective and climate-smart system of protected and conservation areas minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services;
- 2. Biodiversity-friendly working landscapes:** Sustainable wildlife management practices, appropriate fire management, an increased proportion of rangelands under sustainable wildlife-based land use, restoration of degraded ecosystems and allowing resource stocks to recover to optimal levels address the increased risks and improve landscape connectivity and species survival in a changing climate and maintain valuable provisioning services;
- 3. Healthy and resilient aquatic ecosystems:** The quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers, wetlands and estuaries is delivered and natural buffers are protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources.

Outcomes and outputs required to achieve objectives

Objective 1: PCA system is climate smart

The following outcomes identified as being necessary to achieve this objective are listed below, giving the specific outputs that would be needed for each.

- 1. PCA extent meets CBA target** (30% of land area is in protected and conservation areas, of which at least 85% is in declared, permanent PAs and the balance is in OECMs).
 - a. By the end of 2025, NPAES is updated to incorporate increased area targets, identify critical areas for protected areas and high-priority landscapes for OECMs. It also includes an adjustment to the biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III measures and adjust the biodiversity offset policy to ensure

- that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.
- b. Area under declared protection is expanded through direct acquisition, biodiversity offsets and Category I biodiversity stewardship. This will be achieved through implementing spatially targeted incentives for Category I, II and III measures and adjusting the biodiversity offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.
 - c. Conservation of priority landscapes outside of protected areas is achieved through OECMs (Category II and III Biodiversity Stewardship) by spatially targeting biodiversity stewardship incentives for Category II and Category III arrangements to encourage uptake in high-priority landscapes.
- 2. PCA management is climate smart** (PCA management incorporates climate-smart principles).
- a. All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.
- 3. PCA management is highly effective** (area-weighted average METT score exceeds 80%).
- a. PCA funding gap is reduced to zero through securing additional funding for PCA management activities;
 - b. Awareness and understanding of conservation issues and strategies among conservation managers is increased through capacity-building programmes;
 - c. Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps through setting up concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits;
 - d. All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems; and
 - e. Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

A core part of the vision for SANParks into the future is a progressive move towards landscape-level conservation focusing on a broader protected area strategy to include OECMs and stewardship arrangements in a quest to establish eight 'mega-living landscapes' across South Africa. These will form part of the updated NPAES and will go a long way to meeting the targets laid out in these plans.

For each biome, targets and planning should recognise local levels of variation in vegetation types, and also take species irreplaceability into account. A conservation planning process can identify priority areas that contain certain species or habitats which are crucial to South Africa's conservation goals. An optimal strategy should incorporate socio-economic analysis to better understand the values associated with different ecosystems and the services they provide, which could then be compared to the opportunity costs of alternative land uses in the prioritisation and planning process.

Indigenous knowledge offers valuable insights and practices and is incorporated in the 30x30 process. The adaptation plans are feeding into the 30x30 NPAES and it is therefore important to recognise the indigenous knowledge systems at the implementation phase. Indigenous communities have developed an intricate understanding of local ecosystems, weather patterns, and natural resources. They have valuable insights into how ecosystems have historically responded to environmental changes, which can provide important information for effective adaptation strategies. In many areas, indigenous people have already developed adaptive practices to cope with changes in rainfall patterns or other environmental extreme events, for example through changes in land and water management as well as crop diversification. Incorporating indigenous knowledge into the adaptation plans can also increase collaboration and collective efforts, increase trust and decrease the risk of potential conflict.

Objective 2: Working landscapes are biodiversity-friendly

The following outcomes identified as being necessary to achieve this objective are listed below, giving the specific outputs that would be needed for each.

- 1. Livestock and wildlife management is sustainable** (livestock stocking rates are at or below estimated sustainable stocking rates at district scale).
 - a. Vastly improved extension services programme through employing more agricultural extension officers in rangeland areas, relocation of existing and selection of new officers, and an updated extension service officers' training curriculum to include climate-smart strategies.
 - b. By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland. Wildlife-friendly rangeland management methods include the use of non-lethal predator management, such as human shepherding of livestock, which reduces predator threats and the need for fences. Operational certification scheme for sustainable, wildlife-friendly livestock management.
 - c. Increased participation in well-run sustainable livestock ranching programmes in communal land areas through supporting communal farmers.
- 2. Fire frequencies are appropriate for maintaining ecosystem resilience** (burn frequency is within biome guidelines).
 - a. Burning guidelines for all biomes are followed through developing appropriate fire management goals and guidelines and through promoting a unified vision of fire management through information sharing and improved stakeholder communication.
- 3. Proportion of rangeland under WBLU is increased** (land area with wildlife-based land uses increased significantly).
 - a. A clear regulatory framework for the game farming industry is implemented through aligning agricultural and environmental legislation to develop a coherent policy which clarifies the position and role of game farming.
 - b. National electronic database of WBLU properties is developed.
 - c. WBLU is expanded into communal land, land under land reform beneficiary title, and land belonging to emerging farmers through improved WBLU extension services and providing support to emerging farmers and communities.
- 4. Degraded ecosystems are restored to a healthy state in priority landscapes** (priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation).
 - a. Detailed national restoration plan is prepared, including a description of the objectives of IAP and bush clearing for each biome (highlighting water/biodiversity focus).
 - b. Decisions are based on high-quality monitoring data through improving and maintaining national datasets on IAPs.
 - c. Priority landscapes identified for restoration of soil and vegetation cover in the National Restoration Plan for 2025–2034 have been restored. This will be achieved through the implementation of effective and ecologically sound PES schemes/carbon credit projects and active restoration of eroded areas.
 - d. Priority landscapes identified for IAP clearing in the National Restoration Plan for 2025–2034 have been cleared and are under follow-up maintenance. This will be achieved through increasing the efficiency of clearing teams and their funding. Throughout this process, women's and youths' participation should be promoted.
 - e. Priority landscapes identified for bush clearing in the National Restoration Plan for 2025–2034 have been cleared and are under follow-up maintenance. This will be achieved through developing norms and standards for treatment of bush encroachment, creating a fiscal mechanism to incentivise landowners to restore areas of advanced bush encroachment

- through tax write-offs, and clearing encroacher bush in high-priority communal land areas. Similarly, women's and youths' involvement could be increased in bush-clearing processes.
- f. A legislation framework for IAP clearing is implemented.

5. Harvesting rates have allowed resource stocks to recover to optimal levels, taking biodiversity and ecosystem services into account (resource stocks of threatened and endangered fauna and flora have recovered to optimal levels).

- a. Indigenous fauna and flora identified as threatened and endangered are effectively managed using participatory approaches.
- b. Comprehensive baseline data, monitoring and protection of threatened and endangered fauna and flora is improved through undertaking a baseline stock assessment and improving environmental management inspectorates.

Objective 3: Aquatic ecosystems are healthy and resilient

The following outcomes identified as being necessary to achieve this objective are listed below, giving the specific outputs that would be needed for each.

1. Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change (RQOs are met).

- a. Assessment and monitoring of all important water management areas is improved through consistently reviewing and updating RQOs and environmental flows.

2. Riparian and wetland buffer areas are restored and protected (riparian and wetland buffer areas are effectively enforced and are clear from IAPs).

- a. Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment through the implementation of riparian/wetland stewardship programmes.

High-level budget estimate

The biome-level adaptation strategies require an estimated total budget of R41.7 billion – with the largest amount of funding needed to support 'Objective 2: Working landscapes are biodiversity-friendly', particularly to restore degraded ecosystems (Table 6). Making the PCA system climate smart requires 33% of the total implementation costs, with most of the funding needed to achieve 'Outcome 1.1 PCA extent meets CBA target' (Table 6). The overall cost by province is shown in Table 7. National costs, which are not shown in Table 6, amount to some R129 million.

As a comparison, South Africa's NBSAP implementation was costed at R63 billion (in 2018 values) over the ten-year implementation period by BIOFIN (South African Government, 2023a). These estimates were made before the adoption of the Global Biodiversity Framework, and it was subsequently estimated that the costs will be considerably higher.

TABLE 6: Overall implementation costs for achieving the priority adaptation objectives for the biomes over the next ten years (up to 2035; R 2023), excluding national costs.

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	13 720 000	33
Outcome 1.1 PCA extent meets CBA target	13 481 000	
Outcome 1.2 PCA management is climate smart	149 000	
Outcome 1.3 PCA management is highly effective	90 000	
Objective 2: Working landscapes are biodiversity-friendly	27 871 000	67
Outcome 2.1 Livestock and wildlife management is sustainable	2 811 000	
Outcome 2.2 Fire frequencies are appropriate for resilience	8 000	
Outcome 2.3 WBLU in rangelands is increased	630 000	
Outcome 2.4 Degraded ecosystems are restored	24 398 000	
Outcome 2.5 Harvesting rates are sustainable	36 000	
Objective 3: Aquatic ecosystems are healthy and resilient	133 000	0.3
Outcome 3.1 Resource quality objectives are met	68 000	
Outcome 3.2 Riparian and wetland areas restored and protected	65 000	
Overall cost	41 724 000	

TABLE 7: Overall implementation costs for achieving the priority adaptation objectives for all biomes over ten years (2025–2034; R 2023) across relevant provinces (costs in R'000).

	WESTERN CAPE	NORTH WEST	NORTHERN CAPE	MPUMALANGA	LIMPOPO	KWAZULU-NATAL	GAUTENG	FREE STATE	EASTERN CAPE	TOTAL	OBJECTIVE
Objective 1: PCA system is climate smart	1 011 560	1 044 234	4 524 163	938 429	1 066 342	1 178 020	226 023	1 788 387	1 942 844	13 720 000	
Outcome 1.1 PCA extent meets CBA target	977 390	1 026 187	4 464 986	925 338	1 041 607	1 147 481	223 243	1 771 547	1 903 221	13 481 000	
Outcome 1.2 PCA management is climate smart	19 209	15 276	31 793	10 065	20 993	16 031	2 260	12 967	20 407	149 000	
Outcome 1.3 PCA management is highly effective	14 961	2 771	27 384	3 025	3 742	14 507	520	3 873	19 216	90 000	
Objective 2: Working landscapes are biodiversity-friendly	3 848 790	1 531 125	7 724 042	1 783 881	1 072 277	2 461 667	432 988	3 786 515	5 229 715	27 871 000	
Outcome 2.1 Livestock and wildlife management is sustainable	89 248	290 219	632 507	249 466	309 561	263 295	60 056	442 874	473 774	2 811 000	
Outcome 2.2 Fire frequencies are appropriate for resilience	2 061	186	185	469	134	1 189	73	666	3 036	8 000	
Outcome 2.3 WBLU in rangelands is increased	10 160	70 670	115 676	60 980	75 094	64 348	14 683	107 765	110 625	630 000	
Outcome 2.4 Degraded ecosystems are restored	3 745 687	1 170 033	6 963 667	1 471 940	686 823	2 127 542	358 176	3 235 196	4 638 936	24 398 000	
Outcome 2.5 Harvesting rates are sustainable	5 901	16	19 472	1 027	665	5 292	0	15	3 611	36 000	
Objective 3: Aquatic ecosystems are healthy and resilient	14 311	10 757	36 161	8 317	12 770	12 300	1 970	13 814	22 600	133 000	
Outcome 3.1 Resource quality objectives are met	7 497	5 884	20 615	4 245	7 272	5 302	1 013	6 935	9 236	68 000	
Outcome 3.2 Riparian and wetland areas restored and protected	6 814	4 873	15 545	4 072	5 498	6 998	957	6 879	13 364	65 000	
Overall cost	4 874 660	2 586 116	12 284 365	2 730 627	2 151 389	3 651 987	660 980	5 588 716	7 195 160	41 724 000	

4. Biome-level plans

Savanna Biome

The Savanna biome is South Africa's most extensive biome, covering approximately 39 million hectares (34% of South Africa) and spanning eight of the country's nine provinces (all but the Western Cape; Turpie *et al.*, 2021). According to the NPAES and the latest South African Protected and Conservation Areas Database (SAPAD), protected areas cover some 13.8% and CBAs cover a further 22% of the Savanna biome. This biome was found to have the highest predicted overall levels of vegetation change and climate change vulnerability (Turpie *et al.*, 2021). The key threats to this biome are climate-induced vegetation change, a decline in grazing capacity and bush encroachment (Turpie *et al.*, 2021).

Strategic objectives, targets and activities

The Biodiversity Adaptation Strategy identified a number of key climate change adaptation priorities for the Savanna biome, with the most important ones being prioritising wildlife-based land uses, optimising the protected area network, sustainable livestock and wildlife management, water use management and bush encroachment management. Given that just over 27% of the biome could change its characteristics, with roughly 2.2% of the biome becoming more arid (Turpie *et al.*, 2021), these adaptation priorities are critical for building resilience and reducing impacts on livelihoods.

Objective 1: System of protected and conservation areas is climate smart

An expanded, connected, effective and climate-smart system of protected and conservation areas (PCAs) minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services. Achieving this will require expansion of the current PCA network, and ensuring climate-smart and highly effective PCA management. The aim is to meet CBA targets and have 30% of terrestrial ecosystems under conservation by 2030, to incorporate climate-smart principles into PCA management, and to achieve an area-weighted average Management Effectiveness Tracking Tool (METT) score that exceeds 80%.

To achieve these outcomes, it will be critically important to update the NPAES 2030 to incorporate increased area targets, identify critical areas for state protection and high-priority landscapes for spatial targeting of biodiversity stewardship incentives. The process of updating the NPAES should also include adjusting the biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III stewardship measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets. Following this, priority areas for protection within the Savanna biome can be identified and spatially targeted according to the updated NPAES.

Currently, just over 5.5 million ha of land in the Savanna biome is within protected areas and 4.1 million ha is within OECMs, accounting for 13.8% and 10.3% of land, respectively. The aim is to have 30% of land area in protected and conservation areas, of which at least 85% is in declared, permanent PAs and the balance in OECMs. This means that at least 26% of the 30% target should be under declared protection. Therefore, to achieve this target for the Savanna biome, the area under declared protected areas would need to be expanded by a total of 4.6 million ha through direct acquisition, biodiversity offsets and Category I biodiversity stewardship. Securing 4.6 million ha of land by 2034 for formal protection was costed with an assumed ratio of 90:10 for the amount of biodiversity priority land to be secured through biodiversity stewardship in relation to direct land purchase. The area of land under conservation through OECMs already covers the remainder to achieve the 30% target.

Incorporating climate-smart principles into PCA management will require all PCAs to revise management and monitoring plans by 2027, or within two years of establishment. This would require launching guidelines on climate-smart protected area management for PCA managers to follow and adhere to. These could be a web-based set of short, clear guidelines on adapting protected area management to climate change within locational contexts, with interactive maps on projected climate and biodiversity shifts. To ensure that climate-smart management plans and monitoring are mandatory for PCAs, legislation could be reviewed requiring that all state, private and community protected and conservation areas update and lodge online new management plans that take the climate-smart guidelines into account and collect basic monitoring data.

The outputs and activities to achieving an outcome of highly effective protected area management where the area-weighted average METT score exceeds 80% are as follows:

- 1.** Protected area funding gap is reduced to zero by securing additional funding for protected area management activities;
- 2.** Awareness and understanding of conservation issues and strategies among conservation managers is increased by undertaking a capacity-building programme on biodiversity management under climate change;
- 3.** Strategic partnerships with NGOs and private partners improve biodiversity conservation outcomes by alleviating capacity gaps through implementing concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits;
- 4.** All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems; and
- 5.** Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

The lead implementing entities for these activities would be DFFE, SANBI, SANParks, provincial conservation authorities, with support from NGOs, CBOs, and private landowners.

Objective 2: Working landscapes are biodiversity-friendly

Creating biodiversity-friendly working landscapes outside of PCAs is critical to achieving climate resilience and reducing impacts on livelihoods. Indeed, sustainable grazing and fire management practices, sustainable harvesting of natural resources, restoration of degraded ecosystems and an increased proportion of rangeland under sustainable wildlife-based land use address the increased risks and improve landscape connectivity and species survival in a changing climate. Within the Savanna biome, the key adaptation priorities are to improve livestock and wildlife management, increase the proportion of rangeland under wildlife-based land uses, and restore degraded landscapes.

Achieving this objective in the Savanna biome will require improving large-scale ecosystem management through sustainable livestock and wildlife management and increasing the proportion of land under WBLU. Livestock and wildlife management is sustainable if the stocking rates are at or below the estimated sustainable stocking rates at district scale. This will require:

- 1.** A vastly improved extension services programme, achieved through:
 - i. Employing an additional ~600 agricultural extension officers in rangeland areas.
 - ii. Relocating existing and selecting new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.
 - iii. Updating extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.
- 2.** By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland, achieved through:
 - i. Designing national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.
- 3.** Increased participation in well-run sustainable livestock ranching programmes in communal land areas, achieved through:
 - i. Supporting communal farmers in participating in programmes such as Meat Naturally Pty/ Herding 4 Health, prioritising those who have or are establishing conservancies. It is assumed that such programmes could be implemented in 15% of communal rangeland areas.

Most of the responsibilities for these actions fall under the mandate of DALRRD or their provincial departments. However, DFFE and SANBI would be expected to support DALRRD and the provincial agricultural departments in the design of certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching. The Provincial Extension Coordinating Forum (PECF) could assist with expanding extension services and upskilling extension officers. Communal land areas should be prioritised for establishing support through SLM programmes, which are developed by organisations such as Meat Naturally Pty, or through programmes such as Herding 4 Health, with the support of NGOs such as Conservation South Africa that are already actively involved in such initiatives within the Savanna biome.

Adapting to vegetation change, increasing temperatures and reduced grazing capacity will also require livestock farmers switching to WBLU in some areas to reduce impact on livelihoods. However, this will need to be well regulated and sustainable. This will require:

- 1.** Implementation of a clear regulatory framework for the game farming industry, achieved by:
 - i. Aligning agricultural and environmental legislation to develop a coherent policy which clarifies the position and role of game farming in South Africa.
- 2.** Development of a national electronic database of WBLU properties, achieved by:
 - i. Using the latest agricultural census data to develop a digital map and database of WBLU properties.
- 3.** Expanding WBLU into communal land, land under land reform beneficiary title, and land belonging to emerging farmers, achieved through:
 - i. Teaching WBLU practices to emerging farmers through improved WBLU extension services. This will require hiring ~150 additional extension officers.
 - ii. Providing support through infrastructure development and the supply of founder herds of game to emerging farmers and communities.

A clear regulatory framework for the game farming industry is needed to align agricultural and environmental legislation into a coherent policy which clarifies the position and role of game farming in South Africa.

This will require collaboration between DFFE and DALRRD. Additionally, a national electronic database of WBLU properties and their activities needs to be developed with support from Stats SA (as part of the commercial agricultural census). Expanding well-regulated sustainable WBLU into communal land, land under land reform beneficiary title, and land belonging to emerging farmers through improved WBLU extension services will need to involve DFFE, DALRRD, and provincial conservation authorities. Support could be provided to emerging farmers and communities through infrastructure development and the supply of founder herds of game by SANParks and provincial conservation authorities through their Wildlife Economy Programmes.

The increasing levels of degradation across the Savanna biome are concerning and there is a need for focused and improved management and active clearing of bush-encroached land. Restoring degraded ecosystems to a healthy state in priority landscapes will require the preparation of a detailed national restoration plan whereby decisions are being based on high-quality monitoring data. The national plan should identify where to target restoration effort in order to maximise biodiversity and ecosystem services. This will require:

- i. Preparing a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets.
- ii. Improving and maintaining national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.

Once a national restoration plan has been prepared, each biome will be able to have a spatially targeted approach to addressing degradation. According to the land degradation neutrality targets for South Africa (DEA, 2018b), the aim is to clear 633 702 ha of bush-encroached land across South Africa by 2030, of which just more than half falls within the Savanna biome. Therefore, the output is that priority landscapes identified for bush clearing in the National Restoration Plan for 2025–2034 have been cleared of approximately 352 000 ha in the Savanna biome, and are under follow-up maintenance. This will require the following actions:

- i. Developing norms and standards for treatment of bush encroachment in different contexts, to remove the legal barriers to landowners and entrepreneurs.
- ii. Creating fiscal mechanisms to incentivise private landowners to restore areas of advanced bush encroachment as a tax write-off.
- iii. Clearing encroacher bush in areas of advanced bush encroachment in high-priority communal land areas.

These activities would largely fall to DFFE as the lead implementing entity but would likely require support from SANBI, DALRRD, provincial agriculture and provincial conservation authorities.

Objective 3: Aquatic ecosystems are healthy and resilient

Under this objective, the quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers and wetlands is delivered and natural buffers are restored and protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources. The outcomes of this objective are that the resource quality objectives of rivers and wetlands in the Savanna biome are met and endure under climate change, and riparian and wetland buffer areas are restored and protected. This will require:

1. Assessment and monitoring of all important water management areas is improved, by:
 - i. Consistently reviewing and updating RQOs and environmental flows for rivers and wetlands.

2. By 2034, ~16 300 ha of priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment, by:
 - i. Supporting the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas.

The lead implementing entity for this objective would be DWS and catchment management agencies or catchment partnerships, with the support of DFFE, SANBI, NGOs, research organisations, CBOs, and the private sector.

Implementation plan

To achieve the long-term objectives for the Savanna biome, a total of 26 activities have been planned for. The total cost for implementation of these activities is estimated to be in the order of R6.4 billion over the next ten years (Table 8, Table 9). Activities under Objectives 1 and 2 account for the majority of these costs, with PCA expansion, sustainable livestock and wildlife management, and restoration of bush-encroached land being the costliest. Note that budget figures are indicative and are in 2023 Rands. The implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Savanna biome is summarised in Table 10.

TABLE 8: Overall implementation costs for achieving the priority adaptation objectives for the Savanna biome over ten years (2025–2034; R 2023).

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	3 287 000	51
Outcome 1.1 PCA extent meets CBA target	3 211 000	
Outcome 1.2 PCA management is climate smart	66 000	
Outcome 1.3 PCA management is highly effective	10 000	
Objective 2: Working landscapes are biodiversity-friendly	3 075 000	48
Outcome 2.1 Livestock and wildlife management is sustainable	961 000	
Outcome 2.3 WBLU in rangelands is increased	233 000	
Outcome 2.4 Degraded ecosystems are restored	1 881 000	
Objective 3: Aquatic ecosystems are healthy and resilient	40 000	1
Outcome 3.1 Resource quality objectives are met	23 000	
Outcome 3.2 Riparian and wetland areas restored and protected	17 000	
Overall cost	6 402 000	

TABLE 9: Overall implementation costs for achieving the priority adaptation objectives for the Savanna biome over ten years (2025–2034; R 2023) across relevant provinces (costs in R'000).

	NORTH WEST	NORTHERN CAPE	MPUMALANGA	LIMPOPO	KWAZULU-NATAL	GAUTENG	FREE STATE	EASTERN CAPE	TOTAL	OBJECTIVE
Objective 1: PCA system is climate smart	605 171	930 302	223 420	1 008 944	251 212	50 502	74 020	143 429	3 287 000	
Outcome 1.1 PCA extent meets CBA target	591 179	908 792	218 254	985 616	245 403	49 334	72 309	140 113	3 211 000	
Outcome 1.2 PCA management is climate smart	12 151	18 680	4 486	20 259	5 044	1 014	1 486	2 880	66 000	
Outcome 1.3 PCA management is highly effective	1 841	2 830	680	3 069	764	154	225	436	10 000	
Objective 2: Working landscapes are biodiversity-friendly	566 140	870 301	209 010	943 871	235 009	47 244	69 246	134 178	3 075 000	
Outcome 2.1 Livestock and wildlife management is sustainable	176 930	271 987	65 320	294 979	73 445	14 765	21 641	41 933	961 000	
Outcome 2.3 WBLU in rangelands is increased	42 898	65 945	15 837	71 519	17 807	3 580	5 247	10 167	233 000	
Outcome 2.4 Degraded ecosystems are restored	346 312	532 369	127 853	577 373	143 757	28 900	42 358	82 078	1 881 000	
Objective 3: Aquatic ecosystems are healthy and resilient	7 364	11 321	2 719	12 278	3 057	615	901	1 745	40 000	
Outcome 3.1 Resource quality objectives are met	4 235	6 510	1 563	7 060	1 758	353	518	1 004	23 000	
Outcome 3.2 Riparian and wetland areas restored and protected	3 130	4 811	1 156	5 218	1 299	261	383	742	17 000	
Overall cost	1 178 675	1 811 924	435 149	1 965 093	489 278	98 360	144 168	279 353	6 402 000	

TABLE 10: Implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Savanna biome. All costs in 2023 Rands.

* These are national costs (not biome-level costs) to be included as part of the overall national plan.

Objective 1: PCA system is climate smart.				
Outcome 1.1: PCA extent meets CBA target.				
Target: 30% of land area is in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.1.1 NPAES 2030	1.1.1.1 NPAES is updated to incorporate increased area targets, identify critical areas for protected areas and high-priority landscapes for OECMs.	Lead: DFFE	3 840*	By end of 2025
Target: By 2025, NPAES 2030 is available.		Support: SANBI, conservation authorities		
	1.1.1.2 Adjust the biodiversity stewardship policy to simplify process and allow for spatial targeting of Category I, II and III measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.	Lead: DFFE, SANBI	1 620*	By end of 2025
		Support: SANParks, provincial conservation authorities		
1.1.2 Area under strict protection is expanded through direct acquisition, offsets and Category I biodiversity stewardship.	1.1.2.1 Implement spatially targeted incentives for Category I biodiversity stewardship and guide offset policies to expand the area under permanent protection in critical target areas.	Lead: SANParks, provincial conservation authorities	3 209 450	Over ten years, 2025-2034
Target: By 2034, 4 666 320 ha have been added to the PA estate, bringing the overall extent of strict, permanent protected areas to a minimum of 25% of land area.		Support: DFFE, SANBI, local government		
1.1.3 Conservation of priority landscapes outside of protected areas is achieved through OECMs (Category II and III Biodiversity Stewardship).	1.1.3.1 Implement spatial targeting of biodiversity stewardship incentives for Category II and Category III arrangements to encourage uptake in high-priority landscapes.	Lead: SANParks, provincial conservation authorities	0	Over ten years, 2025-2034
Target: By 2034, at least 0 ha of OECMs have been established.		Support: DFFE, SANBI, NGOs, People and Parks		
	1.1.3.2 Development of regulations on OECMs detailing qualifying properties of OECMs.	Lead: SANParks, DFFE	1 120	By end of 2025
		Support: SANBI, People and Parks, local government		

Outcome 1.2: PCA management is climate smart.				
Target: PCA management incorporates climate-smart principles.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.2.1 All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.	1.2.1.1 Review the PA management act to include climate-smart approaches with informative maps.	Lead: SANBI, DFFE Support: Conservation authorities, research institutions	2 200	By end of 2025
Target: By 2027, or within two years of establishment, all PCAs have up-to-date climate-smart management and monitoring plans that follow the guidelines.	1.2.1.2 All state, private and community protected and conservation areas update and lodge online management plans that take the climate-smart guidelines into account and collect basic monitoring data.	Lead: DFFE Support: Conservation authorities	63 340	By 2027, or within two years of establishment
Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.1 Protected area funding gap is reduced to zero.	1.3.1.1 Secure additional funding for protected area management activities.	Lead: SANParks, provincial conservation authorities Support: DFFE, NGOs, private sector	1 100	Over ten years, 2025-2034
Target: Funding for PA management increased by 10%.				
1.3.2 Awareness and understanding of conservation issues and strategies among conservation managers is increased.	1.3.2.1 Undertake a capacity-building programme on biodiversity management under climate change.	Lead: DFFE, SANParks, provincial conservation authorities, local government Support: SANBI, NGOs	540	One year, 2025
Target: Senior staff in conservation agencies have attended a workshop and have in turn delivered a training to staff in their organisation.				
1.3.3 Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps.	1.3.3.1 Set up concessions and joint venture partnerships to increase management effectiveness in protected and conservation areas, within sustainable limits.	Lead: SANParks, provincial conservation authorities, NGOs, private sector Support: DFFE, SANBI	3 930	Over ten years, 2025-2034
Target: Partnership arrangements improve financial and/or management efficiency.				
1.3.4 All PCAs collect comparable and comprehensive baseline data on species and ecosystems to track changes and monitor management effectiveness.	1.3.4.1 Undertake baseline data collection on species and ecosystems within all PCAs.	Lead: SANParks, provincial conservation authorities Support: NGOs, SANBI, research institutions	3 920	Over ten years, 2025-2034
Target: By 2027, or within two years of establishment, all PCAs have comprehensive baseline biodiversity data.				
1.3.5 Species diversity, populations and ecosystem health show recovery or no deterioration over time, after accounting for climatic variability and ecosystem shifts.	1.3.5.1 Develop a monitoring plan to monitor species diversity, populations and ecosystem health.	Lead: SANParks, provincial conservation authorities Support: SANBI, research institutions	620	One year, 2025
Target: By 2034, biodiversity is healthy or recovering at a measurable rate in all PCAs.				

Objective 2: Working landscapes are biodiversity-friendly.				
Outcome 2.1: Livestock and wildlife management is sustainable.				
Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.1.1 Vastly improved extension services programme.	2.1.1.1 Employ more agricultural extension officers in rangeland areas.	Lead: DALRRD and provincial-level agricultural departments	797 560	Over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
	2.1.1.2 Relocate existing and select new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.	Lead: DALRRD and provincial-level agricultural departments	These costs are included in 2.1.1.1	Ongoing, over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
Target: Level of satisfaction with extension officers rated as excellent in next Agricultural Census; Ratio of extension to producer 1:250.	2.1.1.3 Updated extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.	Lead: DALRRD, agricultural institutions, colleges	1 150	One year, 2025
		Support: Provincial-level agricultural departments		
	2.1.1.4 Provide continuous training to extension officers.	Lead: DALRRD, agricultural institutions, colleges	12 350	Every year, starting in 2025
		Support: Provincial-level agricultural departments		
2.1.2 By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland. Operational certification scheme for sustainable, wildlife-friendly livestock management.	2.1.2.1 Design national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 280*	By 2026
		Support: SANBI, NGOs		
Target: By 2034, 30% of rangeland area in the biome is under wildlife/biodiversity-friendly certified farming systems.	2.1.2.2 Encourage livestock/wildlife farmers to apply for sustainable, wildlife-friendly/biodiversity-friendly certification.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 120	2027-2028
		Support: SANBI, NGOs		
2.1.3 Increased participation in well-run sustainable livestock ranching programmes in communal land areas.	2.1.3.1 Increase awareness of opportunities for sustainable livestock ranching and support communal farmers in participating in programmes such as Meat Naturally, prioritising those who have or are establishing conservancies.	Lead: Meat Naturally Pty, NGOs	147 290	Over ten years, 2025-2034
		Support: DFFE, DALRRD, provincial-level agricultural departments		
Target: Support programme is operational.				

Outcome 2.3: Proportion of rangeland under WBLU is increased.				
Target: Land area with wildlife-based land uses increased significantly.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.3.1 A clear regulatory framework for the game farming industry is implemented, including clear standards, regulation, and licensing.	2.3.1.1 Align agricultural and environmental legislation to develop a coherent policy which clarifies the position and role of game farming in South Africa.	Lead: DFFE, DALRRD	1 660*	One year, 2025
Target: Policy for game farming.		Support: SANBI, NGOs, business		
2.3.2 National electronic database of WBLU properties is developed.	2.3.2.1 Use the latest agricultural census to develop a digital map and database of WBLU properties, including capacity building on map use.	Lead: DFFE, Stats SA	960*	Over two years, 2025-2026
Target: All WBLU properties and activities are captured.		Support: DALRRD, SANBI		
2.3.3 WBLU is expanded into communal land, land under land reform beneficiary title, and land belonging to emerging farmers.	2.3.3.1 Teach WBLU practices to emerging farmers through improved WBLU extension services.	Lead: DFFE	199 390	Over ten years, 2025-2034
		Support: DALRRD, SANBI		
Target: Increased number of emerging WBLU farmers.	2.3.3.2 Provide support through infrastructure development and the supply of founder herds of game to emerging farmers and communities.	Lead: SANParks, provincial conservation authorities	34 090	Over three years, 2025-2027
		Support: DFFE, DALRRD, provincial-level agricultural departments		
Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.1 Detailed national restoration plan.	2.4.1.1 Prepare a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets. The plan needs to also map drivers of degradation and existing soil conservation measures.	Lead: DFFE, SANBI	4 000*	By 2025
Target: Restoration plan is in place.		Support: Research institutions, NGOs		
2.4.2 Decisions are based on high-quality monitoring data.	2.4.2.1 Improve and maintain national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.	Lead: SANBI	1 310*	Over ten years, 2025-2034
Target: High-quality data is available online.		Support: DFFE, research institutions		
2.4.5 Priority landscapes identified for bush clearing in the National Restoration Plan for 2024-2030 have been cleared and are under follow-up maintenance.	2.4.5.1 Develop norms and standards for treatment of bush encroachment in different contexts, to remove the legal barriers to landowners and entrepreneurs.	Lead: DFFE	1 310	By 2025
		Support: SANBI, DALRRD		

Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
Target: By 2034, at least 351 990 ha of bush-encroached land have been cleared from priority landscapes.	2.4.5.2 Create fiscal mechanism to incentivise landowners to restore areas of advanced bush encroachment as a tax write-off.	Lead: DFFE	930	By 2025
		Support: SANBI		
	2.4.5.3 Clear encroacher bush in areas of advanced bush encroachment in high-priority communal land areas. Promote women's and youths' participation.	Lead: DFFE, DALRRD	1 878 280	Over ten years, 2025-2034
		Support: NGOs, provincial conservation authorities, provincial agriculture		
2.4.6 The legislation framework for IAP clearing is implemented.	2.4.6.1 Policy guidelines for the adoption and implementation of IAP removal are implemented.	Lead: DFFE	410	By 2025
Target: By 2025, the legislation framework for IAP clearing has been implemented.		Support: NGOs, provincial authorities		
Objective 3: Aquatic ecosystems are healthy and resilient.				
Outcome 3.1: Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change.				
Target: RQOs are met.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.1.1 Assessment and monitoring of all important water management areas is improved.	3.1.1.1 Improve monitoring and consistently review and update RQOs and environmental flows. Identify which areas in the catchment impact the health of important systems.	Lead: DWS	2 840	Annually, starting in 2025
Target: By 2034, all water management areas have updated RQOs and appropriate monitoring in place.		Support: DFFE, CMAs, NGOs, research institutions		
Outcome 3.2: Riparian and wetland buffer areas are restored and protected.				
Target: Riparian and wetland buffer areas are effectively enforced and are clear from IAPs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.2.1 Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment.	3.2.1.1 Support the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas. Ensure that this is done in areas of high importance for catchment health.	Lead: DFFE, DWS	17 240	Over ten years, 2025-2034
Target: By 2034, at least 16 290 ha of riparian/wetland area in priority areas are under stewardship and are being protected from encroachment and degradation.		Support: CMAs, NGOs, CBOs, private sector		

Grassland Biome

Overview

The Grassland biome is the second largest biome in South Africa and is one of the most threatened. This biome extends across most provinces, except for in the North West and Western Cape provinces. The Grassland biome is characterised by low tree cover and a high diversity of bulbs, forbs and grasses. The Grassland biome is one of the most modified with large natural areas converted for agriculture and silviculture, and mining and urban development threatening important ecosystems. Expansion of protected areas in this biome has been slow, with only 4.8% of the land under strict protection.

Strategic objectives, targets and activities

The Biodiversity Adaptation Strategy identified a number of key climate adaptation priorities for the Grassland biome, with the most important ones being expanding the PCA system, sustainably managing rangelands through improved fire and grazing practices, increasing the land under WBLU, and improving bush encroachment and invasive species management (Turpie *et al.*, 2021).

Objective 1: System of protected and conservation areas is climate smart

An expanded, connected, effective and climate-smart system of protected and conservation areas (PCAs) minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services. Achieving this will require expansion of the current PCA network, and ensuring climate-smart and highly effective PCA management. The aim is to meet CBA targets and have 30% of terrestrial ecosystems under conservation by 2034, to incorporate climate-smart principles into PCA management, and to achieve an area-weighted average Management Effectiveness Tracking Tool (METT) score that exceeds 80%.

To achieve these outcomes, it will be critically important to update the NPAES 2030 to incorporate increased area targets, identify critical areas for state protection and high-priority landscapes for spatial targeting of biodiversity stewardship incentives. The process of updating the NPAES should also include adjusting the biodiversity stewardship policy to simplify process and allow for spatial targeting of Category I, II and III stewardship measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets. Following this, priority areas for protection within the Grassland biome can be identified and spatially targeted according to the updated NPAES.

The Grassland biome is desperately under-protected. Currently, just over 1.5 million ha of land in the Grassland biome is within protected areas and just under 525 000 ha is within OECMs, accounting for 4.8% and 1.6% of the land, respectively. The aim is to have 30% of land area in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs. This means that at least 26% of the 30% target should be under strict protection. Therefore, to achieve this target for the Grassland biome, the area under strict protected areas would need to be expanded by a total of 6.6 million ha through direct acquisition, offsets and Category I biodiversity stewardship. It is assumed that securing 6.6 million ha of land by 2034 for formal protection would be through biodiversity stewardship arrangements and direct land purchase with a ratio of 90:10. Additionally, a further 915 000 ha of land conserved through OECMs would be needed to achieve the 30% target by 2034.

Incorporating climate-smart principles into PCA management will require all PCAs to revise management and monitoring plans by 2027, or within two years of establishment. This would require launching guidelines on climate-smart protected area management for PCA managers to follow and adhere to. These could be a web-based set of short, clear guidelines on adapting protected area management to climate change within locational contexts, with interactive maps on projected climate and biodiversity shifts. To ensure that climate-smart management plans and monitoring are mandatory for PCAs, legislation could be reviewed requiring that all state, private and community protected and conservation areas update and lodge online new management plans that take the climate-smart guidelines into account and collect basic monitoring data.

The outputs and activities to achieving an outcome of highly effective protected area management where the area-weighted average METT score exceeds 80% are as follows:

- 1.** Protected area funding gap is reduced to zero by securing additional funding for protected area management activities;
- 2.** Awareness and understanding of conservation issues and strategies among conservation managers is increased by undertaking a capacity-building programme on biodiversity management under climate change;
- 3.** Strategic partnerships with NGOs and private partners improve biodiversity conservation outcomes by alleviating capacity gaps through implementing concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits;
- 4.** All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems; and
- 5.** Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

The lead implementing entities for these activities would be DFFE, SANBI, SANParks, provincial conservation authorities, with support from NGOs, CBOs, and private landowners.

Objective 2: Working landscapes are biodiversity-friendly

Creating biodiversity-friendly working landscapes outside of PCAs is critical to achieving climate resilience and reducing impacts on livelihoods. Indeed, sustainable grazing and fire management practices, sustainable harvesting of natural resources, restoration of degraded ecosystems and an increased proportion of rangeland under sustainable wildlife-based land use address the increased risks and improve landscape connectivity and species survival in a changing climate. Within the Grassland biome, the key adaptation priorities are to improve livestock and wildlife management, increase the proportion of rangeland under wildlife-based land uses, and restore degraded landscapes.

Achieving this objective in the Grassland biome will require large-scale ecosystem management through sustainable livestock and wildlife management and implementing appropriate burning regimes. Livestock and wildlife management is sustainable if the stocking rates are at or below the estimated sustainable stocking rates at district scale. This will require:

- 1.** A vastly improved extension services programme, achieved through:
 - i. Employing an additional ~820 agricultural extension officers in rangeland areas.
 - ii. Relocating existing and selecting new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.
 - iii. Updating extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.

- 2.** By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland, achieved through:
 - i. Designing national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.
- 3.** Increased participation in well-run sustainable livestock ranching programmes in communal land areas, achieved through:
 - i. Supporting communal farmers in participating in programmes such as Meat Naturally Pty/Herding 4 Health, prioritising those who have or are establishing conservancies. It is assumed that such programmes could be implemented in 15% of communal rangeland areas.

Most of the responsibilities for these actions fall under the mandate of DALRRD or their provincial departments. However, DFFE and SANBI would be expected to support DALRRD and the provincial agricultural departments in the design of certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching. The Provincial Extension Coordinating Forum (PECF) could assist with expanding extension services and upskilling extension officers. Communal land areas should be prioritised for establishing support through SLM programmes, which are developed by organisations such as Meat Naturally Pty, or through programmes such as Herding 4 Health, with the support of NGOs such as WWF, BirdLife, EWT and Conservation South Africa that are already actively involved in the Grassland biome.

Proactive fire management will achieve specific ecological outcomes if the burning guidelines for the biome are followed. This will require:

- i. Monitoring long-term fire data and developing appropriate fire management goals and guidelines that ensure correct frequency and intensity to achieve specific ecological outcomes for the Grassland biome.
- ii. Promoting a unified vision of fire management through information sharing/improved communication.

The lead implementing entities for this outcome would be DFFE and provincial conservation authorities with support from SANBI, research institutions, fire protection associations, NGOs, private landowners and CBOs.

Adapting to vegetation change, increasing temperatures and reduced grazing capacity will also require livestock farmers switching to WBLU in some areas to reduce impact on livelihoods. However, this will need to be well regulated and sustainable. This will require:

- 1.** Implementation of a clear regulatory framework for the game farming industry, achieved by:
 - i. Aligning agricultural and environmental legislation to develop a coherent policy which clarifies the position and role of game farming in South Africa.
- 2.** Development of a national electronic database of WBLU properties, achieved by:
 - i. Using the latest agricultural census data to develop a digital map and database of WBLU properties.
- 3.** Expanding WBLU into communal land, land under land reform beneficiary title, and land belonging to emerging farmers, achieved through:
 - i. Teaching WBLU practices to emerging farmers through improved WBLU extension services. This will require hiring ~150 additional extension officers.
 - ii. Providing support through infrastructure development and the supply of founder herds of game to emerging farmers and communities.

A clear regulatory framework for the game farming industry is needed to align agricultural and environmental legislation into a coherent policy which clarifies the position and role of game farming in South Africa. This will require collaboration between DFFE and DALRRD. Additionally, a national electronic database of WBLU properties and their activities needs to be developed with support from Stats SA (as part of the commercial agricultural census). Expanding well-regulated sustainable WBLU into communal land, land under land reform beneficiary title, and land belonging to emerging farmers through improved WBLU extension services will need to involve DFFE, DALRRD, and provincial conservation authorities. Support could be provided to emerging farmers and communities through infrastructure development and the supply of founder herds of game by SANParks and provincial conservation authorities through their Wildlife Economy Programmes.

The increasing levels of degradation across the Grassland biome are concerning and there is a need for focused and improved management and active clearing of bush-encroached land and IAPs. Restoring degraded ecosystems to a healthy state in priority landscapes will require the preparation of a detailed national restoration plan whereby decisions are being based on high-quality monitoring data. The national plan should identify where to target restoration effort in order to maximise biodiversity and ecosystem services. This will require:

- i. Preparing a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets.
- ii. Improving and maintaining national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.

Once a national restoration plan has been prepared, each biome will be able to have a spatially targeted approach to addressing degradation. There is a need for focused and improved management and active clearing of bush-encroached land and IAPs. According to the land degradation neutrality targets for South Africa (DEA, 2018b), the aim is to clear 633 702 ha of bush-encroached land and just over 1 million ha of IAPs across South Africa by 2034. Therefore, the outputs for the Grassland biome are that priority landscapes identified for bush clearing and IAP clearing in the National Restoration Plan for 2025-2034 have been cleared and are under follow-up maintenance. The target is that by 2034, at least 339 500 condensed ha of IAPs and at least 282 000 ha of bush-encroached land have been cleared from priority landscapes in the Grassland biome. This will require the following actions:

- i. Increasing efficiency of clearing teams and funding, e.g. through better equipment and outcome-based payments.
- ii. Developing norms and standards for treatment of bush encroachment in different contexts, to remove the legal barriers to landowners and entrepreneurs.
- iii. Creating fiscal mechanisms to incentivise landowners to restore areas of advanced bush encroachment as a tax write-off.
- iv. Clearing encroacher bush in areas of advanced bush encroachment in high-priority communal land areas.

These activities would largely fall to DFFE as the lead implementing entity but would likely require support from SANBI, DALRRD, provincial agriculture and provincial conservation authorities.

Objective 3: Aquatic ecosystems are healthy and resilient

The Grassland biome is home to many of South Africa's strategic water source areas. Therefore, it is of critical importance that these catchments and their aquatic ecosystems are restored and protected. Under this objective, the quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers, wetlands and estuaries is delivered and natural buffers are restored and protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources. The outcomes of this objective are that the resource quality objectives of rivers, wetlands and estuaries in the Grassland biome are met and endure under climate change, and riparian and wetland buffer areas are restored and protected. This will require:

- 1.** Assessment and monitoring of all important water management areas is improved, by:
 - i. Consistently reviewing and updating RQOs and environmental flows for rivers and wetlands.
- 2.** By 2034, ~18 000 ha of priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment, by:
 - i. Supporting the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas.

The lead implementing entity for this objective would be DWS and CMAs or catchment partnerships, with the support of DFFE, SANBI, NGOs, research organisations, CBOs, and the private sector.

Implementation plan

To achieve the long-term objectives for the Grassland biome, a total of 31 activities have been planned for. The total cost for implementation of these activities is estimated to be in the order of R15.3 billion over the ten years from 2025 to 2034 (Table 11, Table 12). Expanding protected areas, improving livestock and wildlife management, and actively restoring degraded ecosystems account for the majority of these costs. Note that budget figures are indicative and are in 2023 Rands. The implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Grassland biome is summarised in Table 13.

TABLE 11: Overall implementation costs for achieving the five priority adaptation objectives for the Grassland biome over ten years (2025–2034; R 2023).

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	4 790 000	31
Outcome 1.1 PCA extent meets CBA target	4 746 000	
Outcome 1.2 PCA management is climate smart	34 000	
Outcome 1.3 PCA management is highly effective	10 000	
Objective 2: Working landscapes are biodiversity-friendly	10 527 000	69
Outcome 2.1 Livestock and wildlife management is sustainable	1 236 000	
Outcome 2.3 WBLU in rangelands is increased	2 000	
Outcome 2.3 WBLU in rangelands is increased	303 000	
Outcome 2.4 Degraded ecosystems are restored	8 986 000	
Objective 3: Aquatic ecosystems are healthy and resilient	37 000	<1
Outcome 3.1 Resource quality objectives are met	18 000	
Outcome 3.2 Riparian and wetland areas restored and protected	19 000	
Overall cost	15 354 000	

TABLE 12: Overall implementation costs for achieving the priority adaptation objectives for the Grassland biome over ten years (2025–2034; R 2023) across relevant provinces (costs in R'000).

OBJECTIVE	TOTAL	EASTERN CAPE	FREE STATE	GAUTENG	KWAZULU-NATAL	LIMPOPO	MPUMALANGA	NORTHERN CAPE	NORTH WEST	NORTH WEST
Objective 1: PCA system is climate smart	4 790 000	1 017 850	1 589 637	175 521	735 745	56 510	713 639	59 918	439 041	2 138
Outcome 1.1 PCA extent meets CBA target	4 746 000	1 008 500	1 575 035	173 909	728 987	55 991	707 084	59 368	435 008	2 119
Outcome 1.2 PCA management is climate smart	34 000	7 225	11 283	1 246	5 222	401	5 065	425	3 116	15
Outcome 1.3 PCA management is highly effective	10 000	2 125	3 319	366	1 536	118	1 490	125	917	4
Objective 2: Working landscapes are biodiversity-friendly	10 527 000	2 236 932	3 493 550	385 743	1 616 950	124 192	1 568 368	131 683	964 882	4 700
Outcome 2.1 Livestock and wildlife management is sustainable	1 236 000	262 644	410 186	45 291	189 850	14 582	184 146	15 461	113 289	552
Outcome 2.2 Fire frequencies are appropriate for resilience	2 000	425	664	73	307	24	298	25	183	1
Outcome 2.3 WBLU in rangelands is increased	303 000	64 386	100 555	11 103	46 541	3 575	45 143	3 790	27 772	135
Outcome 2.4 Degraded ecosystems are restored	8 986 000	1 909 478	2 982 145	329 276	1 380 252	106 012	1 338 782	112 406	823 638	4 012
Objective 3: Aquatic ecosystems are healthy and resilient	37 000	7 862	12 279	1 356	5 683	437	5 512	463	3 391	17
Outcome 3.1 Resource quality objectives are met	18 000	3 825	5 974	660	2 765	212	2 682	225	1 650	8
Outcome 3.2 Riparian and wetland areas restored and protected	19 000	4 037	6 305	696	2 918	224	2 831	238	1 741	8
Overall cost	15 354 000	3 262 644	5 095 466	562 620	2 358 378	181 138	2 287 520	192 064	1 407 315	6 854

TABLE 13: Implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Grassland biome. All costs in 2023 Rands.

* These are national costs (not biome-level costs) to be included as part of the overall national plan.

Objective 1: PCA system is climate smart.				
Outcome 1.1: PCA extent meets CBA target.				
Target: 30% of land area is in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.1.1 NPAES 2030	1.1.1.1 NPAES is updated to incorporate increased area targets, identify critical areas for protected areas and high-priority landscapes for OECMs.	Lead: DFFE	3 840*	By end of 2025
Target: By 2025, NPAES 2030 is available.		Support: SANBI, conservation authorities		
	1.1.1.2 Adjust the biodiversity stewardship policy to simplify process and allow for spatial targeting of Category I, II and III measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.	Lead: DFFE, SANBI	1 620*	By end of 2025
		Support: SANParks, provincial conservation authorities		
1.1.2 Area under strict protection is expanded through direct acquisition, offsets and Category I biodiversity stewardship.	1.1.2.1 Implement spatially targeted incentives for Category I biodiversity stewardship and guide offset policies to expand the area under permanent protection in critical target areas.	Lead: SANParks, provincial conservation authorities	4 553 300	Over ten years, 2025-2034
Target: By 2034, 6 620 190 ha have been added to the PA estate, bringing the overall extent of strict, permanent protected areas to a minimum of 25% of land area.		Support: DFFE, SANBI, local government		
1.1.3 Conservation of priority landscapes outside of protected areas is achieved through OECMs (Category II and III Biodiversity Stewardship).	1.1.3.1 Implement spatial targeting of biodiversity stewardship incentives for Category II and Category III arrangements to encourage uptake in high-priority landscapes.	Lead: SANParks, provincial conservation authorities	191 170	Over ten years, 2025-2034
Target: By 2034, at least 915 000 ha of OECMs have been established.		Support: DFFE, SANBI, NGOs, People and Parks		
	1.1.3.2 Development of regulations on OECMs detailing qualifying properties of OECMs.	Lead: SANParks, DFFE	1 120	By end of 2025
		Support: SANBI, People and Parks, local government		

Outcome 1.2: PCA management is climate smart.				
Target: PCA management incorporates climate-smart principles.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.2.1 All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.	1.2.1.1 Review the PA management act to include climate-smart approaches with informative maps.	Lead: SANBI, DFFE Support: Conservation authorities, research institutions	2 200	By end of 2025
Target: By 2027, or within two years of establishment, all PCAs have up-to-date climate-smart management and monitoring plans that follow the guidelines.	1.2.1.2 All state, private and community protected and conservation areas update and lodge online management plans that take the climate-smart guidelines into account and collect basic monitoring data.	Lead: DFFE Support: Conservation authorities	31 510	By 2027, or within two years of establishment
Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.1 Protected area funding gap is reduced to zero.	1.3.1.1 Secure additional funding for protected and conservation area management activities.	Lead: SANParks, provincial conservation authorities	1 100	Over ten years, 2025–2036
Target: Funding for PA management increased by 10%.		Support: DFFE, NGOs, private sector		
1.3.2 Awareness and understanding of conservation issues and strategies among conservation managers is increased.	1.3.2.1 Undertake a capacity-building programme on biodiversity management under climate change.	Lead: DFFE, SANParks, provincial conservation authorities, local government	540	One year, 2025
Target: Senior staff in conservation agencies have attended a workshop and have in turn delivered a training to staff in their organisation.		Support: SANBI, NGOs		
1.3.3 Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps.	1.3.3.1 Set up concessions and joint venture partnerships to increase management effectiveness in protected and conservation areas, within sustainable limits.	Lead: SANParks, provincial conservation authorities, NGOs, private sector	3 930	Over ten years, 2025–2034
Target: Partnership arrangements improve financial and/or management efficiency.		Support: DFFE, SANBI		
1.3.4 All PCAs collect comparable and comprehensive baseline data on species and ecosystems to track changes and monitor management effectiveness.	1.3.4.1 Undertake baseline data collection on species and ecosystems within all PCAs.	Lead: SANParks, provincial conservation authorities	3 920	Over ten years, 2025–2034
Target: By 2027, or within two years of establishment, all PCAs have comprehensive baseline biodiversity data.		Support: NGOs, SANBI, research institutions		

Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.5 Species diversity, populations and ecosystem health show recovery or no deterioration over time, after accounting for climatic variability and ecosystem shifts.	1.3.5.1 Develop a monitoring plan to monitor species diversity, populations and ecosystem health.	Lead: SANParks, provincial conservation authorities	620	One year, 2025
Target: By 2034, biodiversity is healthy or recovering at a measurable rate in all PCAs.		Support: SANBI, research institutions		
Objective 2: Working landscapes are biodiversity-friendly.				
Outcome 2.1: Livestock and wildlife management is sustainable.				
Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.1.1 Vastly improved extension services programme.	2.1.1.1 Employ more agricultural extension officers in rangeland areas.	Lead: DALRRD and provincial-level agricultural departments	1 086 510	Over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
	2.1.1.2 Relocate existing and select new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.	Lead: DALRRD and provincial-level agricultural departments	These costs are included in 2.1.1.1	Ongoing, over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
Target: Level of satisfaction with extension officers rated as excellent in next Agricultural Census; Ratio of extension to producer 1:250.	2.1.1.3 Updated extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.	Lead: DALRRD, agricultural institutions, colleges	1 150	One year, 2025
		Support: Provincial-level agricultural departments		
	2.1.1.4 Provide continuous training to extension officers.	Lead: DALRRD, agricultural institutions, colleges	12 350	Every year, starting in 2025
		Support: Provincial-level agricultural departments		
2.1.2 By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland. Operational certification scheme for sustainable, wildlife-friendly livestock management.	2.1.2.1 Design national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 280*	By 2026
		Support: SANBI, NGOs		

Outcome 2.1: Livestock and wildlife management is sustainable.				
Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
Target: By 2034, 30% of rangeland area in the biome is under wildlife/ biodiversity-friendly certified farming systems.	2.1.2.2 Encourage livestock/wildlife farmers to apply for sustainable, wildlife-friendly/ biodiversity-friendly certification.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 120	2027-2028
		Support: SANBI, NGOs		
2.1.3 Increased participation in well-run sustainable livestock ranching programmes in communal land areas.	2.1.3.1 Increase awareness of opportunities for sustainable livestock ranching and support communal farmers in participating in programmes such as Meat Naturally, prioritising those who have or are establishing conservancies.	Lead: Meat Naturally Pty, NGOs	132 950	Over ten years, 2025-2034
Target: Support programme is operational.		Support: DFFE, DALRRD, provincial-level agricultural departments		
Outcome 2.2: Fire frequencies are appropriate for maintaining ecosystem resilience. ('appropriate burning regimes')				
Target: Burn frequency is within biome guidelines.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.2.1 Burning guidelines for all biomes are followed (maintaining biodiversity).	2.2.1.1 Review and potentially adjust current legislation regarding fire to incorporate best practices from an ecological perspective.	Lead: Conservation authorities, SANBI, local government	770	By 2025
		Support: DFFE, SAWS, research institutions		
Target: Proactive fire management achieves specific ecological outcomes.	2.2.1.2 Develop appropriate fire management goals and guidelines that ensure correct frequency and intensity to achieve specific ecological outcomes.	Lead: Conservation authorities, SANBI, local government	770	By 2025
		Support: DFFE, SAWS, research institutions		
	2.2.1.3 Promote a unified vision of fire management through information sharing/ improved stakeholder communication.	Lead: DFFE, FPAs, local government	420*	Each year, 2025-2034
		Support: NGOs, SANBI		

Outcome 2.3: Proportion of rangeland under WBLU is increased.				
Target: Land area with wildlife-based land uses increased significantly.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.3.1 A clear regulatory framework for the game farming industry is implemented, including clear standards, regulation, and licensing.	2.3.1.1 Align agricultural and environmental legislation to develop a coherent policy which clarifies the position and role of game farming in South Africa.	Lead: DFFE, DALRRD	1 660*	One year, 2025
Target: Policy for game farming.		Support: SANBI, NGOs, business		
2.3.2 National electronic database of WBLU properties is developed.	2.3.2.1 Use the latest agricultural census to develop a digital map and database of WBLU properties, including capacity building on map use.	Lead: DFFE, Stats SA	960*	Over two years, 2025–2026
Target: All WBLU properties and activities are captured.		Support: DALRRD, SANBI		
2.3.3 WBLU is expanded into communal land, land under land reform beneficiary title, and land belonging to emerging farmers.	2.3.3.1 Teach WBLU practices to emerging farmers through improved WBLU extension services.	Lead: DFFE	271 630	Over ten years, 2025–2034
		Support: DALRRD, SANBI		
Target: Increased number of emerging WBLU farmers.	2.3.3.2 Provide support through infrastructure development and the supply of founder herds of game to emerging farmers and communities.	Lead: SANParks, provincial conservation authorities	30 930	Over three years, 2025–2027
		Support: DFFE, DALRRD, provincial-level agricultural departments		
Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.1 Detailed national restoration plan.	2.4.1.1 Prepare a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets. The plan needs to also map drivers of degradation and existing soil conservation measures.	Lead: DFFE, SANBI	3 400*	By 2025
Target: Restoration plan is in place.		Support: Research institutions, NGOs		
2.4.2 Decisions are based on high-quality monitoring data.	2.4.2.1 Improve and maintain national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.	Lead: SANBI	1 310*	Over ten years, 2025–2034
Target: High-quality data is available online.		Support: DFFE, research institutions		

Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.4 Priority landscapes identified for IAP clearing in the National Restoration Plan for 2024-2030 have been cleared and are under follow-up maintenance.	2.4.4.1 Increase efficiency of clearing teams and funding, e.g. through better equipment, outcome-based payments. Promote women's and youths' participation.	Lead: DFFE	7 480 280	Over ten years, 2025-2034
Target: By 2034, at least 339 500 condensed ha of IAPs have been cleared from priority landscapes.		Support: Provincial conservation authorities, local government		
2.4.5 Priority landscapes identified for bush clearing in the National Restoration Plan for 2024-2030 have been cleared and are under follow-up maintenance.	2.4.5.1 Develop norms and standards for treatment of bush encroachment in different contexts, to remove the legal barriers to landowners and entrepreneurs.	Lead: DFFE	1 310	By 2025
		Support: SANBI, DALRRD		
Target: By 2034, at least 281 710 ha of bush-encroached land have been cleared from priority landscapes.	2.4.5.2 Create fiscal mechanism to incentivise landowners to restore areas of advanced bush encroachment as a tax write-off.	Lead: DFFE	930	By 2025
		Support: SANBI		
	2.4.5.3 Clear encroacher bush in areas of advanced bush encroachment in high-priority communal land areas. Promote women's and youths' participation.	Lead: DFFE, DALRRD	1 503 280	Over ten years, 2025-2034
		Support: NGOs, provincial conservation authorities, provincial agriculture		
2.4.6 The legislation framework for IAP clearing is implemented.	2.4.6.1 Policy guidelines for the adoption and implementation of IAP removal are implemented.	Lead: DFFE	410	By 2025
Target: By 2025, the legislation framework for IAP clearing has been implemented.		Support: NGOs, provincial authorities		
Objective 3: Aquatic ecosystems are healthy and resilient.				
Outcome 3.1: Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change.				
Target: RQOs are met.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.1.1 Assessment and monitoring of all important water management areas is improved.	3.1.1.1 Improve monitoring and consistently review and update RQOs and environmental flows. Identify which areas in the catchment impact the health of important systems.	Lead: DWS	18 280	Annually, starting in 2025
Target: By 2034, all water management areas have updated RQOs and appropriate monitoring in place.		Support: DFFE, CMAs, NGOs, research institutions		

Outcome 3.2: Riparian and wetland buffer areas are restored and protected.				
<i>Target: Riparian and wetland buffer areas are effectively enforced and are clear from IAPs.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.2.1 Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment.	3.2.1.1 Support the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas. Ensure that this is done in areas of high importance for catchment health.	Lead: DFFE, DWS	18 970	Over ten years, 2025-2034
<i>Target: By 2034, at least 17 920 ha of riparian/wetland area in priority areas are under stewardship and are being protected from encroachment and degradation.</i>		Support: CMAs, NGOs, CBOs, private sector		

Fynbos Biome

Overview

The Fynbos biome covers the south-western part of South Africa and is isolated to the Eastern Cape, Northern Cape and Western Cape provinces. It is a global biodiversity hotspot and has high floristic diversity (Holmes *et al.*, 2012) 460 km² encompasses four local centers of fynbos plant endemism, 19 national terrestrial vegetation types (six endemic to the city. Around 21% of the biome is strictly protected and 22% is conserved within OECMs. However, most protection is in the higher mountainous areas and protection in the lowlands and in the renosterveld is considered insufficient (Skowno *et al.*, 2019). Expanding protected areas in CBAs and maintaining natural land in ESAs will be important. Further to this, better fire management is required to ensure a natural fire cycle.

Strategic objectives, targets and activities

The priority adaptation options identified in the Biodiversity Adaptation Strategy for the Fynbos biome include the expansion of the protected area network into priority landscapes and addressing degradation through improved fire and IAP management (Turpie *et al.*, 2021).

Objective 1: System of protected and conservation areas is climate smart

An expanded, connected, effective and climate-smart system of protected and conservation areas (PCAs) minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services. Achieving this will require expansion of the current PCA network, and ensuring climate-smart and highly effective PCA management. The aim is to meet CBA targets and have 30% of terrestrial ecosystems under conservation by 2034, to incorporate climate-smart principles into PCA management, and to achieve an area-weighted average Management Effectiveness Tracking Tool (METT) score that exceeds 80%.

To achieve these outcomes, it will be critically important to update the NPAES 2030 to incorporate increased area targets, identify critical areas for state protection and high-priority landscapes for spatial targeting of biodiversity stewardship incentives. The process of updating the NPAES should also include adjusting the

biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III stewardship measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets. Following this, priority areas for protection within the Fynbos biome can be identified and spatially targeted according to the updated NPAES.

Currently, just under 1.8 million ha of land in the Fynbos biome is within protected areas and just under 2.4 million ha is within OECSs, accounting for 21% and 29% of the land, respectively. The aim is to have 30% of land area in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECSs. This means that at least 26% of the 30% target should be under strict protection. Therefore, to achieve this target for the Fynbos biome, the area under strict protected areas would need to be expanded by a total of 367 000 ha through direct acquisition, offsets and Category I biodiversity stewardship. It is assumed that securing 367 000 ha of land by 2034 for formal protection would be through biodiversity stewardship arrangements and direct land purchase with a ratio of 90:10. The area of land under conservation through OECSs already covers the remainder to achieve the 30% target.

It also needs to be ensured that an adequate amount of all the different fynbos types is conserved. While some fynbos types, such as the Peninsula Sandstone Fynbos, are well conserved, others, such as the Kogelberg Sandstone Fynbos, are critically endangered (City of Cape Town, 2011). Further strategies for the different fynbos types need to be developed in the future but are not part of this strategy.

Incorporating climate-smart principles into PCA management will require all PCAs to revise management and monitoring plans by 2027, or within two years of establishment. This would require launching guidelines on climate-smart protected area management for PCA managers to follow and adhere to. A climate-smart management plan would need to include that fynbos is managed well in terms of fire and alien species clearing (see Objective 2). Coupled with anthropogenic climate changes, too infrequent burns can lead to more catastrophic fires. These could be a web-based set of short, clear guidelines on adapting protected area management to climate change within locational contexts, with interactive maps on projected climate and biodiversity shifts. To ensure that climate-smart management plans and monitoring are mandatory for PCAs, legislation could be reviewed requiring that all state, private and community protected and conservation areas update and lodge online new management plans that take the climate-smart guidelines into account and collect basic monitoring data.

The outputs and activities to achieving an outcome of highly effective protected area management where the area-weighted average METT score exceeds 80% are as follows:

- 1.** Protected area funding gap is reduced to zero by securing additional funding for protected area management activities.
- 2.** Awareness and understanding of conservation issues and strategies among conservation managers is increased by undertaking a capacity-building programme on biodiversity management under climate change.
- 3.** Strategic partnerships with NGOs and private partners improve biodiversity conservation outcomes by alleviating capacity gaps through implementing concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits.
- 4.** All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems.
- 5.** Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

The lead implementing entities for these activities would be DFFE, SANBI, SANParks, and provincial conservation authorities, with support from NGOs, CBOs, and private landowners.

Objective 2: Working landscapes are biodiversity-friendly

Creating biodiversity-friendly working landscapes outside of PCAs is critical to achieving climate resilience and reducing impacts on livelihoods. Indeed, sustainable grazing and fire management practices, sustainable harvesting of natural resources, and restoration of degraded ecosystems address the increased risks and improve landscape connectivity and species survival in a changing climate. Within the Fynbos biome, the key adaption priorities are to improve fire management and restore degraded landscapes.

Achieving this objective in the Fynbos biome will require improved fire and IAP management. Fire and IAPs are intrinsically linked and should be managed together to achieve conservation outcomes. IAPs increase the severity and frequency of wildfires and in doing so they change the way wildfires behave and alter fire regimes. However, it has been recognised that fire can be used as a management tool in the control of IAPs. This will require further research which should be accommodated in the plan. Proactive fire management will achieve specific ecological outcomes if the burning guidelines for the biome are followed. This will require:

- i. Monitoring long-term fire data and developing appropriate fire management goals and guidelines that ensure correct frequency and intensity to achieve specific ecological outcomes for the Fynbos biome (e.g. including in the management of IAPs).
- ii. Promoting a unified vision of fire management through information sharing/improved communication.

The lead implementing entities for this outcome would be DFFE and provincial conservation authorities (CapeNature, ECPTA) with support from SANBI, research institutions, fire protection associations, NGOs, private landowners and CBOs. To maintain biodiversity, burning guidelines for all biomes need to be followed. This requires monitoring long-term fire data and developing appropriate fire management guidelines and working collaboratively with other stakeholders through information sharing. SANBI and FPAs (e.g. Greater Overberg FPA) could provide technical advice in the creation of appropriate burning guidelines. Information sharing forums could be held through FPAs with assistance from active NGOs, such as WWF-SA.

The increasing levels of degradation across the Fynbos biome are concerning and there is a need for focused and improved management and active clearing of IAPs. Restoring degraded ecosystems to a healthy state in priority landscapes will require the preparation of a detailed national restoration plan whereby decisions are being based on high-quality monitoring data. The national plan should identify where to target restoration effort in order to maximise biodiversity and ecosystem services. This will require:

- i. Preparing a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets.
- ii. Improving and maintaining national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.

Once a national restoration plan has been prepared, each biome will be able to have a spatially targeted approach to addressing degradation. There is a need for focused and improved management and active clearing of IAPs in the Fynbos biome. According to the land degradation neutrality targets for South Africa (DEA, 2018b), the aim is to clear just over 1 million ha of IAPs across South Africa by 2034. Therefore, the output for the Fynbos biome is that priority landscapes identified for IAP clearing in the National Restoration

Plan for 2025–2034 have been cleared and are under follow-up maintenance. The target is that by 2034, at least 130 000 condensed ha of IAPs have been cleared from priority landscapes in the Fynbos biome. This will require the following actions:

- i. Increasing efficiency of clearing teams and funding, e.g. through better equipment and outcome-based payments.

Improving IAP management and undertaking active clearing mostly falls under the DFFE's and provincial conservation authorities' (CapeNature) and environment departments' mandates, but additionally requires the support of SANBI, SAEON (and other research organisations) for the mapping of IAPs and the improvement of the NIAPS dataset, as well as DALRRD and provincial agriculture departments. NGOs could also play an important role in achieving restoration outcomes.

Objective 3: Aquatic ecosystems are healthy and resilient

The main rivers and wetlands of the Fynbos biome provide a vital function in terms of the water needs for the various economic sectors within the Western and Eastern Cape. Therefore, it is of critical importance that these water source areas and their aquatic ecosystems are restored and protected. Under this objective, the quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers, wetlands and estuaries is delivered and natural buffers are restored and protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources. The outcomes of this objective are that the resource quality objectives of rivers, wetlands and estuaries in the Fynbos biome are met and endure under climate change, and riparian and wetland buffer areas are restored and protected. This will require:

- 1.** Assessment and monitoring of all important water management areas is improved, by:
 - i. Consistently reviewing and updating RQOs and environmental flows for rivers and wetlands.
- 2.** By 2034, ~4 100 ha of priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment, by:
 - i. Supporting the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas.

The lead implementing entity for this objective would be DWS and catchment management agencies/ catchment partnerships/GCTWF, with the support of DFFE, SANBI, NGOs, research organisations, CBOs, and the private sector.

Implementation plan

To achieve the long-term objectives for the Fynbos biome, a total of 26 activities have been planned for, which are estimated to cost in the order of R3.2 billion over ten years (Table 14, Table 15). Addressing IAPs through active clearing and maintenance accounts for most of these costs, followed by the expansion of protected areas. Note that budget figures are indicative and are in 2023 Rands. The implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Fynbos biome is summarised in Table 16.

TABLE 14: Overall implementation costs for achieving the five priority adaptation objectives for the Fynbos biome over ten years (2025–2034; R 2023).

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	282 000	9
Outcome 1.1 PCA extent meets CBA target	253 000	
Outcome 1.2 PCA management is climate smart	19 000	
Outcome 1.3 PCA management is highly effective	10 000	
Objective 2: Working landscapes are biodiversity-friendly	2 867 000	91
Outcome 2.3 WBLU in rangelands is increased	2 000	
Outcome 2.4 Degraded ecosystems are restored	2 865 000	
Objective 3: Aquatic ecosystems are healthy and resilient	9 000	<1
Outcome 3.1 Resource quality objectives are met	5 000	
Outcome 3.2 Riparian and wetland areas restored and protected	4 000	
Overall cost	3 158 000	

TABLE 15: Overall implementation costs for achieving the priority adaptation objectives for the Fynbos biome over ten years (2025–2034; R 2023) across relevant provinces (costs in R'000).

OBJECTIVE	TOTAL	EASTERN CAPE	NORTHERN CAPE	NORTH WEST
Objective 1: PCA system is climate smart	282 000	35 791	22 351	223 859
Outcome 1.1 PCA extent meets CBA target	253 000	32 110	20 052	200 838
Outcome 1.2 PCA management is climate smart	19 000	2 411	1 506	15 083
Outcome 1.3 PCA management is highly effective	10 000	1 269	793	7 938
Objective 2: Working landscapes are biodiversity-friendly	2 867 000	363 871	227 234	2 275 896
Outcome 2.2 Fire frequencies are appropriate for resilience	2 000	254	159	1 588
Outcome 2.4 Degraded ecosystems are restored	2 865 000	363 617	227 075	2 274 308
Objective 3: Aquatic ecosystems are healthy and resilient	9 000	1 142	713	7 144
Outcome 3.1 Resource quality objectives are met	5 000	635	396	3 969
Outcome 3.2 Riparian and wetland areas restored and protected	4 000	508	317	3 175
Overall cost	3 158 000	400 803	250 298	2 506 899

TABLE 16: Implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Fynbos biome. All costs in 2023 Rands.

* These are national costs (not biome-level costs) to be included as part of the overall national plan.

Objective 1: PCA system is climate smart.				
Outcome 1.1: PCA extent meets CBA target.				
Target: 30% of land area is in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.1.1 NPAES 2030	1.1.1.1 NPAES is updated to incorporate increased area targets, identify critical areas for protected areas and high-priority landscapes for OECMs.	Lead: DFFE	3 840*	By end of 2025
Target: By 2025, NPAES 2030 is available.		Support: SANBI, conservation authorities		
	1.1.1.2 Adjust the biodiversity stewardship policy to simplify process and allow for spatial targeting of Category I, II and III measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.	Lead: DFFE, SANBI	1 620*	By end of 2025
		Support: SANParks, provincial conservation authorities		
1.1.2 Area under strict protection is expanded through direct acquisition, offsets and Category I biodiversity stewardship.	1.1.2.1 Implement spatially targeted incentives for Category I biodiversity stewardship and guide offset policies to expand the area under permanent protection in critical target areas.	Lead: SANParks, provincial conservation authorities	251 890	Over ten years, 2025-2034
Target: By 2034, 366 230 ha have been added to the PA estate, bringing the overall extent of strict, permanent protected areas to a minimum of 25% of land area.		Support: DFFE, SANBI, local government		
1.1.3 Conservation of priority landscapes outside of protected areas is achieved through OECMs (Category II and III Biodiversity Stewardship).	1.1.3.1 Implement spatial targeting of biodiversity stewardship incentives for Category II and Category III arrangements to encourage uptake in high-priority landscapes.	Lead: SANParks, provincial conservation authorities	0	Over ten years, 2025-2034
Target: By 2034, at least 0 ha of OECMs have been established.		Support: DFFE, SANBI, NGOs, People and Parks		
	1.1.3.2 Development of regulations on OECMs detailing qualifying properties of OECMs.	Lead: SANParks, DFFE	1 120	By end of 2025
		Support: SANBI, People and Parks, local government		

Outcome 1.2: PCA management is climate smart.				
Target: PCA management incorporates climate-smart principles.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.2.1 All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.	1.2.1.1 Review the PA management act to include climate-smart approaches with informative maps.	Lead: SANBI, DFFE Support: Conservation authorities, research institutions	2 200	By end of 2025
Target: By 2027, or within two years of establishment, all PCAs have up-to-date climate-smart management and monitoring plans that follow the guidelines.	1.2.1.2 All state, private and community protected and conservation areas update and lodge online management plans that take the climate-smart guidelines into account and collect basic monitoring data.	Lead: DFFE Support: Conservation authorities	16 390	By 2027, or within two years of establishment
Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.1 Protected area funding gap is reduced to zero.	1.3.1.1 Secure additional funding for protected and conservation area management activities.	Lead: SANParks, provincial conservation authorities	1 100	Over ten years, 2025–2040
Target: Funding for PA management increased by 10%.		Support: DFFE, NGOs, private sector		
1.3.2 Awareness and understanding of conservation issues and strategies among conservation managers is increased.	1.3.2.1 Undertake a capacity-building programme on biodiversity management under climate change.	Lead: DFFE, SANParks, provincial conservation authorities, local government	540	One year, 2025
Target: Senior staff in conservation agencies have attended a workshop and have in turn delivered a training to staff in their organisation.		Support: SANBI, NGOs		
1.3.3 Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps.	1.3.3.1 Set up concessions and joint venture partnerships to increase management effectiveness in protected and conservation areas, within sustainable limits.	Lead: SANParks, provincial conservation authorities, NGOs, private sector	3 930	Over ten years, 2025–2034
Target: Partnership arrangements improve financial and/or management efficiency.		Support: DFFE, SANBI		
1.3.4 All PCAs collect comparable and comprehensive baseline data on species and ecosystems to track changes and monitor management effectiveness.	1.3.4.1 Undertake baseline data collection on species and ecosystems within all PCAs.	Lead: SANParks, provincial conservation authorities	3 920	Over ten years, 2025–2034
Target: By 2027, or within two years of establishment, all PCAs have comprehensive baseline biodiversity data.		Support: NGOs, SANBI, research institutions		

Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.5 Species diversity, populations and ecosystem health show recovery or no deterioration over time, after accounting for climatic variability and ecosystem shifts.	1.3.5.1 Develop a monitoring plan to monitor species diversity, populations and ecosystem health.	Lead: SANParks, provincial conservation authorities	620	One year, 2025
Target: By 2034, biodiversity is healthy or recovering at a measurable rate in all PCAs.		Support: SANBI, research institutions		
Objective 2: Working landscapes are biodiversity-friendly.				
Outcome 2.2: Fire frequencies are appropriate for maintaining ecosystem resilience. ('appropriate burning regimes')				
Target: Burn frequency is within biome guidelines.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.2.1 Burning guidelines for all biomes are followed (maintaining biodiversity).	2.2.1.1 Review and potentially adjust current legislation regarding fire to incorporate best practices from an ecological perspective.	Lead: Conservation authorities, SANBI, local government	770	By 2025
		Support: DFFE, SAWS, research institutions		
Target: Proactive fire management achieves specific ecological outcomes.	2.2.1.2 Develop appropriate fire management goals and guidelines that ensure correct frequency and intensity to achieve specific ecological outcomes.	Lead: Conservation authorities, SANBI, local government	770	By 2025
		Support: DFFE, SAWS, research institutions		
	2.2.1.3 Promote a unified vision of fire management through information sharing/ improved stakeholder communication.	Lead: DFFE, FPAs, local government	420*	Each year, 2025-2034
		Support: NGOs, SANBI		
Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.1 Detailed national restoration plan.	2.4.1.1 Prepare a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets. The plan needs to also map drivers of degradation and existing soil conservation measures.	Lead: DFFE, SANBI	3 400*	By 2025
Target: Restoration plan is in place.		Support: Research institutions, NGOs		

Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.2 Decisions are based on high-quality monitoring data.	2.4.2.1 Improve and maintain national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.	Lead: SANBI	1 310*	Over ten years, 2025-2034
Target: High-quality data is available online.		Support: DFFE, research institutions		
2.4.4 Priority landscapes identified for IAP clearing in the National Restoration Plan for 2024-2030 have been cleared and are under follow-up maintenance.	2.4.4.1 Increase efficiency of clearing teams and funding, e.g. through better equipment, outcome-based payments. Promote women's and youths' participation.	Lead: DFFE	2 864 520	Over ten years, 2025-2034
Target: By 2034, at least 130 010 condensed ha of IAPs have been cleared from priority landscapes.		Support: Provincial conservation authorities, local government		
Objective 3: Aquatic ecosystems are healthy and resilient.				
Outcome 3.1: Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change.				
Target: RQOs are met.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.1.1 Assessment and monitoring of all important water management areas is improved.	3.1.1.1 Improve monitoring and consistently review and update RQOs and environmental flows. Identify which areas in the catchment impact the health of important systems.	Lead: DWS	4 800	Annually, starting in 2025
Target: By 2034, all water management areas have updated RQOs and appropriate monitoring in place.		Support: DFFE, CMAs, NGOs, research institutions		
Outcome 3.2: Riparian and wetland buffer areas are restored and protected.				
Target: Riparian and wetland buffer areas are effectively enforced and are clear from IAPs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.2.1 Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment.	3.2.1.1 Support the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas. Ensure that this is done in areas of high importance for catchment health.	Lead: DFFE, DWS	4 310	Over ten years, 2025-2034
Target: By 2034, at least 4 070 ha of riparian/wetland area in priority areas are under stewardship and are being protected from encroachment and degradation.		Support: CMAs, NGOs, CBOs, private sector		

Succulent Karoo Biome

Overview

The Succulent Karoo biome covers just under 8 million ha and is mostly confined to the Northern and Western Cape, with a small area falling within the Eastern Cape. CBAs cover just under 40% of the biome area. Currently, just under 10% of the biome is formally protected in strict protected areas and just over 10% is conserved in OECMs. However, this biome has more ecosystem types classified as 'not protected' than any other biome (Skowno *et al.*, 2019). Many succulent plant species that characterise the biome are threatened due to degradation from extensive livestock grazing and from poaching for the illegal plant trade.

Strategic objectives, targets and activities

The Biodiversity Adaptation Strategy identified a number of key priority adaptation options for the Succulent Karoo biome. These are expanding the protected area system, improving livestock management, improving the management and harvesting of natural resources, and addressing IAPs.

Objective 1: System of protected and conservation areas is climate smart

An expanded, connected, effective and climate-smart system of protected and conservation areas (PCAs) minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services. Achieving this will require expansion of the current PCA network, and ensuring climate-smart and highly effective PCA management. The aim is to meet CBA targets and have 30% of terrestrial ecosystems under conservation by 2034, to incorporate climate-smart principles into PCA management, and to achieve an area-weighted average Management Effectiveness Tracking Tool (METT) score that exceeds 80%.

To achieve these outcomes, it will be critically important to update the NPAES 2030 to incorporate increased area targets, identify critical areas for state protection and high-priority landscapes for spatial targeting of biodiversity stewardship incentives. The process of updating the NPAES should also include adjusting the biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III stewardship measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets. Following this, priority areas for protection within the Succulent Karoo biome can be identified and spatially targeted according to the updated NPAES.

Currently, just under 814 000 ha of land in the Succulent Karoo biome is within protected areas and just under 864 000 ha is within OECMs, accounting for 9.8% and 10.4% of the land, respectively. The aim is to have 30% of land area in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs. This means that at least 26% of the 30% target should be under strict protection. Therefore, to achieve this target for the Succulent Karoo biome, the area under strict protected areas would need to be expanded by a total of 1.3 million ha through direct acquisition, offsets and Category I biodiversity stewardship. It is assumed that securing 1.3 million ha of land by 2034 for formal protection would be through biodiversity stewardship arrangements and direct land purchase with a ratio of 90:10. The area of land under conservation through OECMs already covers the remainder to achieve the 30% target.

Incorporating climate-smart principles into PCA management will require all PCAs to revise management and monitoring plans by 2027, or within two years of establishment. This would require launching guidelines on climate-smart protected area management for PCA managers to follow and adhere to. These could be

a web-based set of short, clear guidelines on adapting protected area management to climate change within locational contexts, with interactive maps on projected climate and biodiversity shifts. To ensure that climate-smart management plans and monitoring are mandatory for PCAs, legislation could be reviewed requiring that all state, private and community protected and conservation areas update and lodge online new management plans that take the climate-smart guidelines into account and collect basic monitoring data.

The outputs and activities to achieving an outcome of highly effective protected area management where the area-weighted average METT score exceeds 80% are as follows:

- 1.** Protected area funding gap is reduced to zero by securing additional funding for protected area management activities;
- 2.** Awareness and understanding of conservation issues and strategies among conservation managers is increased by undertaking a capacity-building programme on biodiversity management under climate change;
- 3.** Strategic partnerships with NGOs and private partners improve biodiversity conservation outcomes by alleviating capacity gaps through implementing concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits;
- 4.** All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems; and
- 5.** Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

The lead implementing entities for these activities would be DFFE, SANBI, SANParks, and provincial conservation authorities, with support from NGOs, CBOs, and private landowners.

Objective 2: Working landscapes are biodiversity-friendly

Creating biodiversity-friendly working landscapes outside of PCAs is critical to achieving climate resilience and reducing impacts on livelihoods. Indeed, sustainable grazing practices, sustainable harvesting of natural resources, and restoration of degraded ecosystems address the increased risks and improve landscape connectivity and species survival in a changing climate. Within the Succulent Karoo biome, the key adaption priorities are to expand the protected area network, improve livestock management, ensure the sustainable harvesting of fauna and flora, and restore degraded landscapes.

Achieving this objective in the Succulent Karoo biome will require large-scale ecosystem management through sustainable livestock and wildlife management. Livestock and wildlife management is sustainable if the stocking rates are at or below the estimated sustainable stocking rates at district scale. This will require:

- 1.** A vastly improved extension services programme, achieved through:
 - i. Employing an additional ~40 agricultural extension officers in rangeland areas.
 - ii. Relocating existing and selecting new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.
 - iii. Updating extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.
- 2.** By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland, achieved through:
 - i. Designing national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.

- 3.** Increased participation in well-run sustainable livestock ranching programmes in communal land areas, achieved through:
 - i. Supporting communal farmers in participating in programmes such as Meat Naturally Pty/ Herding 4 Health, prioritising those who have or are establishing conservancies. It is assumed that such programmes could be implemented in 15% of communal rangeland areas.

Most of the responsibilities for these actions fall under the mandate of DALRRD or their provincial departments. However, DFFE and SANBI would be expected to support DALRRD and the provincial agricultural departments in the design of certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching. The Provincial Extension Coordinating Forum (PECF) could assist with expanding extension services and upskilling extension officers. Communal land areas should be prioritised for establishing support through SLM programmes, which are developed by organisations such as Meat Naturally Pty, or through programmes such as Herding 4 Health, with the support of NGOs such as WWF-SA, Wilderness Fund, BirdLife, EWT and Conservation South Africa that are already actively involved in the Succulent Karoo biome.

The poaching of indigenous flora in the Succulent Karoo for illegal trade is a major concern. In 2022 the National Response Strategy and Action Plan to address the illegal trade in South African succulent flora was endorsed for implementation. This has led to the formation of a partnership project to implement some of the objectives identified in the strategy. The actions under this objective in the implementation plan would focus on supporting the continuation of this work through the following outputs and activities:

- 1.** Indigenous fauna and flora identified as threatened and endangered are effectively managed using participatory approaches, by
 - i. Securing local community support to develop response actions (such as an anti-poaching strategy) through engagement.
- 2.** Comprehensive baseline data, monitoring and protection of threatened and endangered fauna and flora is improved, by
 - i. Undertaking baseline stock assessments and developing monitoring plans for threatened and endangered fauna and flora.
 - ii. Improving environmental management inspectorates/law enforcement through better resourcing for investigation and prevention of biodiversity crime.

This requires collaboration between DFFE, SANBI, provincial departments of environment and conservation authorities, research institutions, NGOs and local and provincial government law enforcement departments. NGOs that are currently active in this space include WWF-SA, CSA, Wilderness Foundation Africa, and BotSoc.

The increasing levels of degradation across the Succulent Karoo biome are concerning and there is a need for focused and improved management and active clearing of IAPs. Restoring degraded ecosystems to a healthy state in priority landscapes will require the preparation of a detailed national restoration plan whereby decisions are being based on high-quality monitoring data. The national plan should identify where to target restoration effort in order to maximise biodiversity and ecosystem services. This will require:

- i. Preparing a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets.
- ii. Improving and maintaining national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.

Once a national restoration plan has been prepared, each biome will be able to have a spatially targeted approach to addressing degradation. This is particularly important for the arid biomes, for which widescale mapping of IAPs has not been undertaken. IAPs, in particular *Prosopis* sp., are becoming increasingly prevalent in the Succulent Karoo. Dense infestations of *Prosopis* sp. have a negative impact on local flora and can cause extensive erosion, both of which have an impact on livestock production. According to the land degradation neutrality targets for South Africa (DEA, 2018b), the aim is to clear just over 1 million ha of IAPs across South Africa by 2034. Therefore, the output for the Succulent Karoo biome is that priority landscapes identified for IAP clearing in the National Restoration Plan for 2025-2034 have been cleared and are under follow-up maintenance. The target is that by 2034, at least 74 500 condensed ha of IAPs have been cleared from priority landscapes in the Succulent Karoo biome. This will require the following actions:

- i. Increasing efficiency of clearing teams and funding, e.g. through better equipment and outcome-based payments.

Improving IAP management and undertaking active clearing mostly falls under the DFFE's and provincial conservation authorities' (CapeNature) and environment departments' mandates, but additionally requires the support of SANBI, SAEON (and other research organisations) for the mapping of IAPs and the improvement of the NIAPS dataset, as well as DALRRD and provincial agriculture departments. NGOs could also play an important role in achieving restoration outcomes.

Objective 3: Aquatic ecosystems are healthy and resilient

The *Prosopis* invasions are extensive along watercourses, which is problematic for this water-stressed area of the country. Therefore, it is of critical importance that these aquatic ecosystems are restored and protected. Under this objective, the quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers, wetlands and estuaries is delivered and natural buffers are restored and protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources. The outcomes of this objective are that the resource quality objectives of rivers, wetlands and estuaries in the Succulent Karoo biome are met and endure under climate change, and riparian and wetland buffer areas are restored and protected. This will require:

1. Assessment and monitoring of all important water management areas is improved, by:
 - i. Consistently reviewing and updating RQOs and environmental flows for rivers and wetlands.
2. By 2034, ~5 700 ha of priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment, by:
 - i. Supporting the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas.

The lead implementing entity for this objective would be DWS and catchment management agencies or catchment partnerships, with the support of DFFE, SANBI, NGOs, research organisations, CBOs, and the private sector.

Implementation plan

To achieve the long-term objectives for the Succulent Karoo biome, a total of 25 activities have been planned for. The total cost for implementation of these activities is estimated to be in the order of R2.7 billion over ten years (Table 17, Table 18). Clearing IAPs, expanding the protected area network and improving livestock management are the costliest activities, with IAP clearing accounting for more than half of the total cost. Note that budget figures are indicative and are in 2023 Rands. The implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Succulent Karoo biome is summarised in Table 19.

TABLE 17: Overall implementation costs for achieving the five priority adaptation objectives for the Succulent Karoo biome over ten years (2025–2034; R 2023).

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	918 000	34
Outcome 1.1 PCA extent meets CBA target	902 000	
Outcome 1.2 PCA management is climate smart	6 000	
Outcome 1.3 PCA management is highly effective	10 000	
Objective 2: Working landscapes are biodiversity-friendly	1 742 000	65
Outcome 2.1 Livestock and wildlife management is sustainable	102 000	
Outcome 2.4 Degraded ecosystems are restored	1 640 000	
Outcome 2.5 Harvesting rates are sustainable	12 000	
Objective 3: Aquatic ecosystems are healthy and resilient	11 000	<1
Outcome 3.1 Resource quality objectives are met	5 000	
Outcome 3.2 Riparian and wetland areas restored and protected	6 000	
Overall cost	2 671 000	

TABLE 18: Overall implementation costs for achieving the priority adaptation objectives for the Succulent Karoo biome over ten years (2025–2034; R 2023) across relevant provinces (costs in R'000).

OBJECTIVE	TOTAL	EASTERN CAPE	NORTHERN CAPE	NORTH WEST
Objective 1: PCA system is climate smart	918 000	20 421	571 103	326 476
Outcome 1.1 PCA extent meets CBA target	902 000	20 065	561 149	320 786
Outcome 1.2 PCA management is climate smart	6 000	133	3 733	2 134
Outcome 1.3 PCA management is highly effective	10 000	222	6 221	3 556
Objective 2: Working landscapes are biodiversity-friendly	1 742 000	38 751	1 083 727	619 522
Outcome 2.1 Livestock and wildlife management is sustainable	102 000	2 269	63 456	36 275
Outcome 2.2 Fire frequencies are appropriate for resilience	1 640 000	36 482	1 020 271	583 247
Outcome 2.4 Degraded ecosystems are restored	12 000	267	7 465	4 268
Objective 3: Aquatic ecosystems are healthy and resilient	11 000	245	6 843	3 912
Outcome 3.1 Resource quality objectives are met	5 000	111	3 111	1 778
Outcome 3.2 Riparian and wetland areas restored and protected	6 000	133	3 733	2 134
Overall cost	2 671 000	59 416	1 661 673	949 910

TABLE 19: Implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Succulent Karoo biome. All costs in 2023 Rands.

* These are national costs (not biome-level costs) to be included as part of the overall national plan.

Objective 1: PCA system is climate smart.				
Outcome 1.1: PCA extent meets CBA target.				
Target: 30% of land area is in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.1.1 NPAES 2030	1.1.1.1 NPAES is updated to incorporate increased area targets, identify critical areas for protected areas and high-priority landscapes for OECMs.	Lead: DFFE	3 840*	By end of 2025
Target: By 2025, NPAES 2030 is available.		Support: SANBI, conservation authorities		
	1.1.1.2 Adjust the biodiversity stewardship policy to simplify process and allow for spatial targeting of Category I, II and III measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.	Lead: DFFE, SANBI	1 620*	By end of 2025
		Support: SANParks, provincial conservation authorities		
1.1.2 Area under strict protection is expanded through direct acquisition, offsets and Category I biodiversity stewardship.	1.1.2.1 Implement spatially targeted incentives for Category I biodiversity stewardship and guide offset policies to expand the area under permanent protection in critical target areas.	Lead: SANParks, provincial conservation authorities	901 080	Over ten years, 2025-2034
Target: By 2034, 1 310 110 ha have been added to the PA estate, bringing the overall extent of strict, permanent protected areas to a minimum of 25% of land area.		Support: DFFE, SANBI, local government		
1.1.3 Conservation of priority landscapes outside of protected areas is achieved through OECMs (Category II and III Biodiversity Stewardship).	1.1.3.1 Implement spatial targeting of biodiversity stewardship incentives for Category II and Category III arrangements to encourage uptake in high-priority landscapes.	Lead: SANParks, provincial conservation authorities	0	Over ten years, 2025-2034
Target: By 2034, at least 0 ha of OECMs have been established.		Support: DFFE, SANBI, NGOs, People and Parks		
	1.1.3.2 Development of regulations on OECMs detailing qualifying properties of OECMs.	Lead: SANParks, DFFE	1 120	By end of 2025
		Support: SANBI, People and Parks, local government		

Outcome 1.2: PCA management is climate smart.				
Target: PCA management incorporates climate-smart principles.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.2.1 All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.	1.2.1.1 Review the PA management act to include climate-smart approaches with informative maps.	Lead: SANBI, DFFE Support: Conservation authorities, research institutions	2 200	By end of 2025
Target: By 2027, or within two years of establishment, all PCAs have up-to-date climate-smart management and monitoring plans that follow the guidelines.	1.2.1.2 All state, private and community protected and conservation areas update and lodge online management plans that take the climate-smart guidelines into account and collect basic monitoring data.	Lead: DFFE Support: Conservation authorities	3 720	By 2027, or within two years of establishment
Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.1 Protected area funding gap is reduced to zero.	1.3.1.1 Secure additional funding for protected and conservation area management activities.	Lead: SANParks, provincial conservation authorities	1 100	Over ten years, 2025–2038
Target: Funding for PA management increased by 10%.		Support: DFFE, NGOs, private sector		
1.3.2 Awareness and understanding of conservation issues and strategies among conservation managers is increased.	1.3.2.1 Undertake a capacity-building programme on biodiversity management under climate change.	Lead: DFFE, SANParks, provincial conservation authorities, local government	540	One year, 2025
Target: Senior staff in conservation agencies have attended a workshop and have in turn delivered a training to staff in their organisation.		Support: SANBI, NGOs		
1.3.3 Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps.	1.3.3.1 Set up concessions and joint venture partnerships to increase management effectiveness in protected and conservation areas, within sustainable limits.	Lead: SANParks, provincial conservation authorities, NGOs, private sector	3 930	Over ten years, 2025–2034
Target: Partnership arrangements improve financial and/or management efficiency.		Support: DFFE, SANBI		
1.3.4 All PCAs collect comparable and comprehensive baseline data on species and ecosystems to track changes and monitor management effectiveness.	1.3.4.1 Undertake baseline data collection on species and ecosystems within all PCAs.	Lead: SANParks, provincial conservation authorities	3 920	Over ten years, 2025–2034
Target: By 2027, or within two years of establishment, all PCAs have comprehensive baseline biodiversity data.		Support: NGOs, SANBI, research institutions		

Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.5 Species diversity, populations and ecosystem health show recovery or no deterioration over time, after accounting for climatic variability and ecosystem shifts.	1.3.5.1 Develop a monitoring plan to monitor species diversity, populations and ecosystem health.	Lead: SANParks, provincial conservation authorities	620	One year, 2025
Target: By 2034, biodiversity is healthy or recovering at a measurable rate in all PCAs.		Support: SANBI, research institutions		
Objective 2: Working landscapes are biodiversity-friendly.				
Outcome 2.1: Livestock and wildlife management is sustainable.				
Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.1.1 Vastly improved extension services programme.	2.1.1.1 Employ more agricultural extension officers in rangeland areas.	Lead: DALRRD, provincial-level agricultural departments	53 240	Over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
	2.1.1.2 Relocate existing and select new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.	Lead: DALRRD, provincial-level agricultural departments	These costs are included in 2.1.1.1	Ongoing, over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
Target: Level of satisfaction with extension officers rated as excellent in next Agricultural Census; Ratio of extension to producer 1:250.	2.1.1.3 Updated extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.	Lead: DALRRD, agricultural institutions, colleges	1 150	One year, 2025
		Support: Provincial-level agricultural departments		
	2.1.1.4 Provide continuous training to extension officers.	Lead: DALRRD, agricultural institutions, colleges	12 350	Every year, starting in 2025
		Support: Provincial level agricultural departments		
2.1.2 By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland. Operational certification scheme for sustainable, wildlife-friendly livestock management.	2.1.2.1 Design national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 280*	By 2026
		Support: SANBI, NGOs		

Outcome 2.1: Livestock and wildlife management is sustainable.				
<i>Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
<i>Target: By 2034, 30% of rangeland area in the biome is under wildlife/ biodiversity-friendly certified farming systems.</i>	2.1.2.2 Encourage livestock/wildlife farmers to apply for sustainable, wildlife-friendly/ biodiversity-friendly certification.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments Support: SANBI, NGOs	3 120	2027-2028
2.1.3 Increased participation in well-run sustainable livestock ranching programmes in communal land areas.	2.1.3.1 Increase awareness of opportunities for sustainable livestock ranching and support communal farmers in participating in programmes such as Meat Naturally, prioritising those who have or are establishing conservancies.	Lead: Meat Naturally Pty, NGOs Support: DFFE, DALRRD, provincial-level agricultural departments	31 980	Over ten years, 2025-2034
<i>Target: Support programme is operational.</i>				
Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
<i>Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.1 Detailed national restoration plan.	2.4.1.1 Prepare a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets. The plan needs to also map drivers of degradation and existing soil conservation measures.	Lead: DFFE, SANBI Support: Research institutions, NGOs	3 400*	By 2025
<i>Target: Restoration plan is in place.</i>				
2.4.2 Decisions are based on high-quality monitoring data.	2.4.2.1 Improve and maintain national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.	Lead: SANBI Support: DFFE, research institutions	1 310*	Over ten years, 2025-2034
<i>Target: High-quality data is available online.</i>				
2.4.4 Priority landscapes identified for IAP clearing in the National Restoration Plan for 2024-2030 have been cleared and are under follow-up maintenance.	2.4.4.1 Increase efficiency of clearing teams and funding, e.g. through better equipment, outcome-based payments. Promote women's and youths' participation.	Lead: DFFE Support: Provincial conservation authorities, local government	1 640 480	Over ten years, 2025-2034
<i>Target: By 2034, at least 74 450 condensed ha of IAPs have been cleared from priority landscapes.</i>				

Outcome 2.5: Harvesting rates have allowed resource stocks to recover to optimal levels, taking biodiversity and ecosystem services into account.				
Target: Resource stocks of threatened and endangered fauna and flora have recovered to optimal levels.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.5.1 Indigenous fauna and flora identified as threatened and endangered are effectively managed using participatory approaches.	2.5.1.1 Secure local community/traditional authority support to develop response actions through engagement and develop management plans.	Lead: NGOs, provincial conservation authorities	930	Over ten years, 2025-2034
Target: Management plans for identified 'at risk' fauna and flora are in place.		Support: DFFE, SANBI		
2.5.2 Comprehensive baseline data, monitoring and protection of threatened and endangered fauna and flora is improved.	2.5.2.1 Undertake baseline stock assessments and develop monitoring plan for threatened and endangered fauna and flora.	Lead: SANBI, provincial conservation authorities	4 110	Annually, starting in 2025
		Support: DFFE, research institutions, NGOs		
Target: By 2034, threatened and endangered fauna and flora have recovered and are being effectively protected.	2.5.2.2 Improve environmental management inspectorates/ law enforcement through better resourcing for investigation and prevention of biodiversity crime.	Lead: DFFE, local and provincial government	6 560	Annually, starting in 2025
		Support: SANBI, NGOs		
Objective 3: Aquatic ecosystems are healthy and resilient.				
Outcome 3.1: Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change.				
Target: RQOs are met.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.1.1 Assessment and monitoring of all important water management areas is improved.	3.1.1.1 Improve monitoring and consistently review and update RQOs and environmental flows. Identify which areas in the catchment impact the health of important systems.	Lead: DWS	4 760	Annually, starting in 2025
Target: By 2034, all water management areas have updated RQOs and appropriate monitoring in place.		Support: DFFE, CMAs, NGOs, research institutions		
Outcome 3.2: Riparian and wetland buffer areas are restored and protected.				
Target: Riparian and wetland buffer areas are effectively enforced and are clear from IAPs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.2.1 Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment.	3.2.1.1 Support the implementation of riparian/ wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas. Ensure that this is done in areas of high importance for catchment health.	Lead: DFFE, DWS	6 040	Over ten years, 2025-2034
Target: By 2034, at least 5 700 ha of riparian/wetland area in priority areas are under stewardship and are being protected from encroachment and degradation.		Support: CMAs, NGOs, CBOs, private sector		

Nama-Karoo Biome

Overview

The Nama-Karoo falls mostly within the Northern Cape, with smaller areas in the Free State, Western and Eastern Cape provinces. This is the third largest biome covering just under 25 million ha of the country. With just 2.1% of the Nama-Karoo protected, it has the lowest proportional area under formal protection of any biome in South Africa. While much of the biome remains in a largely natural condition, large areas are considered degraded but there is little data in the way of ecosystem condition to quantify the exact extent and severity of degradation (Skowno *et al.*, 2019). Key threats in this biome are vegetation change and a decline in grazing capacity, degradation from poor rangeland practices and the spread of IAPs.

Strategic objectives, targets and activities

The most important priority adaptation options identified for the Nama-Karoo biome are the expansion of protected areas, increasing the proportion of land under WBLU, improving livestock management and restoring and rehabilitating landscapes outside of protected areas.

Objective 1: System of protected and conservation areas is climate smart

An expanded, connected, effective and climate-smart system of protected and conservation areas (PCAs) minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services. Achieving this will require expansion of the current PCA network, and ensuring climate-smart and highly effective PCA management. The aim is to meet CBA targets and have 30% of terrestrial ecosystems under conservation by 2034, to incorporate climate-smart principles into PCA management, and to achieve an area-weighted average Management Effectiveness Tracking Tool (METT) score that exceeds 80%.

To achieve these outcomes, it will be critically important to update the NPAES 2030 to incorporate increased area targets, identify critical areas for state protection and high-priority landscapes for spatial targeting of biodiversity stewardship incentives. The process of updating the NPAES should also include adjusting the biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III stewardship measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets. Following this, priority areas for protection within the Nama-Karoo biome can be identified and spatially targeted according to the updated NPAES.

Although there are fewer threatened ecosystem types in the Nama-Karoo biome, expanding protected areas is critical to ensuring higher adaptive capacity to reduce vulnerability to climate change in the future. Currently, just under 941 000 ha of land in the Nama-Karoo biome is within protected areas and just under 87 000 ha is within OECMs, accounting for just 3.8% and 0.3% of the land, respectively. The aim is to have 30% of land area in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs. This means that at least 26% of the 30% target should be under strict protection. Therefore, to achieve this target for the Nama-Karoo biome, the area under strict protected areas would need to be expanded by a total of 5.4 million ha through direct acquisition, offsets and Category I biodiversity stewardship. It is assumed that securing this land by 2034 for formal protection would be through biodiversity stewardship arrangements and direct land purchase with a ratio of 90:10. Additionally, a further 1 million ha of land conserved through OECMs would be needed to achieve the 30% target by 2034.

Incorporating climate-smart principles into PCA management will require all PCAs to revise management and monitoring plans by 2027, or within two years of establishment. This would require launching guidelines on climate-smart protected area management for PCA managers to follow and adhere to. These could be a web-based set of short, clear guidelines on adapting protected area management to climate change within locational contexts, with interactive maps on projected climate and biodiversity shifts. To ensure that climate-smart management plans and monitoring are mandatory for PCAs, legislation could be reviewed requiring that all state, private and community protected and conservation areas update and lodge online new management plans that take the climate-smart guidelines into account and collect basic monitoring data.

The outputs and activities to achieving an outcome of highly effective protected area management where the area-weighted average METT score exceeds 80% are as follows:

- 1.** Protected area funding gap is reduced to zero by securing additional funding for protected area management activities;
- 2.** Awareness and understanding of conservation issues and strategies among conservation managers is increased by undertaking a capacity-building programme on biodiversity management under climate change;
- 3.** Strategic partnerships with NGOs and private partners improve biodiversity conservation outcomes by alleviating capacity gaps through implementing concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits;
- 4.** All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems; and
- 5.** Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

The lead implementing entities for these activities would be DFFE, SANBI, SANParks, and provincial conservation authorities, with support from NGOs, CBOs, and private landowners.

Objective 2: Working landscapes are biodiversity-friendly

Creating biodiversity-friendly working landscapes outside of PCAs is critical to achieving climate resilience and reducing impacts on livelihoods. Indeed, sustainable grazing practices, sustainable harvesting of natural resources, restoration of degraded ecosystems and an increased proportion of rangeland under sustainable wildlife-based land use address the increased risks and improve landscape connectivity and species survival in a changing climate. Within the Nama-Karoo biome, the key adaptation priorities are to improve livestock and wildlife management, increase the proportion of rangeland under wildlife-based land uses, and restore degraded landscapes.

Achieving this objective in the Nama-Karoo biome will require improving large-scale ecosystem management through sustainable livestock and wildlife management and increasing the proportion of land under WBLU. Livestock and wildlife management is sustainable if the stocking rates are at or below the estimated sustainable stocking rates at district scale. This will require:

- 1.** A vastly improved extension services programme, achieved through:
 - i. Employing an additional ~150 agricultural extension officers in rangeland areas.
 - ii. Relocating existing and selecting new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.
 - iii. Updating extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.

- 2.** By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland, achieved through:
 - i. Designing national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.
- 3.** Increased participation in well-run sustainable livestock ranching programmes in communal land areas, achieved through:
 - i. Supporting communal farmers in participating in programmes such as Meat Naturally Pty/Herding 4 Health, prioritising those who have or are establishing conservancies. It is assumed that such programmes could be implemented in 15% of communal rangeland areas.

Most of the responsibilities for these actions fall under the mandate of DALRRD or their provincial departments. However, DFFE and SANBI would be expected to support DALRRD and the provincial agricultural departments in the design of certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching. The Provincial Extension Coordinating Forum (PECF) could assist with expanding extension services and upskilling extension officers. Communal land areas should be prioritised for establishing support through SLM programmes, which are developed by organisations such as Meat Naturally Pty, or through programmes such as Herding 4 Health, with the support of NGOs and conservation organisations such as Conservation South Africa, EWT, and BotSoc that are already actively involved in such initiatives within the Nama-Karoo biome.

Adapting to vegetation change, increasing temperatures and reduced grazing capacity will also require increasing the proportion of land under WBLU, with livestock farmers switching to wildlife in some areas to reduce the impact on livelihoods. However, this will need to be well regulated and sustainable. This will require:

- 1.** Implementation of a clear regulatory framework for the game farming industry, achieved by:
 - i. Aligning agricultural and environmental legislation to develop a coherent policy which clarifies the position and role of game farming in South Africa.
- 2.** Development of a national electronic database of WBLU properties, achieved by:
 - i. Using the latest agricultural census data to develop a digital map and database of WBLU properties.
- 3.** Expanding WBLU into communal land, land under land reform beneficiary title, and land belonging to emerging farmers, achieved through:
 - i. Teaching WBLU practices to emerging farmers through improved WBLU extension services. This will require hiring ~40 additional extension officers.
 - ii. Providing support through infrastructure development and the supply of founder herds of game to emerging farmers and communities.

A clear regulatory framework for the game farming industry is needed to align agricultural and environmental legislation into a coherent policy which clarifies the position and role of game farming in South Africa. This will require collaboration between DFFE and DALRRD. Additionally, a national electronic database of WBLU properties and their activities needs to be developed with support from Stats SA (as part of the commercial agricultural census). Expanding well-regulated sustainable WBLU into communal land, land under land reform beneficiary title, and land belonging to emerging farmers through improved WBLU extension services will need to involve DFFE, DALRRD, and provincial conservation authorities. Support could be provided to emerging farmers and communities through infrastructure development and the supply of founder herds of game by SANParks and provincial conservation authorities through their Wildlife Economy Programmes.

The increasing levels of degradation across the Nama-Karoo biome are concerning and there is a need for focused and improved management and active clearing of IAPs. Restoring degraded ecosystems to

a healthy state in priority landscapes will require the preparation of a detailed national restoration plan whereby decisions are being based on high-quality monitoring data. The national plan should identify where to target restoration effort in order to maximise biodiversity and ecosystem services. This will require:

- i. Preparing a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets.
- ii. Improving and maintaining national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.

Once a national restoration plan has been prepared, each biome will be able to have a spatially targeted approach to addressing degradation. This is particularly important for the arid biomes, for which widescale mapping of IAPs has not been undertaken. IAPs, in particular *Prosopis* sp., are becoming increasingly prevalent in the Nama-Karoo, as well as species such as Prickly Pear (*Opuntia aurantiaca*). Dense infestations of *Prosopis* sp. have a negative impact on groundwater and local flora and can cause extensive erosion, which has an impact on grazing and livestock production. According to the land degradation neutrality targets for South Africa (DEA, 2018b), the aim is to clear just over 1 million ha of IAPs across South Africa by 2034. Therefore, the output for the Nama-Karoo biome is that priority landscapes identified for IAP clearing in the National Restoration Plan for 2025–2034, have been cleared and are under follow-up maintenance. The target for this biome is that by 2034, at least 222 000 condensed ha of IAPs have been cleared from priority landscapes. This will require the following actions:

- i. Increasing efficiency of clearing teams and funding, e.g. through better equipment and outcome-based payments.

Improving IAP management and undertaking active clearing mostly falls under the DFFE's and provincial conservation authorities' and environment departments' mandates, but additionally requires the support of SANBI, SAEON (and other research organisations) for the mapping of IAPs and the improvement of the NIAPS dataset, as well as DALRRD and provincial agriculture departments. NGOs could also play an important role in achieving restoration outcomes.

In the Nama-Karoo, vast areas of land have become degraded as a result of poor rangeland management. The cost of fully restoring these areas at scale would be too high and as such the focus should be on intact but vulnerable areas (i.e. identified as being prone to degradation in the future). The outputs and activities to achieve this are as follows:

- 1.** Priority landscapes identified for restoration of soil and vegetation cover in the National Restoration Plan for 2025–2034 have been restored, by:
 - i. Preparing guidelines for and support of the implementation of effective and ecologically sound PES schemes/carbon credit projects to incentivise restoration by the private sector and communities in priority areas for restoration.
 - ii. Undertaking active restoration of eroded areas and areas of extreme loss of vegetation and soil cover as per the National Restoration Plan for 2025–2034.

The lead implementing entities for undertaking active restoration would be the PES/carbon schemes with DFFE and relevant provincial conservation authorities and provincial agriculture departments.

Objective 3: Aquatic ecosystems are healthy and resilient

The *Prosopis* invasions are extensive along watercourses and across agricultural lands, which is reducing groundwater levels and grazing capacity. Therefore, it is of critical importance that these aquatic ecosystems are restored and protected. Under this objective, the quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers and wetlands is delivered and natural buffers are restored and protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources. The outcomes of this objective are that the resource quality objectives of rivers and wetlands in the Nama-Karoo biome are met and endure under climate change, and riparian and wetland buffer areas are restored and protected. This will require:

- 1.** Assessment and monitoring of all important water management areas is improved, by:
 - i. Consistently reviewing and updating RQOs and environmental flows for rivers and wetlands.
- 2.** By 2034, ~5 700 ha of priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment, by:
 - i. Supporting the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas.

The lead implementing entity for this objective would be DWS and catchment management agencies or catchment partnerships, with the support of DFFE, SANBI, NGOs, research organisations, CBOs, and the private sector.

Implementation plan

To achieve the long-term objectives for the Nama-Karoo biome, a total of 28 activities have been planned for. The total cost for implementation of these activities is estimated to be in the order of R11 billion over ten years (Table 20, Table 21). Actively clearing IAPs and expanding the protected area network accounts for the majority of these costs, followed by sustainable livestock and wildlife management. Note that budget figures are indicative and are in 2023 Rands. The implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Nama-Karoo biome is summarised in Table 22.

TABLE 20: Overall implementation costs for achieving the five priority adaptation objectives for the Nama-Karoo biome over ten years (2025–2034; R 2023).

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	3 940 000	36
Outcome 1.1 PCA extent meets CBA target	3 924 000	
Outcome 1.2 PCA management is climate smart	6 000	
Outcome 1.3 PCA management is highly effective	10 000	
Objective 2: Working landscapes are biodiversity-friendly	7 065 000	64
Outcome 2.1 Livestock and wildlife management is sustainable	349 000	
Outcome 2.3 WBLU in rangelands is increased	62 000	
Outcome 2.4 Degraded ecosystems are restored	6 654 000	
Objective 3: Aquatic ecosystems are healthy and resilient	20 000	<1
Outcome 3.1 Resource quality objectives are met	14 000	
Outcome 3.2 Riparian and wetland areas restored and protected	6 000	
Overall cost	11 025 000	

TABLE 21: Overall implementation costs for achieving the priority adaptation objectives for the Nama-Karoo biome over ten years (2025–2034; R 2023) across relevant provinces (costs in R'000).

OBJECTIVE	TOTAL	EASTERN CAPE	FREE STATE	NORTHERN CAPE	NORTH WEST
Objective 1: PCA system is climate smart	3 940 000	461 875	124 710	2 919 480	433 935
Outcome 1.1 PCA extent meets CBA target	3 924 000	460 000	124 204	2 907 624	432 172
Outcome 1.2 PCA management is climate smart	6 000	703	190	4 446	661
Outcome 1.3 PCA management is highly effective	10 000	1 172	317	7 410	1 101
Objective 2: Working landscapes are biodiversity-friendly	7 065 000	828 211	223 624	5 235 057	778 108
Outcome 2.1 Livestock and wildlife management is sustainable	349 000	40 912	11 047	258 604	38 437
Outcome 2.3 WBLU in rangelands is increased	62 000	7 268	1 962	45 941	6 828
Outcome 2.4 Degraded ecosystems are restored	6 654 000	780 030	210 615	4 930 513	732 843
Objective 3: Aquatic ecosystems are healthy and resilient	20 000	2 345	633	14 820	2 203
Outcome 3.1 Resource quality objectives are met	14 000	1 641	443	10 374	1 542
Outcome 3.2 Riparian and wetland areas restored and protected	6 000	703	190	4 446	661
Overall cost	11 025 000	1 292 431	348 967	8 169 357	1 214 246

TABLE 22: Implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Nama-Karoo biome. All costs in 2023 Rands.

* These are national costs (not biome-level costs) to be included as part of the overall national plan.

Objective 1: PCA system is climate smart.				
Outcome 1.1: PCA extent meets CBA target.				
Target: 30% of land area is in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.1.1 NPAES 2030	1.1.1.1 NPAES is updated to incorporate increased area targets, identify critical areas for protected areas and high-priority landscapes for OECMs.	Lead: DFFE	3 840*	By end of 2025
Target: By 2025, NPAES 2030 is available.		Support: SANBI, conservation authorities		
	1.1.1.2 Adjust the biodiversity stewardship policy to simplify process and allow for spatial targeting of Category I, II and III measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.	Lead: DFFE, SANBI	1 620*	By end of 2025
		Support: SANParks, provincial conservation authorities		
1.1.2 Area under strict protection is expanded through direct acquisition, offsets and Category I biodiversity stewardship.	1.1.2.1 Implement spatially targeted incentives for Category I biodiversity stewardship and guide offset policies to expand the area under permanent protection in critical target areas.	Lead: SANParks, provincial conservation authorities	3 707 350	Over ten years, 2025-2034
Target: By 2034, 5 390 230 ha have been added to the PA estate, bringing the overall extent of strict, permanent protected areas to a minimum of 25% of land area.		Support: DFFE, SANBI, local government		
1.1.3 Conservation of priority landscapes outside of protected areas is achieved through OECMs (Category II and III Biodiversity Stewardship).	1.1.3.1 Implement spatial targeting of biodiversity stewardship incentives for Category II and Category III arrangements to encourage uptake in high-priority landscapes.	Lead: SANParks, provincial conservation authorities	215 390	Over ten years, 2025-2034
Target: By 2034, at least 1 030 920 ha of OECMs have been established.		Support: DFFE, SANBI, NGOs, People and Parks		
	1.1.3.2 Development of regulations on OECMs detailing qualifying properties of OECMs.	Lead: SANParks, DFFE	1 120	By end of 2025
		Support: SANBI, People and Parks, local government		

Outcome 1.2: PCA management is climate smart.				
Target: PCA management incorporates climate-smart principles.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.2.1 All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.	1.2.1.1 Review the PA management act to include climate-smart approaches with informative maps.	Lead: SANBI, DFFE Support: Conservation authorities, research institutions	2 200	By end of 2025
Target: By 2027, or within two years of establishment, all PCAs have up-to-date climate-smart management and monitoring plans that follow the guidelines.	1.2.1.2 All state, private and community protected and conservation areas update and lodge online management plans that take the climate-smart guidelines into account and collect basic monitoring data.	Lead: DFFE Support: Conservation authorities	4 150	By 2027, or within two years of establishment
Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.1 Protected area funding gap is reduced to zero.	1.3.1.1 Secure additional funding for protected and conservation area management activities.	Lead: SANParks, provincial conservation authorities	1 100	Over ten years, 2025–2037
Target: Funding for PA management increased by 10%.		Support: DFFE, NGOs, private sector		
1.3.2 Awareness and understanding of conservation issues and strategies among conservation managers is increased.	1.3.2.1 Undertake a capacity-building programme on biodiversity management under climate change.	Lead: DFFE, SANParks, provincial conservation authorities, local government	540	One year, 2025
Target: Senior staff in conservation agencies have attended a workshop and have in turn delivered a training to staff in their organisation.		Support: SANBI, NGOs		
1.3.3 Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps.	1.3.3.1 Set up concessions and joint venture partnerships to increase management effectiveness in protected and conservation areas, within sustainable limits.	Lead: SANParks, provincial conservation authorities, NGOs, private sector	3 930	Over ten years, 2025–2034
Target: Partnership arrangements improve financial and/or management efficiency.		Support: DFFE, SANBI		
1.3.4 All PCAs collect comparable and comprehensive baseline data on species and ecosystems to track changes and monitor management effectiveness.	1.3.4.1 Undertake baseline data collection on species and ecosystems within all PCAs.	Lead: SANParks, provincial conservation authorities	3 920	Over ten years, 2025–2034
Target: By 2027, or within two years of establishment, all PCAs have comprehensive baseline biodiversity data.		Support: NGOs, SANBI, research institutions		

Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.5 Species diversity, populations and ecosystem health show recovery or no deterioration over time, after accounting for climatic variability and ecosystem shifts.	1.3.5.1 Develop a monitoring plan to monitor species diversity, populations and ecosystem health.	Lead: SANParks, provincial conservation authorities	620	One year, 2025
Target: By 2034, biodiversity is healthy or recovering at a measurable rate in all PCAs.		Support: SANBI, research institutions		
Objective 2: Working landscapes are biodiversity-friendly.				
Outcome 2.1: Livestock and wildlife management is sustainable.				
Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.1.1 Vastly improved extension services programme.	2.1.1.1 Employ more agricultural extension officers in rangeland areas.	Lead: DALRRD, provincial-level agricultural departments	196 110	Over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
	2.1.1.2 Relocate existing and select new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.	Lead: DALRRD, provincial-level agricultural departments	These costs are included in 2.1.1.1	Ongoing, over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
Target: Level of satisfaction with extension officers rated as excellent in next Agricultural Census; Ratio of extension to producer 1:250.	2.1.1.3 Updated extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.	Lead: DALRRD, agricultural institutions, colleges	1 150	One year, 2025
		Support: Provincial-level agricultural departments		
	2.1.1.4 Provide continuous training to extension officers.	Lead: DALRRD, agricultural institutions, colleges	12 350	Every year, starting in 2025
		Support: Provincial-level agricultural departments		
2.1.2 By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland. Operational certification scheme for sustainable, wildlife-friendly livestock management.	2.1.2.1 Design national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 280*	By 2026
		Support: SANBI, NGOs		

Outcome 2.1: Livestock and wildlife management is sustainable.				
Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
Target: By 2034, 30% of rangeland area in the biome is under wildlife/ biodiversity-friendly certified farming systems.	2.1.2.2 Encourage livestock/wildlife farmers to apply for sustainable, wildlife-friendly/ biodiversity-friendly certification.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 120	2027-2028
		Support: SANBI, NGOs		
2.1.3 Increased participation in well-run sustainable livestock ranching programmes in communal land areas.	2.1.3.1 Increase awareness of opportunities for sustainable livestock ranching and support communal farmers in participating in programmes such as Meat Naturally, prioritising those who have or are establishing conservancies.	Lead: Meat Naturally Pty, NGOs	136 290	Over ten years, 2025-2034
Target: Support programme is operational.		Support: DFFE, DALRRD, provincial-level agricultural departments		
Outcome 2.3: Proportion of rangeland under WBLU is increased.				
Target: Land area with wildlife-based land uses increased significantly.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.3.1 A clear regulatory framework for the game farming industry is implemented, including clear standards, regulation, and licensing.	2.3.1.1 Align agricultural and environmental legislation to develop a coherent policy which clarifies the position and role of game farming in South Africa.	Lead: DFFE, DALRRD	1 660*	One year, 2025
Target: Policy for game farming.		Support: SANBI, NGOs, business		
2.3.2 National electronic database of WBLU properties is developed.	2.3.2.1 Use the latest agricultural census to develop a digital map and database of WBLU properties, including capacity building on map use.	Lead: DFFE, Stats SA	960*	Over two years, 2025-2026
Target: All WBLU properties and activities are captured.		Support: DALRRD, SANBI		
2.3.3 WBLU is expanded into communal land, land under land reform beneficiary title, and land belonging to emerging farmers.	2.3.3.1 Teach WBLU practices to emerging farmers through improved WBLU extension services.	Lead: DFFE	49 030	Over ten years, 2025-2034
		Support: DALRRD, SANBI		
Target: Increased number of emerging WBLU farmers.	2.3.3.2 Provide support through infrastructure development and the supply of founder herds of game to emerging farmers and communities.	Lead: SANParks, provincial conservation authorities	12 670	Over three years, 2025-2027
		Support: DFFE, DALRRD, provincial-level agricultural departments		

Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.1 Detailed national restoration plan.	2.4.1.1 Prepare a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets. The plan needs to also map drivers of degradation and existing soil conservation measures.	Lead: DFFE, SANBI	3 400*	By 2025
Target: Restoration plan is in place.		Support: Research institutions, NGOs		
2.4.2 Decisions are based on high-quality monitoring data.	2.4.2.1 Improve and maintain national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.	Lead: SANBI	1 310*	Over ten years, 2025-2034
Target: High-quality data is available online.		Support: DFFE, research institutions		
2.4.3 Priority landscapes identified for restoration of soil and vegetation cover in the National Restoration Plan for 2024-2030 have been restored.	2.4.3.1 Prepare guidelines for and support the implementation of effective and ecologically sound PES schemes/carbon credit projects to incentivise restoration by the private sector and communities in priority areas for restoration.	Lead: DFFE, SANBI	890	By 2025
		Support: NGOs, carbon management and offsetting companies, private sector		
Target: By 2034, the area of denuded land restored to recovering or healthy vegetation cover brings overall extent of degraded area to pre-2015 levels (LDN).	2.4.3.2 Undertake active restoration of eroded areas as per the National Restoration Plan for 2024-2030, focusing on lightly degraded areas first.	Lead: Provincial conservation authorities, DFFE	1 762 920	Over ten years, 2025-2034
		Support: Provincial agriculture departments, local government, NGOs		
2.4.4 Priority landscapes identified for IAP clearing in the National Restoration Plan for 2024-2030 have been cleared and are under follow-up maintenance.	2.4.4.1 Increase efficiency of clearing teams and funding, e.g. through better equipment, outcome-based payments. Promote women's and youths' participation.	Lead: DFFE	4 890 470	Over ten years, 2025-2034
Target: By 2034, at least 221 960 condensed ha of IAPs have been cleared from priority landscapes.		Support: Provincial conservation authorities, local government		

Objective 3: Aquatic ecosystems are healthy and resilient.				
Outcome 3.1: Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change.				
Target: RQOs are met.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.1.1 Assessment and monitoring of all important water management areas is improved.	3.1.1.1 Improve monitoring and consistently review and update RQOs and environmental flows. Identify which areas in the catchment impact the health of important systems.	Lead: DWS	14 190	Annually, starting in 2025
Target: By 2034, all water management areas have updated RQOs and appropriate monitoring in place.		Support: DFFE, CMAs, NGOs, research institutions		
Outcome 3.2: Riparian and wetland buffer areas are restored and protected.				
Target: Riparian and wetland buffer areas are effectively enforced and are clear from IAPs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.2.1 Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment	3.2.1.1 Support the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas. Ensure that this is done in areas of high importance for catchment health.	Lead: DFFE, DWS	6 040	Over ten years, 2025-2034
Target: By 2034, at least 5 700 ha of riparian/wetland area in priority areas are under stewardship and are being protected from encroachment and degradation.		Support: CMAs, NGOs, CBOs, private sector		

Desert Biome

Overview

The Desert biome is the second smallest biome (626 000 ha) and is found entirely within the Northern Cape Province bordering Namibia. Protected areas almost meet the 30% protection target in this biome, covering approximately 26.3% of desert area. While there have been relatively low levels of modification in this biome, mining and overgrazing have had a negative impact on ecosystem condition. Species loss due to poaching and livestock pressure is also of concern. Vulnerability to climate change in the Desert biome was considered relatively low (Turpie *et al.*, 2021).

Strategic objectives, targets and activities

The priority adaptation options identified for the Desert biome are to expand the protected and conservation areas to meet targets, improving livestock management, improving the management and harvesting of natural resources, and addressing IAPs.

Objective 1: System of protected and conservation areas is climate smart

An expanded, connected, effective and climate-smart system of protected and conservation areas (PCAs) minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services. Achieving this will require expansion of the current PCA network, and ensuring climate-smart and highly effective PCA management. The aim is to meet CBA targets and have 30% of terrestrial ecosystems under conservation by 2034, to incorporate climate-smart principles into PCA management, and to achieve an area-weighted average Management Effectiveness Tracking Tool (METT) score that exceeds 80%.

To achieve these outcomes, it will be critically important to update the NPAES 2030 to incorporate increased area targets, identify critical areas for state protection and high-priority landscapes for spatial targeting of biodiversity stewardship incentives. The process of updating the NPAES should also include adjusting the biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III stewardship measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets. Following this, priority areas for protection within the Desert biome can be identified and spatially targeted according to the updated NPAES.

Currently, just over 188 000 ha of land in the Desert biome is within protected areas and 230 ha is within OECMs, accounting for 26.3% and >1% of the land, respectively. The aim is to have 30% of land area in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs. This means that at least 26% of the 30% target should be under strict protection. Therefore, this target has been achieved for the Desert biome and the remainder can be fulfilled through the expansion of conservation areas (OECMs). This will require that conservation areas are expanded by 32 000 ha through biodiversity stewardship arrangements to achieve the 30% target by 2034. This expansion should target the updated NPAES Focus Areas and CBAs.

Incorporating climate-smart principles into PCA management will require all PCAs to revise management and monitoring plans by 2027, or within two years of establishment. This would require launching guidelines on climate-smart protected area management for PCA managers to follow and adhere to. These could be a web-based set of short, clear guidelines on adapting protected area management to climate change within locational contexts, with interactive maps on projected climate and biodiversity shifts. To ensure that climate-smart management plans and monitoring are mandatory for PCAs, legislation could be reviewed requiring that all state, private and community protected and conservation areas update and lodge online new management plans that take the climate-smart guidelines into account and collect basic monitoring data.

The outputs and activities to achieving an outcome of highly effective protected area management where the area-weighted average METT score exceeds 80% are as follows:

- 1.** Protected area funding gap is reduced to zero by securing additional funding for protected area management activities;
- 2.** Awareness and understanding of conservation issues and strategies among conservation managers is increased by undertaking a capacity-building programme on biodiversity management under climate change;
- 3.** Strategic partnerships with NGOs and private partners improve biodiversity conservation outcomes by alleviating capacity gaps through implementing concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits;
- 4.** All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems; and
- 5.** Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

The lead implementing entities for these activities would be DFFE, SANBI, SANParks, and provincial conservation authorities, with support from NGOs, CBOs, and private landowners.

Objective 2: Working landscapes are biodiversity-friendly

Creating biodiversity-friendly working landscapes outside of PCAs is critical to achieving climate resilience and reducing impacts on livelihoods. Indeed, sustainable grazing practices, sustainable harvesting of natural resources, and restoration of degraded ecosystems address the increased risks and improve landscape connectivity and species survival in a changing climate. Within the Desert biome, the key adaptation priorities are to expand protected and conservation areas, improve livestock management, ensure the sustainable harvesting of fauna and flora, and restore degraded landscapes.

Achieving this objective in the Desert biome will require large-scale ecosystem management through sustainable livestock management. Livestock management is sustainable if the stocking rates are at or below the estimated sustainable stocking rates at district scale. This will require:

- 1.** A vastly improved extension services programme, achieved through:
 - i. Employing an additional ~2 agricultural extension officers in rangeland areas.
 - ii. Relocating existing and selecting new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.
 - iii. Updating extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.
- 2.** By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland, achieved through:
 - i. Designing national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.
- 3.** Increased participation in well-run sustainable livestock ranching programmes in communal land areas, achieved through:
 - i. Supporting communal farmers in participating in programmes such as Meat Naturally Pty/ Herding 4 Health, prioritising those who have or are establishing conservancies. It is assumed that such programmes could be implemented in 15% of communal rangeland areas.

Most of the responsibilities for these actions fall under the mandate of DALRRD or their provincial departments. However, DFFE and SANBI would be expected to support DALRRD and the provincial agricultural departments in the design of certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching. The Provincial Extension Coordinating Forum (PECF) could assist with expanding extension services and upskilling extension officers. Communal land areas should be prioritised for establishing support through SLM programmes, which are developed by organisations such as Meat Naturally Pty, or through programmes such as Herding 4 Health, with the support of NGOs that are already actively involved in the Desert biome.

Species loss due to overgrazing, drought and poaching is a key threat in the Desert biome. The poaching of indigenous flora and fauna in the Desert biome for illegal trade is a major concern. The activities under this objective in the implementation plan would focus on the sustainable harvesting of natural resources in the biome through the following outputs and activities:

- 1.** Indigenous fauna and flora identified as threatened and endangered are effectively managed using participatory approaches, by
 - i. Securing local community support to develop response actions (such as an anti-poaching strategy) through engagement.

2. Comprehensive baseline data, monitoring and protection of threatened and endangered fauna and flora is improved, by
 - i. Undertaking baseline stock assessments and developing monitoring plans for threatened and endangered fauna and flora.
 - ii. Improving environmental management inspectorates/law enforcement through better resourcing for investigation and prevention of biodiversity crime.

This requires collaboration between DFFE, SANBI, provincial departments of environment and conservation authorities, research institutions, NGOs and local and provincial government law enforcement departments.

The increasing levels of degradation across the Desert biome are concerning and there is a need for focused and improved management and active clearing of IAPs. Restoring degraded ecosystems to a healthy state in priority landscapes will require the preparation of a detailed national restoration plan whereby decisions are being based on high-quality monitoring data. The national plan should identify where to target restoration effort in order to maximise biodiversity and ecosystem services. This will require:

- i. Preparing a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets.
- ii. Improving and maintaining national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.

Once a national restoration plan has been prepared, each biome will be able to have a spatially targeted approach to addressing degradation. This is particularly important for the arid biomes, for which widescale mapping of IAPs has not been undertaken. IAPs, in particular *Prosopis* sp., are becoming increasingly prevalent in the Desert biome, particularly along the Orange River. Dense infestations of *Prosopis* sp. have a negative impact on local flora and can cause extensive erosion, both of which have an impact on livestock production. According to the land degradation neutrality targets for South Africa (DEA, 2018b), the aim is to clear just over 1 million ha of IAPs across South Africa by 2034. Therefore, the output for the Desert biome is that priority landscapes identified for IAP clearing in the National Restoration Plan for 2025–2034 have been cleared and are under follow-up maintenance. The target is that by 2034, at least 6 400 condensed ha of IAPs have been cleared from priority landscapes in the Desert biome. This will require the following actions:

- i. Increasing efficiency of clearing teams and funding, e.g. through better equipment and outcome-based payments.

Improving IAP management and undertaking active clearing mostly falls under the DFFE's and provincial conservation authorities' and environment departments' mandates, but additionally requires the support of SANBI, SAEON (and other research organisations) for the mapping of IAPs and the improvement of the NIAPS dataset, as well as DALRRD and provincial agriculture departments. NGOs could also play an important role in achieving restoration outcomes.

Objective 3: Aquatic ecosystems are healthy and resilient

The *Prosopis* invasions are extensive along watercourses and across agricultural lands, which is reducing groundwater levels and grazing capacity. While widescale mapping of IAPs has not been undertaken across the arid regions, it is known that there are high concentrations of *Prosopis* sp. along the Orange River. Therefore, it is of critical importance that riparian buffer areas are restored and protected. Under this objective, the quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers, wetlands and estuaries is delivered and natural buffers are

restored and protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources. The outcomes of this objective are that the resource quality objectives of rivers, wetlands and **estuary** in the Desert biome are met and endure under climate change, and riparian and wetland buffer areas are restored and protected. This will require:

1. Assessment and monitoring of all important water management areas is improved, by:
 - i. Consistently reviewing and updating RQOs and environmental flows for rivers and wetlands.
2. By 2034, ~1 600 ha of priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment, by:
 - i. Supporting the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas.

The lead implementing entity for this objective would be DWS and catchment management agencies or catchment partnerships, with the support of DFFE, SANBI, NGOs, research organisations, CBOs, and the private sector.

Implementation plan

To achieve the long-term objectives for the Desert biome, a total of 21 activities have been planned for. The total cost for implementation of these activities is estimated to be in the order of **R185 million** over ten years (Table 23). The costliest activity is the active clearing of IAPs and ensuring the sustainable management of livestock and natural resources. The cost of protected area expansion is relatively low due to current protection levels being already close to meeting the 30% target. Note that budget figures are indicative and are in 2023 Rands. The implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Desert biome is summarised in Table 24.

TABLE 23: Overall implementation costs for achieving the five priority adaptation objectives for the Desert biome over ten years (2025-2034; R 2023).

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	21 000	11
Outcome 1.1 PCA extent meets CBA target	8 000	
Outcome 1.2 PCA management is climate smart	3 000	
Outcome 1.3 PCA management is highly effective	10 000	
Objective 2: Working landscapes are biodiversity-friendly	176 000	88
Outcome 2.1 Livestock and wildlife management is sustainable	23 000	
Outcome 2.4 Degraded ecosystems are restored	141 000	
Outcome 2.5 Harvesting rates are sustainable	12 000	
Objective 3: Aquatic ecosystems are healthy and resilient	2 000	1
Outcome 3.2 Riparian and wetland areas restored and protected	2 000	
Overall cost	199 000	

Note that all these costs are applicable to only the Northern Cape as this province holds 100% of the country's Desert biome extent.

TABLE 24: Implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Desert biome. All costs in 2023 Rands.

* These are national costs (not biome-level costs) to be included as part of the overall national plan.

Objective 1: PCA system is climate smart.				
Outcome 1.1: PCA extent meets CBA target.				
Target: 30% of land area is in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.1.1 NPAES 2030	1.1.1.1 NPAES is updated to incorporate increased area targets, identify critical areas for protected areas and high-priority landscapes for OECMs.	Lead: DFFE	3 840*	By end of 2025
Target: By 2025, NPAES 2030 is available.		Support: SANBI, conservation authorities		
	1.1.1.2 Adjust the biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.	Lead: DFFE, SANBI	1 620*	By end of 2025
		Support: SANParks, provincial conservation authorities		
1.1.2 Area under strict protection is expanded through direct acquisition, offsets and Category I biodiversity stewardship.	1.1.2.1 Implement spatially targeted incentives for Category I biodiversity stewardship and guide offset policies to expand the area under permanent protection in critical target areas.	Lead: SANParks, provincial conservation authorities	0	Over ten years, 2025-2034
Target: By 2034, 0 ha have been added to the PA estate, bringing the overall extent of strict, permanent protected areas to a minimum of 25% of land area.		Support: DFFE, SANBI, local government		
1.1.3 Conservation of priority landscapes outside of protected areas is achieved through OECMs (Category II and III Biodiversity Stewardship).	1.1.3.1 Implement spatial targeting of biodiversity stewardship incentives for Category II and Category III arrangements to encourage uptake in high-priority landscapes.	Lead: SANParks, provincial conservation authorities	6 690	Over ten years, 2025-2034
Target: By 2034, at least 32 020 ha of OECMs have been established.		Support: DFFE, SANBI, NGOs, People and Parks		
	1.1.3.2 Development of regulations on OECMs detailing qualifying properties of OECMs.	Lead: SANParks, DFFE	1 120	By end of 2025
		Support: SANBI, People and Parks, local government		

Outcome 1.2: PCA management is climate smart.				
<i>Target: PCA management incorporates climate-smart principles.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.2.1 All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.	1.2.1.1 Review the PA management act to include climate-smart approaches with informative maps.	Lead: SANBI, DFFE Support: Conservation authorities, research institutions	2 200	By end of 2025
<i>Target: By 2027, or within two years of establishment, all PCAs have up-to-date climate-smart management and monitoring plans that follow the guidelines.</i>	1.2.1.2 All state, private and community protected and conservation areas update and lodge online management plans that take the climate-smart guidelines into account and collect basic monitoring data.	Lead: DFFE Support: Conservation authorities	1 130	By 2027, or within two years of establishment
Outcome 1.3: PCA management is highly effective.				
<i>Target: Area-weighted average METT score exceeds 80%.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.1 Protected area funding gap is reduced to zero.	1.3.1.1 Secure additional funding for protected and conservation area management activities.	Lead: SANParks, provincial conservation authorities	1 100	Over ten years, 2025–2042
<i>Target: Funding for PA management increased by 10%.</i>		Support: DFFE, NGOs, private sector		
1.3.2 Awareness and understanding of conservation issues and strategies among conservation managers is increased.	1.3.2.1 Undertake a capacity-building programme on biodiversity management under climate change.	Lead: DFFE, SANParks, provincial conservation authorities, local government	540	One year, 2025
<i>Target: Senior staff in conservation agencies have attended a workshop and have in turn delivered a training to staff in their organisation.</i>		Support: SANBI, NGOs		
1.3.3 Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps.	1.3.3.1 Set up concessions and joint venture partnerships to increase management effectiveness in protected and conservation areas, within sustainable limits.	Lead: SANParks, provincial conservation authorities, NGOs, private sector	3 930	Over ten years, 2025–2034
<i>Target: Partnership arrangements improve financial and/or management efficiency.</i>		Support: DFFE, SANBI		
1.3.4 All PCAs collect comparable and comprehensive baseline data on species and ecosystems to track changes and monitor management effectiveness.	1.3.4.1 Undertake baseline data collection on species and ecosystems within all PCAs.	Lead: SANParks, provincial conservation authorities	3 920	Over ten years, 2025–2034
<i>Target: By 2027, or within two years of establishment, all PCAs have comprehensive baseline biodiversity data.</i>		Support: NGOs, SANBI, research institutions		

Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.5 Species diversity, populations and ecosystem health show recovery or no deterioration over time, after accounting for climatic variability and ecosystem shifts.	1.3.5.1 Develop a monitoring plan to monitor species diversity, populations and ecosystem health.	Lead: SANParks, provincial conservation authorities	620	One year, 2025
Target: By 2034, biodiversity is healthy or recovering at a measurable rate in all PCAs.		Support: SANBI, research institutions		
Objective 2: Working landscapes are biodiversity-friendly.				
Outcome 2.1: Livestock and wildlife management is sustainable.				
Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.1.1 Vastly improved extension services programme.	2.1.1.1 Employ more agricultural extension officers in rangeland areas.	Lead: DALRRD, provincial-level agricultural departments	2 150	Over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
	2.1.1.2 Relocate existing and select new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.	Lead: DALRRD, provincial-level agricultural departments	These costs are included in 2.1.1.1	Ongoing, over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
Target: Level of satisfaction with extension officers rated as excellent in next Agricultural Census; Ratio of extension to producer 1:250.	2.1.1.3 Updated extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.	Lead: DALRRD, agricultural institutions, colleges	1 150	One year, 2025
		Support: Provincial-level agricultural departments		
	2.1.1.4 Provide continuous training to extension officers.	Lead: DALRRD, agricultural institutions, colleges	12 350	Every year, starting in 2025
		Support: Provincial-level agricultural departments		
2.1.2 By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland. Operational certification scheme for sustainable, wildlife-friendly livestock management.	2.1.2.1 Design national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 280*	By 2026
		Support: SANBI, NGOs		

Outcome 2.1: Livestock and wildlife management is sustainable.				
<i>Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
<i>Target: By 2034, 30% of rangeland area in the biome is under wildlife/ biodiversity-friendly certified farming systems.</i>	2.1.2.2 Encourage livestock/wildlife farmers to apply for sustainable, wildlife-friendly/ biodiversity-friendly certification.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments Support: SANBI, NGOs	3 120	2027-2028
2.1.3 Increased participation in well-run sustainable livestock ranching programmes in communal land areas.	2.1.3.1 Increase awareness of opportunities for sustainable livestock ranching and support communal farmers in participating in programmes such as Meat Naturally, prioritising those who have or are establishing conservancies.	Lead: Meat Naturally Pty, NGOs Support: DFFE, DALRRD, provincial-level agricultural departments	4 020	Over ten years, 2025-2034
<i>Target: Support programme is operational.</i>				
Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
<i>Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.1 Detailed national restoration plan.	2.4.1.1 Prepare a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets. The plan needs to also map drivers of degradation and existing soil conservation measures.	Lead: DFFE, SANBI Support: Research institutions, NGOs	3 400*	By 2025
<i>Target: Restoration plan is in place.</i>				
2.4.2 Decisions are based on high-quality monitoring data.	2.4.2.1 Improve and maintain national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.	Lead: SANBI Support: DFFE, research institutions	1 310*	Over ten years, 2025-2034
<i>Target: High-quality data is available online.</i>				
2.4.4 Priority landscapes identified for IAP clearing in the National Restoration Plan for 2024-2030 have been cleared and are under follow-up maintenance.	2.4.4.1 Increase efficiency of clearing teams and funding, e.g. through better equipment, outcome-based payments. Promote women's and youths' participation.	Lead: DFFE Support: Provincial conservation authorities, local government	141 140	Over ten years, 2025-2034
<i>Target: By 2034, at least 6 410 condensed ha of IAPs have been cleared from priority landscapes.</i>				

Outcome 2.5: Harvesting rates have allowed resource stocks to recover to optimal levels, taking biodiversity and ecosystem services into account.				
Target: Resource stocks of threatened and endangered fauna and flora have recovered to optimal levels.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.5.1 Indigenous fauna and flora identified as threatened and endangered are effectively managed using participatory approaches.	2.5.1.1 Secure local community/traditional authority support to develop response actions through engagement and develop management plans.	Lead: NGOs, provincial conservation authorities	930	Over ten years, 2025-2034
Target: Management plans for identified 'at risk' fauna and flora are in place.		Support: DFFE, SANBI		
2.5.2 Comprehensive baseline data, monitoring and protection of threatened and endangered fauna and flora is improved.	2.5.2.1 Undertake baseline stock assessments and develop monitoring plan for threatened and endangered fauna and flora.	Lead: SANBI, provincial conservation authorities	4 110	Annually, starting in 2025
Target: By 2034, threatened and endangered fauna and flora have recovered and are being effectively protected.		Support: DFFE, research institutions, NGOs		
	2.5.2.2 Improve environmental management inspectorates/ law enforcement through better resourcing for investigation and prevention of biodiversity crime.	Lead: DFFE, local and provincial government	6 560	Annually, starting in 2025
		Support: SANBI, NGOs		
Objective 3: Aquatic ecosystems are healthy and resilient.				
Outcome 3.1: Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change.				
Target: RQOs are met.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.1.1 Assessment and monitoring of all important water management areas is improved.	3.1.1.1 Improve monitoring and consistently review and update RQOs and environmental flows. Identify which areas in the catchment impact the health of important systems.	Lead: DWS	410	Annually, starting in 2025
Target: By 2034, all water management areas have updated RQOs and appropriate monitoring in place.		Support: DFFE, CMAs, NGOs, research institutions		
Outcome 3.2: Riparian and wetland buffer areas are restored and protected.				
Target: Riparian and wetland buffer areas are effectively enforced and are clear from IAPs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.2.1 Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment.	3.2.1.1 Support the implementation of riparian/ wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas. Ensure that this is done in areas of high importance for catchment health.	Lead: DFFE, DWS	1 720	Over ten years, 2025-2034
Target: By 2034, at least 1 630 ha of riparian/wetland area in priority areas are under stewardship and are being protected from encroachment and degradation.		Support: CMAs, NGOs, CBOs, private sector		

Albany Thicket Biome

Overview

The Albany Thicket biome covers 3.5 million ha across the Eastern Cape (90%) and Western Cape (10%) provinces. Approximately 11% of the biome is protected. While there is a relatively low level of modified land in this biome, there are very high levels of degradation (Skowno *et al.*, 2019), which is mostly due to overstocking of livestock on soils that are highly susceptible to erosion (Turpie *et al.*, 2021). Other key threats include the spread of IAPs, conflicting land uses and urban expansion.

Strategic objectives, targets and activities

The priority adaptation options identified for the Albany Thicket biome are the expansion of protected and conservation areas, increasing the proportion of land under WBLU and improving large-scale ecosystem management through fire and livestock management, and restoring and rehabilitating degraded land.

Objective 1: System of protected and conservation areas is climate smart

An expanded, connected, effective and climate-smart system of protected and conservation areas (PCAs) minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services. Achieving this will require expansion of the current PCA network, and ensuring climate-smart and highly effective PCA management. The aim is to meet CBA targets and have 30% of terrestrial ecosystems under conservation by 2034, to incorporate climate-smart principles into PCA management, and to achieve an area-weighted average Management Effectiveness Tracking Tool (METT) score that exceeds 80%.

To achieve these outcomes, it will be critically important to update the NPAES 2030 to incorporate increased area targets, identify critical areas for state protection and high-priority landscapes for spatial targeting of biodiversity stewardship incentives. The process of updating the NPAES should also include adjusting the biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III stewardship measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets. Following this, priority areas for protection within the Albany Thicket biome can be identified and spatially targeted according to the updated NPAES.

Currently, just under 432 000 ha of land in the Albany Thicket biome is within protected areas and just under 162 000 ha is within OECMs, accounting for 14.8% and 5.5% of the land, respectively. The aim is to have 30% of land area in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs. This means that at least 26% of the 30% target should be under strict protection. Therefore, to achieve this target for the Albany Thicket biome, the area under strict protected areas would need to be expanded by a total of 311 500 ha through direct acquisition, offsets and Category I biodiversity stewardship. It is assumed that securing this land by 2034 for formal protection would be through biodiversity stewardship arrangements and direct land purchase with a ratio of 90:10. The area of land under conservation through OECMs already covers the remainder to achieve the 30% target.

Incorporating climate-smart principles into PCA management will require all PCAs to revise management and monitoring plans by 2027, or within two years of establishment. This would require launching guidelines on climate-smart protected area management for PCA managers to follow and adhere to. These could be a web-based set of short, clear guidelines on adapting protected area management to climate change

within locational contexts, with interactive maps on projected climate and biodiversity shifts. To ensure that climate-smart management plans and monitoring are mandatory for PCAs, legislation could be reviewed requiring that all state, private and community protected and conservation areas update and lodge online new management plans that take the climate-smart guidelines into account and collect basic monitoring data.

The outputs and activities to achieving an outcome of highly effective protected area management where the area-weighted average METT score exceeds 80% are as follows:

- 1.** Protected area funding gap is reduced to zero by securing additional funding for protected area management activities;
- 2.** Awareness and understanding of conservation issues and strategies among conservation managers is increased by undertaking a capacity-building programme on biodiversity management under climate change;
- 3.** Strategic partnerships with NGOs and private partners improve biodiversity conservation outcomes by alleviating capacity gaps through implementing concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits;
- 4.** All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems; and
- 5.** Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

The lead implementing entities for these activities would be DFFE, SANBI, SANParks, and provincial conservation authorities, with support from NGOs, CBOs, and private landowners.

Objective 2: Working landscapes are biodiversity-friendly

Creating biodiversity-friendly working landscapes outside of PCAs is critical to achieving climate resilience and reducing impacts on livelihoods. Indeed, sustainable grazing and fire management practices, restoration of degraded ecosystems and an increased proportion of rangeland under sustainable wildlife-based land use address the increased risks and improve landscape connectivity and species survival in a changing climate. Within the Albany Thicket biome, the key adaption priorities are to improve livestock and wildlife management, increase the proportion of rangeland under wildlife-based land uses, and restore degraded landscapes.

Achieving this objective in the Albany Thicket biome will require large-scale ecosystem management through sustainable livestock and wildlife management and implementing appropriate burning regimes. Livestock and wildlife management is sustainable if the stocking rates are at or below the estimated sustainable stocking rates at district scale. This will require:

- 1.** A vastly improved extension services programme, achieved through:
 - i. Employing an additional ~80 agricultural extension officers in rangeland areas.
 - ii. Relocating existing and selecting new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.
 - iii. Updating extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.
- 2.** By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland, achieved through:
 - i. Designing national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.

- 3.** Increased participation in well-run sustainable livestock ranching programmes in communal land areas, achieved through:
 - i. Supporting communal farmers in participating in programmes such as Meat Naturally Pty/Herding 4 Health, prioritising those who have or are establishing conservancies. It is assumed that such programmes could be implemented in 15% of communal rangeland areas.

Most of the responsibilities for these actions fall under the mandate of DALRRD or their provincial departments. However, DFFE and SANBI would be expected to support DALRRD and the provincial agricultural departments in the design of certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching. The Provincial Extension Coordinating Forum (PECF) could assist with expanding extension services and upskilling extension officers. Communal land areas should be prioritised for establishing support through SLM programmes, which are developed by organisations such as Meat Naturally Pty, or through programmes such as Herding 4 Health, with the support of NGOs already actively involved in the Albany Thicket biome.

Proactive fire management will achieve specific ecological outcomes if the burning guidelines for the biome are followed. This will require:

- i. Monitoring long-term fire data and developing appropriate fire management goals and guidelines that ensure correct frequency and intensity to achieve specific ecological outcomes for the Albany Thicket biome.
- ii. Promoting a unified vision of fire management through information sharing/improved communication.

The lead implementing entities for this outcome would be DFFE and provincial conservation authorities with support from SANBI, research institutions, fire protection associations, NGOs, private landowners and CBOs.

Adapting to vegetation change, increasing temperatures and reduced grazing capacity will also require livestock farmers switching to WBLU in some areas to reduce the impact on livelihoods. However, this will need to be well regulated and sustainable. This will require:

- 1.** Implementation of a clear regulatory framework for the game farming industry, achieved by:
 - i. Aligning agricultural and environmental legislation to develop a coherent policy which clarifies the position and role of game farming in South Africa.
- 2.** Development of a national electronic database of WBLU properties, achieved by:
 - i. Using the latest agricultural census data to develop a digital map and database of WBLU properties.
- 3.** Expanding WBLU into communal land, land under land reform beneficiary title, and land belonging to emerging farmers, achieved through:
 - i. Teaching WBLU practices to emerging farmers through improved WBLU extension services. This will require hiring ~20 additional extension officers.
 - ii. Providing support through infrastructure development and the supply of founder herds of game to emerging farmers and communities.

A clear regulatory framework for the game farming industry is needed to align agricultural and environmental legislation into a coherent policy which clarifies the position and role of game farming in South Africa. This will require collaboration between DFFE and DALRRD. Additionally, a national electronic database of WBLU properties and their activities needs to be developed with support from Stats SA (as part of the commercial agricultural census). Expanding well-regulated sustainable WBLU into communal land, land

under land reform beneficiary title, and land belonging to emerging farmers through improved WBLU extension services will need to involve DFFE, DALRRD, and provincial conservation authorities. Support could be provided to emerging farmers and communities through infrastructure development and the supply of founder herds of game by SANParks and provincial conservation authorities through their Wildlife Economy Programmes.

The increasing levels of degradation across the Albany Thicket biome are concerning and there is a need for focused and improved management and active clearing of IAPs. Restoring degraded ecosystems to a healthy state in priority landscapes will require the preparation of a detailed national restoration plan whereby decisions are being based on high-quality monitoring data. The national plan should identify where to target restoration effort in order to maximise biodiversity and ecosystem services. This will require:

- i. Preparing a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets.
- ii. Improving and maintaining national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.

Once a national restoration plan has been prepared, each biome will be able to have a spatially targeted approach to addressing degradation. There is a need for focused and improved management and active clearing of IAPs in the Albany Thicket biome. According to the land degradation neutrality targets for South Africa (DEA, 2018b), the aim is to clear just over 1 million ha of IAPs across South Africa by 2034. Therefore, the output for the Albany Thicket biome is that priority landscapes identified for IAP clearing in the National Restoration Plan for 2025–2034 have been cleared and are under follow-up maintenance. The target for this biome is that by 2034, at least 51 600 condensed ha of IAPs have been cleared from priority landscapes. This will require the following actions:

- i. Increasing efficiency of clearing teams and funding, e.g. through better equipment and outcome-based payments.

Improving IAP management and undertaking active clearing mostly falls under the DFFE's and provincial conservation authorities' and environment departments' mandates, but additionally requires the support of SANBI, SAEON (and other research organisations) for the mapping of IAPs and the improvement of the NIAPS dataset, as well as DALRRD and provincial agriculture departments. NGOs could also play an important role in achieving restoration outcomes.

In the Albany Thicket land degradation is extensive and severe, mostly the result of overstocking. The cost of fully restoring these areas at scale would be very high and as such the focus should be on degradation avoidance by preventing degradation of good-condition rangelands and restoration of habitats should focus on moderately degraded areas in climate-stable areas. The outputs and activities to achieve this are as follows:

- 1.** Priority landscapes identified for restoration of soil and vegetation cover in the National Restoration Plan for 2025–2034 have been restored, by:
 - i. Preparing guidelines for and support of the implementation of effective and ecologically sound PES schemes/carbon credit projects to incentivise restoration by the private sector and communities in priority areas for restoration.
 - ii. Undertaking active restoration of eroded areas and areas of extreme loss of vegetation and soil cover as per the National Restoration Plan for 2025–2034.

The lead implementing entities for undertaking active restoration would be the PES/carbon schemes with DFFE and relevant provincial conservation authorities and provincial agriculture departments.

Objective 3: Aquatic ecosystems are healthy and resilient

The main rivers and wetlands of the Albany Thicket biome provide a vital function in terms of the water needs for the various economic sectors within the Eastern Cape. Therefore, it is of critical importance that these water source areas and their aquatic ecosystems are restored and protected. Within the Albany Thicket biome, IAPs are particularly dense along watercourses. Under this objective, the quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers, wetlands and estuaries is delivered and natural buffers are restored and protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources. The outcomes of this objective are that the resource quality objectives of rivers, wetlands and estuaries in the Albany Thicket biome are met and endure under climate change, and riparian and wetland buffer areas are restored and protected. This will require:

- 1.** Assessment and monitoring of all important water management areas is improved, by:
 - i. Consistently reviewing and updating RQOs and environmental flows for rivers and wetlands.
- 2.** By 2034, ~6 500 ha of priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment, by:
 - ii. Supporting the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas.

The lead implementing entity for this objective would be DWS and catchment management agencies or catchment partnerships, with the support of DFFE, SANBI, NGOs, research organisations, CBOs, and the private sector.

Implementation plan

To achieve the long-term objectives for the Albany Thicket biome, a total of 30 activities have been planned for. The total cost for implementation of these activities is estimated to be in the order of R1.8 billion over ten years (Table 25, Table 26). The costliest activity is actively clearing IAPs followed by the expansion of protected areas. Note that budget figures are indicative and are in 2023 Rands. The implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Albany Thicket biome is summarised in Table 27.

TABLE 25: Overall implementation costs for achieving the five priority adaptation objectives for the Albany Thicket biome over ten years (2025–2034; R 2023).

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	230 000	13
Outcome 1.1 PCA extent meets CBA target	215 000	
Outcome 1.2 PCA management is climate smart	5 000	
Outcome 1.3 PCA management is highly effective	10 000	
Objective 2: Working landscapes are biodiversity-friendly	1 604 000	87
Outcome 2.1 Livestock and wildlife management is sustainable	140 000	
Outcome 2.2 Fire frequencies are appropriate for resilience	2 000	
Outcome 2.3 WBLU in rangelands is increased	32 000	
Outcome 2.4 Degraded ecosystems are restored	1 430 000	
Objective 3: Aquatic ecosystems are healthy and resilient	9 000	<1
Outcome 3.1 Resource quality objectives are met	2 000	
Outcome 3.2 Riparian and wetland areas restored and protected	7 000	
Overall cost	1 843 000	

TABLE 26: Overall implementation costs for achieving the five priority adaptation objectives for the Albany Thicket biome over ten years (2025–2034; R 2023), by province (costs in R'000).

OBJECTIVE	EASTERN CAPE	NORTH WEST
Objective 1: PCA system is climate smart	207 026	22 974
Outcome 1.1 PCA extent meets CBA target	193 524	21 476
Outcome 1.2 PCA management is climate smart	4 501	499
Outcome 1.3 PCA management is highly effective	9 001	999
Objective 2: Working landscapes are biodiversity-friendly	1 443 782	160 218
Outcome 2.1 Livestock and wildlife management is sustainable	126 016	13 984
Outcome 2.2 Fire frequencies are appropriate for resilience	1 800	200
Outcome 2.3 WBLU in rangelands is increased	28 804	3 196
Outcome 2.4 Degraded ecosystems are restored	1 287 163	142 837
Objective 3: Aquatic ecosystems are healthy and resilient	8 101	899
Outcome 3.1 Resource quality objectives are met	1 800	200
Outcome 3.2 Riparian and wetland areas restored and protected	6 301	699
Overall cost	1 658 910	184 090

TABLE 27: Implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Albany Thicket biome. All costs in 2023 Rands.

* These are national costs (not biome-level costs) to be included as part of the overall national plan.

Objective 1: PCA system is climate smart.				
Outcome 1.1: PCA extent meets CBA target.				
Target: 30% of land area is in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.1.1 NPAES 2030	1.1.1.1 NPAES is updated to incorporate increased area targets, identify critical areas for protected areas and high-priority landscapes for OECMs.	Lead: DFFE	3 840*	By end of 2025
Target: By 2025, NPAES 2030 is available.		Support: SANBI, conservation authorities		
	1.1.1.2 Adjust the biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.	Lead: DFFE, SANBI	1 620*	By end of 2025
		Support: SANParks, provincial conservation authorities		
1.1.2 Area under strict protection is expanded through direct acquisition, offsets and Category I biodiversity stewardship.	1.1.2.1 Implement spatially targeted incentives for Category I biodiversity stewardship and guide offset policies to expand the area under permanent protection in critical target areas.	Lead: SANParks, provincial conservation authorities	214 080	Over ten years, 2025-2034
Target: By 2034, 311 250 ha have been added to the PA estate, bringing the overall extent of strict, permanent protected areas to a minimum of 25% of land area.		Support: DFFE, SANBI, local government		
1.1.3 Conservation of priority landscapes outside of protected areas is achieved through OECMs (Category II and III Biodiversity Stewardship).	1.1.3.1 Implement spatial targeting of biodiversity stewardship incentives for Category II and Category III arrangements to encourage uptake in high-priority landscapes.	Lead: SANParks, provincial conservation authorities	0	Over ten years, 2025-2034
Target: By 2034, at least 0 ha of OECMs have been established.		Support: DFFE, SANBI, NGOs, People and Parks		
	1.1.3.2 Development of regulations on OECMs detailing qualifying properties of OECMs.	Lead: SANParks, DFFE	1 120	By end of 2025
		Support: SANBI, People and Parks, local government		

Outcome 1.2: PCA management is climate smart.				
Target: PCA management incorporates climate-smart principles.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.2.1 All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.	1.2.1.1 Review the PA management act to include climate-smart approaches with informative maps.	Lead: SANBI, DFFE Support: Conservation authorities, research institutions	2 200	By end of 2025
Target: By 2027, or within two years of establishment, all PCAs have up-to-date climate-smart management and monitoring plans that follow the guidelines.	1.2.1.2 All state, private and community protected and conservation areas update and lodge online management plans that take the climate-smart guidelines into account and collect basic monitoring data.	Lead: DFFE Support: Conservation authorities	3 140	By 2027, or within two years of establishment
Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.1 Protected area funding gap is reduced to zero.	1.3.1.1 Secure additional funding for protected and conservation area management activities.	Lead: SANParks, provincial conservation authorities	1 100	Over ten years, 2025–2035
Target: Funding for PA management increased by 10%.		Support: DFFE, NGOs, private sector		
1.3.2 Awareness and understanding of conservation issues and strategies among conservation managers is increased.	1.3.2.1 Undertake a capacity-building programme on biodiversity management under climate change.	Lead: DFFE, SANParks, provincial conservation authorities, local government	540	One year, 2025
Target: Senior staff in conservation agencies have attended a workshop and have in turn delivered a training to staff in their organisation.		Support: SANBI, NGOs		
1.3.3 Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps.	1.3.3.1 Set up concessions and joint venture partnerships to increase management effectiveness in protected and conservation areas, within sustainable limits.	Lead: SANParks, provincial conservation authorities, NGOs, private sector	3 930	Over ten years, 2025–2034
Target: Partnership arrangements improve financial and/or management efficiency.		Support: DFFE, SANBI		
1.3.4 All PCAs collect comparable and comprehensive baseline data on species and ecosystems to track changes and monitor management effectiveness.	1.3.4.1 Undertake baseline data collection on species and ecosystems within all PCAs.	Lead: SANParks, provincial conservation authorities	3 920	Over ten years, 2025–2034
Target: By 2027, or within two years of establishment, all PCAs have comprehensive baseline biodiversity data.		Support: NGOs, SANBI, research institutions		

Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.5 Species diversity, populations and ecosystem health show recovery or no deterioration over time, after accounting for climatic variability and ecosystem shifts.	1.3.5.1 Develop a monitoring plan to monitor species diversity, populations and ecosystem health.	Lead: SANParks, provincial conservation authorities	620	One year, 2025
Target: By 2034, biodiversity is healthy or recovering at a measurable rate in all PCAs.		Support: SANBI, research institutions		
Objective 2: Working landscapes are biodiversity-friendly.				
Outcome 2.1: Livestock and wildlife management is sustainable.				
Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.1.1 Vastly improved extension services programme.	2.1.1.1 Employ more agricultural extension officers in rangeland areas.	Lead: DALRRD, provincial-level agricultural departments	109 050	Over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
	2.1.1.2 Relocate existing and select new officers so as to ensure that they come from a similar background to the farmers they will be working with and with an appropriate skillset to the activities they will be advising on.	Lead: DALRRD, provincial-level agricultural departments	These costs are included in 2.1.1.1	Ongoing, over ten years, 2025-2034
		Support: Provincial Extension Coordinating Forum (PECF)		
Target: Level of satisfaction with extension officers rated as excellent in next Agricultural Census; Ratio of extension to producer 1:250.	2.1.1.3 Updated extension service officers' training curriculum to include climate-smart strategies for rangeland management, including WBLU.	Lead: DALRRD, agricultural institutions, colleges	1 150	One year, 2025
		Support: Provincial-level agricultural departments		
	2.1.1.4 Provide continuous training to extension officers.	Lead: DALRRD, agricultural institutions, colleges	12 350	Every year, starting in 2025
		Support: Provincial-level agricultural departments		
2.1.2 By 2034, there has been increased uptake of sustainable, wildlife-friendly rangeland management methods on privately owned farmland. Operational certification scheme for sustainable, wildlife-friendly livestock management.	2.1.2.1 Design national certification schemes for sustainable, extensive wildlife-friendly livestock management and for extensive biodiversity-friendly wildlife ranching.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 280*	By 2026
		Support: SANBI, NGOs		

Outcome 2.1: Livestock and wildlife management is sustainable.				
Target: Livestock stocking rates are at or below estimated sustainable stocking rates at district scale.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
Target: By 2034, 30% of rangeland area in the biome is under wildlife/ biodiversity-friendly certified farming systems.	2.1.2.2 Encourage livestock/wildlife farmers to apply for sustainable, wildlife-friendly/ biodiversity-friendly certification.	Lead: DALRRD, DFFE, provincial-level agricultural and environment departments	3 120	2027-2028
		Support: SANBI, NGOs		
2.1.3 Increased participation in well-run sustainable livestock ranching programmes in communal land areas.	2.1.3.1 Increase awareness of opportunities for sustainable livestock ranching and support communal farmers in participating in programmes such as Meat Naturally, prioritising those who have or are establishing conservancies.	Lead: Meat Naturally Pty, NGOs	14 430	Over ten years, 2025-2034
Target: Support programme is operational.		Support: DFFE, DALRRD, provincial-level agricultural departments		
Outcome 2.2: Fire frequencies are appropriate for maintaining ecosystem resilience. ('appropriate burning regimes')				
Target: Burn frequency is within biome guidelines.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.2.1 Burning guidelines for all biomes are followed (maintaining biodiversity).	2.2.1.1 Review and potentially adjust current legislation regarding fire to incorporate best practices from an ecological perspective.	Lead: Conservation authorities, SANBI, local government	770	By 2025
		Support: DFFE, SAWS, research institutions		
Target: Proactive fire management achieves specific ecological outcomes.	2.2.1.2 Develop appropriate fire management goals and guidelines that ensure correct frequency and intensity to achieve specific ecological outcomes.	Lead: Conservation authorities, SANBI, local government	770	By 2025
		Support: DFFE, SAWS, research institutions		
	2.2.1.3 Promote a unified vision of fire management through information sharing/ improved stakeholder communication.	Lead: DFFE, FPAs, local government	420*	Each year, 2025-2034
		Support: NGOs, SANBI		

Outcome 2.3: Proportion of rangeland under WBLU is increased.				
Target: Land area with wildlife-based land uses increased significantly.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.3.1 A clear regulatory framework for the game farming industry is implemented, including clear standards, regulation, and licensing.	2.3.1.1 Align agricultural and environmental legislation to develop a coherent policy which clarifies the position and role of game farming in South Africa.	Lead: DFFE, DALRRD	1 660*	One year, 2025
Target: Policy for game farming.		Support: SANBI, NGOs, business		
2.3.2 National electronic database of WBLU properties is developed.	2.3.2.1 Use the latest agricultural census to develop a digital map and database of WBLU properties, including capacity building on map use.	Lead: DFFE, Stats SA	960*	Over two years, 2025–2026
Target: All WBLU properties and activities are captured.		Support: DALRRD, SANBI		
2.3.3 WBLU is expanded into communal land, land under land reform beneficiary title, and land belonging to emerging farmers.	2.3.3.1 Teach WBLU practices to emerging farmers through improved WBLU extension services.	Lead: DFFE	27 260	Over ten years, 2025–2034
		Support: DALRRD, SANBI		
Target: Increased number of emerging WBLU farmers.	2.3.3.2 Provide support through infrastructure development and the supply of founder herds of game to emerging farmers and communities.	Lead: SANParks, provincial conservation authorities	5 210	Over three years, 2025–2027
		Support: DFFE, DALRRD, provincial-level agricultural departments		
Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.1 Detailed national restoration plan.	2.4.1.1 Prepare a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets. The plan needs to also map drivers of degradation and existing soil conservation measures.	Lead: DFFE, SANBI	3 400*	By 2025
Target: Restoration plan is in place.		Support: Research institutions, NGOs		
2.4.2 Decisions are based on high-quality monitoring data.	2.4.2.1 Improve and maintain national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.	Lead: SANBI	1 310*	Over ten years, 2025–2034
Target: High-quality data is available online.		Support: DFFE, research institutions		

Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
<i>Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.3 Priority landscapes identified for restoration of soil and vegetation cover in the National Restoration Plan for 2024–2030 have been restored.	2.4.3.1 Prepare guidelines for and support the implementation of effective and ecologically sound PES schemes/carbon credit projects to incentivise restoration by the private sector and communities in priority areas for restoration.	Lead: DFFE, SANBI Support: NGOs, carbon management and offsetting companies, private sector	890	By 2025
<i>Target: By 2034, the area of denuded land restored to recovering or healthy vegetation cover brings overall extent of degraded area to pre-2015 levels (LDN).</i>	2.4.3.2 Undertake active restoration of eroded areas as per the National Restoration Plan for 2024–2030, focusing on lightly degraded areas first.	Lead: Provincial conservation authorities, DFFE Support: Provincial agriculture departments, local government, NGOs	292 210	Over ten years, 2025–2034
2.4.4 Priority landscapes identified for IAP clearing in the National Restoration Plan for 2024–2030 have been cleared and are under follow-up maintenance.	2.4.4.1 Increase efficiency of clearing teams and funding, e.g. through better equipment, outcome-based payments. Promote women's and youths' participation.	Lead: DFFE Support: Provincial conservation authorities, local government	1 136 950	Over ten years, 2025–2034
<i>Target: By 2034, at least 51 600 condensed ha of IAPs have been cleared from priority landscapes.</i>				
Objective 3: Aquatic ecosystems are healthy and resilient.				
Outcome 3.1: Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change.				
<i>Target: RQOs are met.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.1.1 Assessment and monitoring of all important water management areas is improved.	3.1.1.1 Improve monitoring and consistently review and update RQOs and environmental flows. Identify which areas in the catchment impact the health of important systems.	Lead: DWS Support: DFFE, CMAs, NGOs, research institutions	1 660	Annually, starting in 2025
<i>Target: By 2034, all water management areas have updated RQOs and appropriate monitoring in place.</i>				

Outcome 3.2: Riparian and wetland buffer areas are restored and protected.				
<i>Target: Riparian and wetland buffer areas are effectively enforced and are clear from IAPs.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.2.1 Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment.	3.2.1.1 Support the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas. Ensure that this is done in areas of high importance for catchment health.	Lead: DFFE, DWS	6 900	Over ten years, 2025-2034
<i>Target: By 2034, at least 6 520 ha of riparian/wetland area in priority areas are under stewardship and are being protected from encroachment and degradation.</i>		Support: CMAs, NGOs, CBOs, private sector		

Forest Biome

Overview

The Forest biome in South Africa comprises several fragmented patches of indigenous forest predominantly in the southern and eastern parts of the country. Forests are well protected and formal conservation now stands at about 40% as a result of legislation that is aimed specifically at conserving forests. Key threats in this biome include IAPs, unsustainable harvesting of forest fauna and flora, fire and drought.

Strategic objectives, targets and activities

The key adaptation options identified for the Forest biome are improved PCA management, improved fire management, sustainable harvesting practices, and improved IAP management.

Objective 1: System of protected and conservation areas is climate smart

An expanded, connected, effective and climate-smart system of protected and conservation areas (PCAs) minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services. Achieving this will require expansion of the current PCA network, and ensuring climate-smart and highly effective PCA management. The aim is to meet CBA targets and have 30% of terrestrial ecosystems under conservation by 2034, to incorporate climate-smart principles into PCA management, and to achieve an area-weighted average Management Effectiveness Tracking Tool (METT) score that exceeds 80%.

Currently, just under 182 000 ha of land in the Forest biome is within protected areas and just under 60 000 ha is within OECMs, accounting for 40.9% and 13.5% of the biome, respectively. Given that the Forest biome exceeds the CBA 30% target, the focus here should be on improving PCA management and ensuring it is climate smart.

Incorporating climate-smart principles into PCA management will require all PCAs to revise management and monitoring plans by 2027, or within two years of establishment. This would require launching guidelines on climate-smart protected area management for PCA managers to follow and adhere to. These could be a web-based set of short, clear guidelines on adapting protected area management to climate change

within locational contexts, with interactive maps on projected climate and biodiversity shifts. To ensure that climate-smart management plans and monitoring are mandatory for PCAs, legislation could be reviewed requiring that all state, private and community protected and conservation areas update and lodge online new management plans that take the climate-smart guidelines into account and collect basic monitoring data.

The outputs and activities to achieving an outcome of highly effective protected area management where the area-weighted average METT score exceeds 80% are as follows:

- 1.** Protected area funding gap is reduced to zero by securing additional funding for protected area management activities;
- 2.** Awareness and understanding of conservation issues and strategies among conservation managers is increased by undertaking a capacity-building programme on biodiversity management under climate change;
- 3.** Strategic partnerships with NGOs and private partners improve biodiversity conservation outcomes by alleviating capacity gaps through implementing concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits;
- 4.** All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems; and
- 5.** Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

The lead implementing entities for these activities would be DFFE, SANBI, SANParks, and provincial conservation authorities, with support from NGOs, CBOs, and private landowners.

Objective 2: Working landscapes are biodiversity-friendly

Proactive fire management will achieve specific ecological outcomes if the burning guidelines for the biome are followed. This will require:

- i. Monitoring long-term fire data and developing appropriate fire management goals and guidelines that ensure correct frequency and intensity to achieve specific ecological outcomes for the Forest biome.
- ii. Promoting a unified vision of fire management through information sharing/improved communication.

The lead implementing entities for this outcome would be DFFE and provincial conservation authorities with support from SANBI, research institutions, fire protection associations, NGOs, private landowners and CBOs.

Indigenous forests have long been used as a source of traditional medicines and wild food products, which has over time led to increasing and unsustainable harvesting pressure. Ensuring efficient and sustainable harvesting of forest resources will require community engagement to encourage custodianship. Furthermore, a stock assessment of key forest resources would help to determine appropriate harvesting rates and ensure their protection into the future. The following outputs and activities are needed to achieve sustainable harvesting:

- 1.** Indigenous fauna and flora identified as threatened and endangered are effectively managed using participatory approaches, by:
 - i. Securing local community/traditional authority support to develop response actions (such as an anti-poaching strategy) through engagement.

- 2.** Comprehensive baseline data, monitoring and protection of threatened and endangered fauna and flora is improved, by:
 - i. Undertaking baseline stock assessments and developing monitoring plans for threatened and endangered fauna and flora.
 - ii. Improving environmental management inspectorates/law enforcement through better resourcing for investigation and prevention of biodiversity crime.

This requires collaboration between DFFE, SANBI, provincial departments of environment and conservation authorities, research institutions, NGOs and local and provincial government law enforcement departments, traditional authorities and local communities.

The remaining forest patches are highly susceptible to encroachment and invasion from surrounding vegetation. As a result, the Forest biome is considered to be the most proportionately impacted by IAPs with more than 17% invaded to some degree. There is a need to determine which forests are the most impacted and where clearing IAPs would yield the greatest benefits. Therefore, restoring degraded ecosystems to a healthy state in priority landscapes will require the preparation of a detailed national restoration plan whereby decisions are being based on high-quality monitoring data. The national plan should identify where to target restoration effort in order to maximise biodiversity and ecosystem services. This will require:

- i. Preparing a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets.
- ii. Improving and maintaining national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.

Once a national restoration plan has been prepared, each biome will be able to have a spatially targeted approach to addressing degradation. There is a need for focused and improved management and active clearing of IAPs in the Forest biome. According to the land degradation neutrality targets for South Africa (DEA, 2018b), the aim is to clear just over 1 million ha of IAPs across South Africa by 2034. Therefore, the output for the Forest biome is that priority landscapes identified for IAP clearing in the National Restoration Plan for 2025-2034 have been cleared and are under follow-up maintenance. The target for this biome is that by 2034, at least 2 800 condensed ha of IAPs have been cleared from priority landscapes. This will require the following actions:

- i. Increasing efficiency of clearing teams and funding, e.g. through better equipment and outcome-based payments.

Improving IAP management and undertaking active clearing mostly falls under the DFFE's and provincial conservation authorities' and environment departments' mandates, but additionally requires the support of SANBI, SAEON (and other research organisations) for the mapping of IAPs and the improvement of the NIAPS dataset, as well as DALRRD and provincial agriculture departments. NGOs could also play an important role in achieving restoration outcomes.

Objective 3: Aquatic ecosystems are healthy and resilient

Under this objective, the quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers, wetlands and estuaries is delivered and natural buffers are restored and protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources. The outcomes of this objective are that

the resource quality objectives of rivers, wetlands and estuaries in the Forest biome are met and endure under climate change, and riparian and wetland buffer areas are restored and protected. This will require:

- 1.** Assessment and monitoring of all important water management areas is improved, by:
 - i. Consistently reviewing and updating RQOs and environmental flows for rivers and wetlands.
- 2.** By 2034, ~815 ha of priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment, by:
 - i. Supporting the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas.

The lead implementing entity for this objective would be DWS and catchment management agencies or catchment partnerships, with the support of DFFE, SANBI, NGOs, research organisations, CBOs, and the private sector.

Implementation plan

To achieve the long-term objectives for the Forest biome, a total of 17 activities have been planned for. The total cost for implementation of these activities is estimated to be in the order of **R91 million** over ten years (Table 28, Table 29). The costliest objective is achieving landscape restoration targets. Note that budget figures are indicative and are in 2023 Rands. The implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Forest biome is summarised in Table 30.

TABLE 28: Overall implementation costs for achieving the five priority adaptation objectives for the Forest biome over ten years (2025–2034; R 2023).

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	16 000	18
Outcome 1.2 PCA management is climate smart	6 000	
Outcome 1.3 PCA management is highly effective	10 000	
Objective 2: Working landscapes are biodiversity-friendly	76 000	81
Outcome 2.2 Fire frequencies are appropriate for resilience	2 000	
Outcome 2.4 Degraded ecosystems are restored	62 000	
Outcome 2.5 Harvesting rates are sustainable	12 000	
Objective 3: Aquatic ecosystems are healthy and resilient	1 000	1
Outcome 3.2 Riparian and wetland areas restored and protected	1 000	
Overall cost	93 000	

TABLE 29: Overall implementation costs for achieving the priority adaptation objectives for the Forest biome over ten years (2025–2034; R 2023) across relevant provinces (costs in R'000).

OBJECTIVE	TOTAL	EASTERN CAPE	FREE STATE	KWAZULU-NATAL	LIMPOPO	MPUMALANGA	NORTHERN CAPE	NORTH WEST	NORTH WEST
Objective 1: PCA system is climate smart	16 000	4 459	20	7 056	887	1 369	8	22	2 178
Outcome 1.2 PCA management is climate smart	6 000	1 672	8	2 646	333	513	3	8	817
Outcome 1.3 PCA management is highly effective	10 000	2 787	13	4 410	555	856	5	14	1 361
Objective 2: Working landscapes are biodiversity-friendly	76 000	21 181	95	33 517	4 214	6 503	40	103	10 346
Outcome 2.2 Fire frequencies are appropriate for resilience	2 000	557	3	882	111	171	1	3	272
Outcome 2.4 Degraded ecosystems are restored	62 000	17 279	78	27 343	3 438	5 305	33	84	8 441
Outcome 2.5 Harvesting rates are sustainable	12 000	3 344	15	5 292	665	1 027	6	16	1 634
Objective 3: Aquatic ecosystems are healthy and resilient	1 000	279	1	441	55	86	1	1	136
Outcome 3.2 Riparian and wetland areas restored and protected	1 000	279	1	441	55	86	1	1	136
Overall cost	93 000	25 919	116	41 014	5 157	7 958	49	126	12 661

TABLE 30: Implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the Forest biome. All costs in 2023 Rands.

* These are national costs (not biome-level costs) to be included as part of the overall national plan.

Objective 1: PCA system is climate smart.				
Outcome 1.2: PCA management is climate smart.				
<i>Target: PCA management incorporates climate-smart principles.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.2.1 All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.	1.2.1.1 Review the PA management act to include climate-smart approaches with informative maps.	Lead: SANBI, DFFE Support: Conservation authorities, research institutions	2 200	By end of 2025
<i>Target: By 2027, or within two years of establishment, all PCAs have up-to-date climate-smart management and monitoring plans that follow the guidelines.</i>	1.2.1.2 All state, private and community protected and conservation areas update and lodge online management plans that take the climate-smart guidelines into account and collect basic monitoring data.	Lead: DFFE Support: Conservation authorities	3 430	By 2027, or within two years of establishment
Outcome 1.3: PCA management is highly effective.				
<i>Target: Area-weighted average METT score exceeds 80%.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.1 Protected area funding gap is reduced to zero.	1.3.1.1 Secure additional funding for protected and conservation area management activities.	Lead: SANParks, provincial conservation authorities Support: DFFE, NGOs, private sector	1 100	Over ten years, 2025-2041
<i>Target: Funding for PA management increased by 10%.</i>				
1.3.2 Awareness and understanding of conservation issues and strategies among conservation managers is increased.	1.3.2.1 Undertake a capacity-building programme on biodiversity management under climate change.	Lead: DFFE, SANParks, provincial conservation authorities, local government Support: SANBI, NGOs	540	One year, 2025
<i>Target: Senior staff in conservation agencies have attended a workshop and have in turn delivered a training to staff in their organisation.</i>				
1.3.3 Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps.	1.3.3.1 Set up concessions and joint venture partnerships to increase management effectiveness in protected and conservation areas, within sustainable limits.	Lead: SANParks, provincial conservation authorities, NGOs, private sector Support: DFFE, SANBI	3 930	Over ten years, 2025-2034
<i>Target: Partnership arrangements improve financial and/or management efficiency.</i>				

Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.4 All PCAs collect comparable and comprehensive baseline data on species and ecosystems to track changes and monitor management effectiveness.	1.3.4.1 Undertake baseline data collection on species and ecosystems within all PCAs.	Lead: SANParks, provincial conservation authorities	3 920	Over ten years, 2025-2034
Target: By 2027, or within two years of establishment, all PCAs have comprehensive baseline biodiversity data.		Support: NGOs, SANBI, research institutions		
1.3.5 Species diversity, populations and ecosystem health show recovery or no deterioration over time, after accounting for climatic variability and ecosystem shifts.	1.3.5.1 Develop a monitoring plan to monitor species diversity, populations and ecosystem health.	Lead: SANParks, provincial conservation authorities	620	One year, 2025
Target: By 2034, biodiversity is healthy or recovering at a measurable rate in all PCAs.		Support: SANBI, research institutions		
Objective 2: Working landscapes are biodiversity-friendly.				
Outcome 2.2: Fire frequencies are appropriate for maintaining ecosystem resilience. ('appropriate burning regimes')				
Target: Burn frequency is within biome guidelines.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.2.1 Burning guidelines for all biomes are followed (maintaining biodiversity).	2.2.1.1 Review and potentially adjust current legislation regarding fire to incorporate best practices from an ecological perspective.	Lead: Conservation authorities, SANBI, local government	770	By 2025
		Support: DFFE, SAWS, research institutions		
Target: Proactive fire management achieves specific ecological outcomes.	2.2.1.2 Develop appropriate fire management goals and guidelines that ensure correct frequency and intensity to achieve specific ecological outcomes.	Lead: Conservation authorities, SANBI, local government	770	By 2025
		Support: DFFE, SAWS, research institutions		
	2.2.1.3 Promote a unified vision of fire management through information sharing/ improved stakeholder communication.	Lead: DFFE, FPAs, local government	420*	Each year, 2025-2034
		Support: NGOs, SANBI		

Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.1 Detailed national restoration plan.	2.4.1.1 Prepare a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets. The plan needs to also map drivers of degradation and existing soil conservation measures.	Lead: DFFE, SANBI	3 400*	By 2025
Target: Restoration plan is in place.		Support: Research institutions, NGOs		
2.4.2 Decisions are based on high-quality monitoring data.	2.4.2.1 Improve and maintain national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.	Lead: SANBI	1 310*	Over ten years, 2025-2034
Target: High-quality data is available online.		Support: DFFE, research institutions		
2.4.4 Priority landscapes identified for IAP clearing in the National Restoration Plan for 2024-2030 have been cleared and are under follow-up maintenance.	2.4.4.1 Increase efficiency of clearing teams and funding, e.g. through better equipment, outcome-based payments. Promote women's and youths' participation.	Lead: DFFE	61 620	Over ten years, 2025-2034
Target: By 2034, at least 2 800 condensed ha of IAPs have been cleared from priority landscapes.		Support: Provincial conservation authorities, local government		
Outcome 2.5: Harvesting rates have allowed resource stocks to recover to optimal levels, taking biodiversity and ecosystem services into account.				
Target: Resource stocks of threatened and endangered fauna and flora have recovered to optimal levels.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.5.1 Indigenous fauna and flora identified as threatened and endangered are effectively managed using participatory approaches.	2.5.1.1 Secure local community/traditional authority support to develop response actions through engagement and develop management plans.	Lead: NGOs, provincial conservation authorities	930	Over ten years, 2025-2034
Target: Management plans for identified 'at risk' fauna and flora are in place.		Support: DFFE, SANBI		
2.5.2 Comprehensive baseline data, monitoring and protection of threatened and endangered fauna and flora is improved.	2.5.2.1 Undertake baseline stock assessments and develop monitoring plan for threatened and endangered fauna and flora.	Lead: SANBI, provincial conservation authorities	4 110	Annually, starting in 2025
		Support: DFFE, research institutions, NGOs		

Outcome 2.5: Harvesting rates have allowed resource stocks to recover to optimal levels, taking biodiversity and ecosystem services into account.				
<i>Target: Resource stocks of threatened and endangered fauna and flora have recovered to optimal levels.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
<i>Target: By 2034, threatened and endangered fauna and flora have recovered and are being effectively protected.</i>	2.5.2.2 Improve environmental management inspectorates/ law enforcement through better resourcing for investigation and prevention of biodiversity crime.	Lead: DFFE, local and provincial government Support: SANBI, NGOs	6 560	Annually, starting in 2025
Objective 3: Aquatic ecosystems are healthy and resilient.				
Outcome 3.1: Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change.				
<i>Target: RQOs are met.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.1.1 Assessment and monitoring of all important water management areas is improved.	3.1.1.1 Improve monitoring and consistently review and update RQOs and environmental flows. Identify which areas in the catchment impact the health of important systems.	Lead: DWS Support: DFFE, CMAs, NGOs, research institutions	250	Annually, starting in 2025
<i>Target: By 2034, all water management areas have updated RQOs and appropriate monitoring in place.</i>				
Outcome 3.2: Riparian and wetland buffer areas are restored and protected.				
<i>Target: Riparian and wetland buffer areas are effectively enforced and are clear from IAPs.</i>				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.2.1 Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment.	3.2.1.1 Support the implementation of riparian/ wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas. Ensure that this is done in areas of high importance for catchment health.	Lead: DFFE, DWS Support: CMAs, NGOs, CBOs, private sector	860	Over ten years, 2025-2034
<i>Target: By 2034, at least 810 ha of riparian/wetland area in priority areas are under stewardship and are being protected from encroachment and degradation.</i>				

Indian Ocean Coastal Belt Biome

Overview

The Indian Ocean Coastal Belt (IOCB) is the most modified biome in South Africa, with just 47% of its historical area remaining. It covers just under 1.2 million ha extending along the eastern coastline of KwaZulu-Natal and the Eastern Cape. Just 6.2% of the biome is under protection, with remaining unprotected habitats threatened by agricultural and urban expansion and IAPs.

Strategic objectives, targets and activities

The key adaptation options for the IOCB biome are expanding the protected area network, prioritising IAP clearing and protecting and restoring aquatic ecosystems.

Objective 1: System of protected and conservation areas is climate smart

An expanded, connected, effective and climate-smart system of protected and conservation areas (PCAs) minimises risks to biodiversity under climate change and maintains valuable regulating and cultural ecosystem services. Achieving this will require expansion of the current PCA network, and ensuring climate-smart and highly effective PCA management. The aim is to meet CBA targets and have 30% of terrestrial ecosystems under conservation by 2034, to incorporate climate-smart principles into PCA management, and to achieve an area-weighted average Management Effectiveness Tracking Tool (METT) score that exceeds 80%.

To achieve these outcomes, it will be critically important to update the NPAES 2030 to incorporate increased area targets, identify critical areas for state protection and high-priority landscapes for spatial targeting of biodiversity stewardship incentives. The process of updating the NPAES should also include adjusting the biodiversity stewardship policy to simplify the process and allow for spatial targeting of Category I, II and III stewardship measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets. Following this, priority areas for protection within the IOCB biome can be identified and spatially targeted according to the updated NPAES.

Currently, just under 62 500 ha of land in the IOCB biome is within protected areas and only 390 ha is within OECMs, accounting for 4.4% and <0.1% of the land, respectively. The aim is to have 30% of land area in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs. This means that at least 26% of the 30% target should be under strict protection. Therefore, to achieve this target for the IOCB biome, the area under strict protected areas would need to be expanded by a total of 302 000 ha through direct acquisition, offsets and Category I biodiversity stewardship. It is assumed that securing this land by 2034 for formal protection would be through biodiversity stewardship arrangements and direct land purchase with a ratio of 90:10. Additionally, a further 64 000 ha of land conserved through OECMs would be needed to achieve the 30% target by 2034.

Incorporating climate-smart principles into PCA management will require all PCAs to revise management and monitoring plans by 2027, or within two years of establishment. This would require launching guidelines on climate-smart protected area management for PCA managers to follow and adhere to. These could be a web-based set of short, clear guidelines on adapting protected area management to climate change within locational contexts, with interactive maps on projected climate and biodiversity shifts. To

ensure that climate-smart management plans and monitoring are mandatory for PCAs, legislation could be reviewed requiring that all state, private and community protected and conservation areas update and lodge online new management plans that take the climate-smart guidelines into account and collect basic monitoring data.

The outputs and activities to achieving an outcome of highly effective protected area management where the area-weighted average METT score exceeds 80% are as follows:

- 1.** Protected area funding gap is reduced to zero by securing additional funding for protected area management activities;
- 2.** Awareness and understanding of conservation issues and strategies among conservation managers is increased by undertaking a capacity-building programme on biodiversity management under climate change;
- 3.** Strategic partnerships with NGOs and private partners improve biodiversity conservation outcomes by alleviating capacity gaps through implementing concessions and joint venture partnerships to increase management effectiveness in PCAs, within sustainable limits;
- 4.** All PCAs collect comparable and comprehensive baseline data to track changes and monitor management effectiveness by undertaking baseline data collection on species and ecosystems; and
- 5.** Changes in species diversity, populations and ecosystem health are detected, after accounting for climatic variability and ecosystem shifts through effective monitoring.

The lead implementing entities for these activities would be DFFE, SANBI, SANParks, and provincial conservation authorities (Ezemvelo KZN Wildlife, ECPTA), with support from NGOs, CBOs, and private landowners.

Objective 2: Working landscapes are biodiversity-friendly

Creating biodiversity-friendly working landscapes outside of PCAs is critical to achieving climate resilience and reducing impacts on livelihoods. Indeed, sustainable grazing and fire management practices, restoration of degraded ecosystems and an increased proportion of rangeland under sustainable wildlife-based land use address the increased risks and improve landscape connectivity and species survival in a changing climate. Within the IOCB biome, the key adaptation priority is to restore degraded landscapes.

The increasing levels of IAPs across the IOCB biome are concerning and there is a need for focused and improved management and active clearing of IAPs. Restoring degraded ecosystems to a healthy state in priority landscapes will require the preparation of a detailed national restoration plan whereby decisions are being based on high-quality monitoring data. The national plan should identify where to target restoration effort in order to maximise biodiversity and ecosystem services. This will require:

- i. Preparing a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets.
- ii. Improving and maintaining national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.

Once a national restoration plan has been prepared, each biome will be able to have a spatially targeted approach to addressing degradation. There is a need for focused and improved management and active clearing of IAPs in the IOCB biome. According to the land degradation neutrality targets for South Africa (DEA, 2018b), the aim is to clear just over 1 million ha of IAPs across South Africa by 2034. Therefore, the

output for the IOCB biome is that priority landscapes identified for IAP clearing in the National Restoration Plan for 2025–2034 have been cleared and are under follow-up maintenance. The target is that by 2034, at least 33 500 condensed ha of IAPs have been cleared from priority landscapes in the IOCB biome. This will require the following actions:

- i. Increasing efficiency of clearing teams and funding, e.g. through better equipment and outcome-based payments.

Improving IAP management and undertaking active clearing mostly falls under the DFFE's and provincial conservation authorities' and environment departments' mandates, but additionally requires the support of SANBI, SAEON (and other research organisations) for the mapping of IAPs and the improvement of the NIAPS dataset, as well as DALRRD and provincial agriculture departments. NGOs could also play an important role in achieving restoration outcomes.

Objective 3: Aquatic ecosystems are healthy and resilient

Designated environmental flows to rivers and groundwater dependent ecosystems in the IOCB biome need to be ensured. Under this objective, the quantity and quality of water flows required for maintaining the ecological functioning and meeting conservation requirements of rivers, wetlands and estuaries is delivered and natural buffers are restored and protected to support landscape-level biodiversity and connectivity in the face of changing rainfall patterns and pressures on water resources. The outcomes of this objective are that the resource quality objectives of rivers, wetlands and estuaries in the IOCB biome are met and endure under climate change, and riparian and wetland buffer areas are restored and protected. This will require:

1. Assessment and monitoring of all important water management areas is improved, by:
 - i. Consistently reviewing and updating RQOs and environmental flows for rivers and wetlands.
2. By 2034, ~3 300 ha of priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment, by:
 - i. Supporting the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas.

The lead implementing entity for this objective would be DWS and catchment management agencies or catchment partnerships, with the support of DFFE, SANBI, NGOs, research organisations, CBOs, and the private sector.

Implementation plan

To achieve the long-term objectives for the IOCB biome, a total of 16 activities have been planned for. The total cost for implementation of these activities is estimated to be in the order of **R978 million** over ten years (Table 31, Table 32). The costliest activities are those to achieve landscape restoration through IAP clearing and the expansion of the protected and conservation areas. Note that budget figures are indicative and are in 2023 Rands. The implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the IOCB biome is summarised in Table 33.

TABLE 31: Overall implementation costs for achieving the five priority adaptation objectives for the IOCB biome over ten years (2025–2034; R 2023).

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	236 000	24
Outcome 1.1 PCA extent meets CBA target	222 000	
Outcome 1.2 PCA management is climate smart	4 000	
Outcome 1.3 PCA management is highly effective	10 000	
Objective 2: Working landscapes are biodiversity-friendly	739 000	76
Outcome 2.4 Degraded ecosystems are restored	739 000	
Objective 3: Aquatic ecosystems are healthy and resilient	4 000	<1
Outcome 3.1 Resource quality objectives are met	1 000	
Outcome 3.2 Riparian and wetland areas restored and protected	3 000	
Overall cost	979 000	

TABLE 32: Overall implementation costs for achieving the five priority adaptation objectives for the IOCB biome over ten years (2025–2034; R 2023), by relevant province (costs in R'000).

OBJECTIVE	EASTERN CAPE	KWAZULU-NATAL
Objective 1: PCA system is climate smart	51 993	184 007
Outcome 1.1 PCA extent meets CBA target	48 909	173 091
Outcome 1.2 PCA management is climate smart	881	3 119
Outcome 1.3 PCA management is highly effective	2 203	7 797
Objective 2: Working landscapes are biodiversity-friendly	162 809	576 191
Outcome 2.4 Degraded ecosystems are restored	162 809	576 191
Objective 3: Aquatic ecosystems are healthy and resilient	881	3 119
Outcome 3.1 Resource quality objectives are met	220	780
Outcome 3.2 Riparian and wetland areas restored and protected	661	2 339
Overall cost	215 684	763 316

TABLE 33: Implementation plan with associated costs and timeframes to operationalise the adaptation options identified for the IOCB biome. All costs in 2023 Rands.

* These are national costs (not biome-level costs) to be included as part of the overall national plan.

Objective 1: PCA system is climate smart.				
Outcome 1.1: PCA extent meets CBA target.				
Target: 30% of land area is in protected and conservation areas, of which at least 85% is in strict, permanent PAs and the balance in OECMs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.1.1 NPAES 2030	1.1.1.1 NPAES is updated to incorporate increased area targets, identify critical areas for protected areas and high-priority landscapes for OECMs.	Lead: DFFE	3 840*	By end of 2025
Target: By 2025, NPAES 2030 is available.		Support: SANBI, conservation authorities		
	1.1.1.2 Adjust the biodiversity stewardship policy to simplify process and allow for spatial targeting of Category I, II and III measures and adjust the offset policy to ensure that conservation land acquisitions are spatially aligned with updated NPAES protected area targets.	Lead: DFFE, SANBI	1 620*	By end of 2025
		Support: SANParks, provincial conservation authorities		
1.1.2 Area under strict protection is expanded through direct acquisition, offsets and Category I biodiversity stewardship.	1.1.2.1 Implement spatially targeted incentives for Category I biodiversity stewardship and guide offset policies to expand the area under permanent protection in critical target areas.	Lead: SANParks, provincial conservation authorities	207 490	Over ten years, 2025-2034
Target: By 2034, 301 680 ha have been added to the PA estate, bringing the overall extent of strict, permanent protected areas to a minimum of 25% of land area.		Support: DFFE, SANBI, local government		
1.1.3 Conservation of priority landscapes outside of protected areas is achieved through OECMs (Category II and III Biodiversity Stewardship).	1.1.3.1 Implement spatial targeting of biodiversity stewardship incentives for Category II and Category III arrangements to encourage uptake in high-priority landscapes.	Lead: SANParks, provincial conservation authorities	13 350	Over ten years, 2025-2034
Target: By 2034, at least 63 880 ha of OECMs have been established.		Support: DFFE, SANBI, NGOs, People and Parks		
	1.1.3.2 Development of regulations on OECMs detailing qualifying properties of OECMs.	Lead: SANParks, DFFE	1 120	By end of 2025
		Support: SANBI, People and Parks, local government		

Outcome 1.2: PCA management is climate smart.				
Target: PCA management incorporates climate-smart principles.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.2.1 All PCAs integrate climate principles into existing plans and manage purposely in response to climate change.	1.2.1.1 Review the PA management act to include climate-smart approaches with informative maps.	Lead: SANBI, DFFE Support: Conservation authorities, research institutions	2 200	By end of 2025
Target: By 2027, or within two years of establishment, all PCAs have up-to-date climate-smart management and monitoring plans that follow the guidelines.	1.2.1.2 All state, private and community protected and conservation areas update and lodge online management plans that take the climate-smart guidelines into account and collect basic monitoring data.	Lead: DFFE Support: Conservation authorities	1 700	By 2027, or within two years of establishment.
Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.1 Protected area funding gap is reduced to zero.	1.3.1.1 Secure additional funding for protected and conservation area management activities.	Lead: SANParks, provincial conservation authorities	1 100	Over ten years, 2025–2039
Target: Funding for PA management increased by 10%.		Support: DFFE, NGOs, private sector		
1.3.2 Awareness and understanding of conservation issues and strategies among conservation managers is increased.	1.3.2.1 Undertake a capacity-building programme on biodiversity management under climate change.	Lead: DFFE, SANParks, provincial conservation authorities, local government	540	One year, 2025
Target: Senior staff in conservation agencies have attended a workshop and have in turn delivered a training to staff in their organisation.		Support: SANBI, NGOs		
1.3.3 Strategic partnerships with NGOs and private partners are created to help alleviate capacity gaps.	1.3.3.1 Set up concessions and joint venture partnerships to increase management effectiveness in protected and conservation areas, within sustainable limits.	Lead: SANParks, provincial conservation authorities, NGOs, private sector	3 930	Over ten years, 2025–2034
Target: Partnership arrangements improve financial and/or management efficiency.		Support: DFFE, SANBI		
1.3.4 All PCAs collect comparable and comprehensive baseline data on species and ecosystems to track changes and monitor management effectiveness.	1.3.4.1 Undertake baseline data collection on species and ecosystems within all PCAs.	Lead: SANParks, provincial conservation authorities	3 920	Over ten years, 2025–2034
Target: By 2027, or within two years of establishment, all PCAs have comprehensive baseline biodiversity data.		Support: NGOs, SANBI, research institutions		

Outcome 1.3: PCA management is highly effective.				
Target: Area-weighted average METT score exceeds 80%.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
1.3.5 Species diversity, populations and ecosystem health show recovery or no deterioration over time, after accounting for climatic variability and ecosystem shifts.	1.3.5.1 Develop a monitoring plan to monitor species diversity, populations and ecosystem health.	Lead: SANParks, provincial conservation authorities	620	One year, 2025
Target: By 2034, biodiversity is healthy or recovering at a measurable rate in all PCAs.		Support: SANBI, research institutions		
Objective 2: Working landscapes are biodiversity-friendly.				
Outcome 2.4: Degraded ecosystems are restored to a healthy state in priority landscapes.				
Target: Priority landscapes for biodiversity and ecosystem services are clear of all forms of degradation.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
2.4.1 Detailed national restoration plan.	2.4.1.1 Prepare a detailed spatial restoration plan that aligns with priority areas for conservation as well as those for ecosystem-based adaptation, and that meets or exceeds land degradation neutrality targets. The plan needs to also map drivers of degradation and existing soil conservation measures.	Lead: DFFE, SANBI	3 400*	By 2025
Target: Restoration plan is in place.		Support: Research institutions, NGOs		
2.4.2 Decisions are based on high-quality monitoring data.	2.4.2.1 Improve and maintain national datasets on IAPs (NIAPS), bush encroachment and denuded/eroded areas with particular attention to priority areas for biodiversity and ecosystem services.	Lead: SANBI	1 310*	Over ten years, 2025-2034
Target: High-quality data is available online.		Support: DFFE, research institutions		
2.4.4 Priority landscapes identified for IAP clearing in the National Restoration Plan for 2024-2030 have been cleared and are under follow-up maintenance.	2.4.4.1 Increase efficiency of clearing teams and funding, e.g. through better equipment, outcome-based payments. Promote women's and youths' participation.	Lead: DFFE	739 230	Over ten years, 2025-2034
Target: By 2034, at least 33 550 condensed ha of IAPs have been cleared from priority landscapes.		Support: Provincial conservation authorities, local government		

Objective 3: Aquatic ecosystems are healthy and resilient.				
Outcome 3.1: Resource quality objectives of rivers, wetlands and estuaries are met and endure under climate change.				
Target: RQOs are met.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.1.1 Assessment and monitoring of all important water management areas is improved.	3.1.1.1 Improve monitoring and consistently review and update RQOs and environmental flows. Identify which areas in the catchment impact the health of important systems.	Lead: DWS	820	Annually, starting in 2025
Target: By 2034, all water management areas have updated RQOs and appropriate monitoring in place.		Support: DFFE, CMAs, NGOs, research institutions		
Outcome 3.2: Riparian and wetland buffer areas are restored and protected.				
Target: Riparian and wetland buffer areas are effectively enforced and are clear from IAPs.				
Output	Activity	Responsibility	Cost (R'000)	Timeframe
3.2.1 Priority riparian buffer areas and wetlands have been restored and are effectively protected from encroachment.	3.2.1.1 Support the implementation of riparian/wetland stewardship programmes to incentivise restoration by the private sector and communities in priority areas. Ensure that this is done in areas of high importance for catchment health.	Lead: DFFE, DWS	3 450	Over ten years, 2025-2034
Target: By 2034, at least 3 260 ha of riparian/wetland area in priority areas are under stewardship and are being protected from encroachment and degradation.		Support: CMAs, NGOs, CBOs, private sector		

5. Existing budgets and addressing the financing gap

Financing the climate change implementation plans will require a combination of funding sources and strategies. Therefore, availability of funding should not be the driving force when it comes to climate change adaptation priorities, but priorities should be decided on first and then funding sources need to be determined subsequently. To implement the biome-level adaptation strategies, a total of R41.8 billion is required – with the largest amount of funding needed to support ‘Objective 2: Working landscapes are biodiversity-friendly’, particularly to restore degraded ecosystems (Table 6).

TABLE 34: Implementation costs for achieving the priority adaptation objectives for the biomes over ten years (2025–2034; R 2023) and existing budgets, excluding national costs.

OBJECTIVE	COST (R'000)	% OF TOTAL
Objective 1: PCA system is climate smart	13 720 000	341 000 ¹
Objective 2: Working landscapes are biodiversity-friendly	27 871 000	130 000 ² 9 468 00 ³
Objective 3: Aquatic ecosystems are healthy and resilient	133 000	
Overall cost	41 724 000	14 939 000

¹ DFFE Protected Areas Systems Management (DFFE, 2020b)

² DFFE Natural Resources Management (DFFE, 2020b)

³ Working for Water and LandCare programmes (DALRRD, 2022)

Some of the implementation plan costs could be covered by already existing programmes (Table 34), such as the DFFE’s Protected Areas Systems Management (DFFE, 2020b); the DFFE’s Natural Resources Management (DFFE, 2020b) programme, which is contributing towards ensuring that fire frequencies are appropriate for ecosystem resilience; and the Working for Water and LandCare programmes (DALRRD, 2022), which contribute around 9.5 billion towards restoring degraded ecosystems.

Alternative funding opportunities could be secured through international climate and biodiversity funds, carbon offsets (e.g. from the construction or mining sector), and conservation NGOs. Government could seek additional funding assistance through domestic biodiversity offsets of payments for ecosystem services, especially through the water sector. The following section provides an overview of some of the existing budgets and what options exist for financing the activities laid out in the biome-level implementation plans.

Government funding

Government funding, the allocation of a portion of the national budget, will keep on playing a major role in the funding of biodiversity conservation. Public expenditure still is the largest contributor to biodiversity conservation financing in South Africa, with the DFFE accounting for the largest public sector share (Evans, 2023). A Biodiversity Expenditure Review was conducted in 2018 and updated figures for 2021 showed that about R17.8 billion of government spending was allocated to biodiversity (South African Government, 2023a). Government funding was supplemented with R849 million of private sector funding and R597 million from NGOs (South African Government, 2023a). However, provincial budgets for biodiversity conservation have been declining in real terms over time (Evans, 2023). To ensure the implementation of the adaptation plan in the longer term, provincial governments and their relevant departments need to be actively involved and receive sufficient funding to be able to successfully undertake and implement the activities outlined in these plans. Reoccurring costs of adaptation plan activities should ideally be financed by the South African government and not from international funders as many international funding cycles are short lived and do not exceed more than five years. Reviewing existing capacities within provinces and supporting them in the institutionalisation of the proposed measures will support a more longer-term sustainable approach.

Expansion of protected and conservation areas

DFFE's strategic plan envisions having a larger percentage of land under conservation, as mentioned under their Programme 5: Biodiversity and Conservation. In 2022/23, the entire programme had an annual budget of R953 million. Protected Areas Systems Management was allocated a budget of R56.8 million in the financial year 2022/23 (DFFE, 2020b). In the biome-level implementation plans, total PA expansion costs across all biomes, assuming a 90:10 ratio for expansion through stewardship and land acquisition, was estimated at around R13.7 billion for the entire implementation plan period (2025–2034), equivalent to around R2 283 million per annum. Given that DFFE's Programme 5 was given an annual budget of R953 million, this suggests that the budget needs to more than double.

A core part of the vision for SANParks into the future is a progressive move towards landscape-level conservation focusing on a broader protected area strategy to include OECMs and stewardship arrangements in a quest to establish eight 'mega-living landscapes' across South Africa, highlighting the bigger role that SANParks is willing to play in the expansion of protected and conservation areas. However, this will require durable financing given the extent of these landscapes. Funding through the Global Environment Facility (GEF) will be used to pilot the mega-living landscape vision in three of the identified landscapes, a positive step towards securing longer-term finance for the establishment and management of these spaces.

Restoration programmes

As part of the DFFE's Environmental Programmes (Programme 6), the department envisions having cleared a total of 794 419 ha of invasive plant species over five years (DFFE, 2020b). In the financial year 2022/23, the total Environmental Programme had an annual budget of R4.15 billion, with the Natural Resource Management (NRM) Programme receiving a budget allocation of R2.4 billion (DFFE, 2020b). The Working for Water (WfW) programme is South Africa's largest government-funded programme aimed at IAP removal, with a 2015/16 budget of R1.5 billion. In the financial year 2015/16, the WfW programme cleared 202 628 ha of IAPs. Over the entire period of the implementation plan (2025–2034), IAP removal across all biomes is costed at around R18.95 billion, roughly R3.2 billion per annum. Given that the budget for the entire NRM

programme is about R2.4 billion in 2022/23, existing funding will need to be increased by about 50% to meet IAP clearing targets in priority landscapes.

Bush encroachment is a major concern in the Savanna and Grassland biomes. The Working on Land and LandCare programme have overlapping objectives which also include addressing the country's level of bush encroachment. The LandCare Programme works in both rangelands and cultivated areas. The programme is funded through the Expanded Public Works Programme (EPWP) and DAFF is responsible for monitoring the performance and the impact of the programme on the state of agriculture. In the financial year 2021/22, the LandCare programme paid a total of R78 million to South Africa's provinces (Table 35).

Working for Land falls under the DFFE's Environmental Protection and Infrastructure Programme (EPIP) and has several environmental objectives, including (a) the restoration and rehabilitation of degraded land; (b) encouraging biodiversity; (c) curtailing and mitigating bush encroachment; (d) mitigating the loss of top soil; and (e) encouraging sustainable land use practices. In the financial year 2015/16, it was reported that a total of around 55 000 ha of land were restored or rehabilitated.

TABLE 35: Conditional Grant 3: LandCare 2021/2022. Source: DALRRD, 2022.

PROVINCE	AMOUNT SPENT BY THE DEPARTMENT (IN RAND)
Eastern Cape	12 512 000
Free State	8 074 758
Gauteng	2 249 643
KwaZulu-Natal	13 022 000
Limpopo	8 540 957
Mpumalanga	9 474 000
Northern Cape	7 697 000
North West	8 782 000
Western Cape	5 451 000
Gauteng	2 249 643
Total	78 053 001

The biome-level implementation plans envision that by 2034, at least 633 700 ha (around 106 000 ha per annum) of bush-encroached land has been cleared from priority landscapes. Legal barriers to landowners and entrepreneurs of clearing bush encroachment need to be removed. Additionally, fiscal mechanisms to incentivise landowners to restore areas of advanced bush encroachment need to be introduced. This could be in the form of tax write-offs. A percentage of land tax could be reduced based on the area debushed to reward environmentally friendly practices. It is estimated that a total of R3.4 billion will be required to sufficiently clear encroacher bush in areas of advanced bush encroachment in high-priority communal land areas in the Grassland and Savanna biomes. This is well outside of the current budgets for LandCare, Working for Water or Working for Land. For this reason, innovative incentive and financing programmes will need to be developed.

International climate and biodiversity funds and offsets

Ecosystem restoration can, among others, be financed through global climate change funds and carbon tax offsets funding (DEA, 2017). Global climate change funds will need to be accessed to provide funding for biodiversity conservation and supplement existing public and private sector engagements (DEA, 2017). Climate change funds provide financial support for projects focusing on climate mitigation and adaptation. The largest climate funds are the Green Climate Fund IRM (GCF IRM; US\$10.3 billion), the Green Climate Fund (GCF-1; US\$10 billion), and the Clean Technology Fund (CTF; US\$7.9 billion) (Climate Funds Update, 2023). By July 2023, South Africa had received a total of US\$415.2 million through the GCF. Direct access accredited entities in South Africa are DBSA and SANBI. As a direct access entity, SANBI is responsible for presenting funding applications to the GCF, and for managing and monitoring GCF-approved projects. The most recent GCF investments focused on reducing the price of renewable energy in South Africa. However, some of these financing mechanisms have short-term funding cycles and are highly competitive, hence additional funding sources would need to be found to reduce the funding gap.

Funds which have relevance for biodiversity include the Adaptation Fund (US\$1.4 billion) and the Global Environment Facility (GEF). The GEF is a main funding mechanism in the fight against biodiversity loss and climate change and supports projects which address the key drivers of biodiversity loss and prioritise biodiversity conservation. The GEF has been a strong funder of South Africa's conservation efforts and, since 2010, South Africa has received more than US\$100 million for biodiversity projects (South African Government, 2023a). In 2022, the GEF agreed on the Kunming-Montreal Global Biodiversity Framework and subsequently approved the disbursement of US\$1.4 billion to address climate, biodiversity and pollution issues. Additionally, the GEF is set to generate US\$9.1 billion in co-financing from other sources (GEF, 2023a). The new fund, which will be launched officially at the Seventh GEF Assembly in August 2023, will also provide enhanced access to Indigenous Peoples and local communities (GEF, 2023b).

GEF has made large efforts to increase private sector financing for environmental protection and has collaborated with other institutions to design blended finance options which can be attractive investment opportunities. For example, the Wildlife Conservation Bond, funded by GEF and issued by the World Bank, was launched to support the protection of black rhinos in the Addo Elephant National Park and the Great Fish River Nature Reserve (GEF, 2022). It is a five-year bond which is paired with a performance-based GEF grant. Investors receive their principal at the end of the bond's life and a payout, funded by GEF, depending on the rhino population growth. Such conservation financing mechanisms promote biodiversity conservation and could be replicated in other parks or be used similarly for other conservation goals.

Private funds for conservation have also been raised for restoration of catchments in South Africa, for water security. For example, through the Greater Cape Town Water Fund the City of Cape Town was the first city in South Africa to invest around R62 million into active restoration of mountain catchments outside their spatial boundaries in order to increase the city's future water supply security (TNC, 2019).

Carbon credit markets can also be used as a source of funding. Ecosystems actively remove carbon from the atmosphere through vegetation growth (carbon sequestration) and retain stored carbon (carbon storage). Businesses could buy carbon credits to compensate for emissions generated by their activities. South Africa has shown strong commitment to establish domestic standards for carbon offset programmes and to develop a carbon offsets programme which is linked to international markets.

Debt for Nature swaps reduce countries' debt in return for a government commitment to invest in biodiversity conservation, protection of endangered ecosystems, or low-carbon transport and infrastructure. Such an innovative financing model has been developed since many developing countries are unable to repay their debt in full. Lending institutions, such as commercial banks or governments, could be willing to sell debts at

a discount rather than waiting for an uncertain future repayment. In return for debt restructuring, countries agree to invest in conservation projects and thereby give investors a way to show their ESG commitments. For example, in Ecuador, Credit Suisse helped the government to buy US\$1.6 billion of debt for US\$644 million (World Economic Forum, 2023). In return, the government committed to investing US\$18 million per annum over the next 20 years in the Galapagos islands (World Economic Forum, 2023).

Domestic biodiversity offsets

Additional biodiversity funding could be generated through requiring biodiversity offsets designed to internalise externalities. Developers try to compensate for biodiversity loss created by their activities through biodiversity conservation elsewhere. Such requirements could be integrated into the approval process of new projects in the mining sector, property development, plantation forestry, commercial agriculture, and water supply infrastructure. However, such practices have been criticised as the impact of development in one area can often not be cancelled out by enhanced conservation activity in some other place. Biodiversity offsets should be used to offset unavoidable impacts but not as a remedy for impacts that could be addressed through other means. DFFE issued a Biodiversity Offsets Guideline in June 2023 in terms of the National Environmental Management Act to provide a framework for implementing biodiversity offsets, including principles, procedures, and standards for developing offset programmes (DFFE, 2023). The Guideline serves to provide a degree of consistency and standardisation.

Domestic payment for ecosystem services schemes

Through PES schemes, landowners receive financial incentives to conserve ecosystems and protect biodiversity. Payments are conditional on improved land management practices that are implemented or actual ecosystem services that are delivered. Whereas PES schemes that receive international flows tend to focus on carbon and biodiversity, PES schemes for hydrological services are generally domestic schemes. Given South Africa's water scarcity situation, this is something that has been considered in the past, and recent studies suggest that doing so through raising urban water tariffs is a financially viable option (Letley & Turpie, 2023; du Plessis, Turpie & Letley, 2024). In Africa as a whole, it has proved difficult to set up hydrological PES schemes in the past, but recent initiatives have shown that the best way to do this is through the setting up of independently managed Water Funds (these may or may not include PES schemes). There are already working models of Water Funds in South Africa that could be extended for this purpose in appropriate catchment areas (see above).

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APPENDIX 1:

Institutional and governance considerations

This appendix provides some context on the stakeholders responsible for and active in biodiversity conservation in South Africa and discusses the type of governance arrangements that could bring about effective and efficient implementation of the biome-level biodiversity adaptation plans.

Institutional context for the biodiversity sector

Overview

South Africa is a parliamentary republic with a three-tier system of government (Figure 8). While national, provincial and local spheres of government are autonomous, they work together through a cooperative governance system which is a fundamental philosophy of the Constitution (Chapter 3 of the Constitution; Government of South Africa, 2015).

The institutional context for the biodiversity sector has been described in the Fifth National Report to the Convention on Biological Diversity (SANBI, 2014), the NBSAP 2015–2025 (Government of South Africa, 2015) and other relevant reports, e.g. National Protected Area Expansion Strategy (NPAES) (DEA, 2016). However, since the release of these reports, national and provincial government institutions, have been restructured and renamed. This includes the national department responsible for the environment, now the Department of Forestry, Fisheries and the Environment (DFFE).³

Responsibility for the environment is shared between national and provincial government. The national legislative competencies include land reform, water resources, forest resources, marine resources, national parks and national botanical gardens (Government of South Africa, 2015). Legislative competencies that are cross-cutting at the national and provincial level include environmental management, pollution control, soil conservation and nature conservation (other than national parks, national botanical gardens and marine resources), as well as regional planning and development (Government of South Africa, 2015). At the local level, the competencies of district and local municipalities include biodiversity and development planning,⁴ through integrated development plans (IDPs) and spatial development frameworks (SDFs).

³ In 2009 the national department responsible for the environment was the Department of Environmental Affairs (DEA). In 2019 it was dissolved and merged with the forestry and fisheries functions of the previous Department of Agriculture, Forestry and Fisheries (DAFF) into the Department of Environment, Forestry and Fisheries (DEFF). In 2021, the department was renamed the Department of Forestry, Fisheries and the Environment (DFFE). This in turn resulted in the renaming and restructuring of corresponding departments at the provincial level.

⁴ The South African government uses the term 'biodiversity planning' for what is internationally referred to as conservation planning.

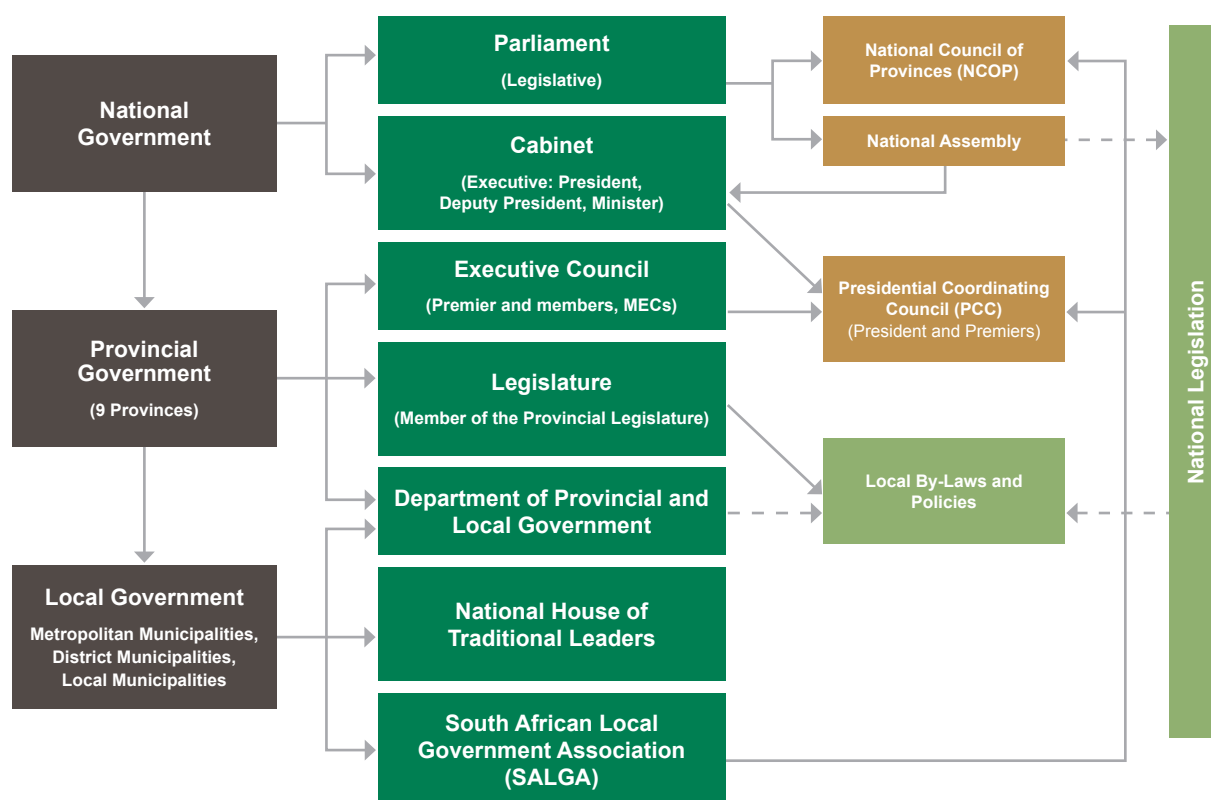


FIGURE 8: Structure of South African government. Created from information presented by the Parliamentary Monitoring Group, <https://pmg.org.za/page/structure-of-government>.

Government departments with mandates that are related to the conservation and management of biodiversity and natural resources are outlined below. This is followed by a description of the main private and public organisations and institutions and cooperative networks that provide management, research and funding support to the biodiversity sector.

Institutions responsible for biodiversity and their guiding plans

National institutions

The **Department of Forestry, Fisheries and the Environment (DFFE)** is responsible for the management, protection, and conservation of South Africa's natural resources and environment, and to promote sustainable development, based on section 24 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996). DFFE has developed several legislative and regulatory frameworks comprising environmental laws, regulations, policies, and standards. The department has nine branches to carry out its mandate (Figure 9) and is guided by its five-year Strategic Plan 2019/20–2023/24. The Strategic Plan is informed by South Africa's Constitution, the National Development Plan (NDP), the Medium Term Strategic Framework 2019–2024 (MTSF), **Acts of Parliament of Environment Management** and other relevant legislation, and international conventions on environmental management to which South Africa is a signatory (DFFE, 2020b).

The work of the department is supported by five statutory bodies or reporting entities (Figure 9): South African National Biodiversity Institute (SANBI), South African National Parks (SANParks), the South African Weather Service (SAWS), iSimangaliso Wetland Park, and the Environmental Assessment Practitioners Association of South Africa (EAPASA). These bodies report to the Minister of DFFE but have an independent Board of

Directors, Chief Executive Officer (CEO) and Executive Committee. These are briefly discussed in Figure 9.

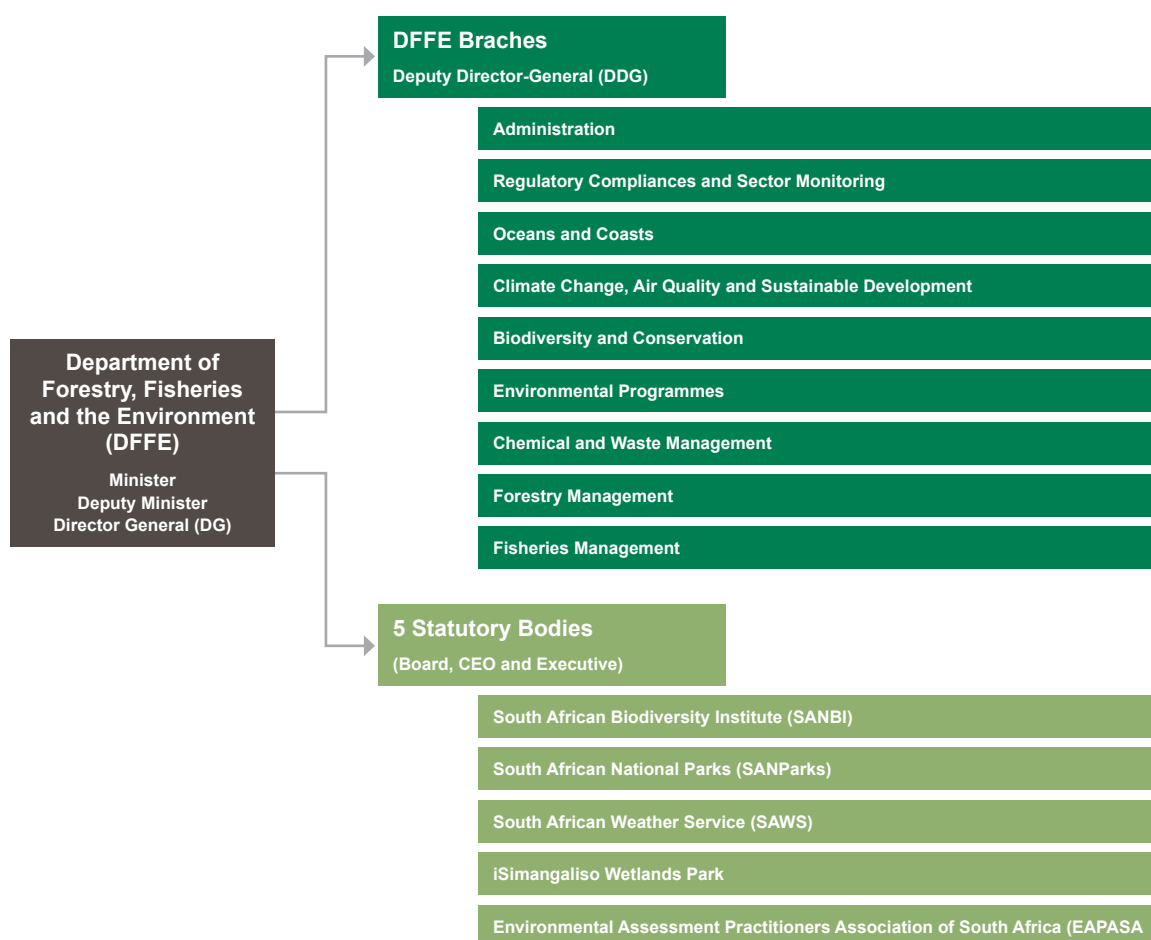


FIGURE 9: The structure of the Department of Forestry, Fisheries and the Environment (DFFE).

The **South African National Biodiversity Institute (SANBI)** was established in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) and is a key contributor to South Africa's sustainable development (SANBI, 2020). SANBI's mandate is to assist in achieving the objectives of the Biodiversity Act (SANBI, 2022). In addition to managing national botanical gardens, SANBI plays a leading role in the management and conservation of South Africa's biological diversity through research, knowledge sharing, policy support and advice, monitoring and reporting (Government of South Africa, 2015).

SANBI is obliged to monitor and report regularly on the status of biodiversity, threatened and protected, as well as invasive species (SANBI, 2022). It maintains databases on important biodiversity indicators, provides knowledge products and technical insights, helps build capacity and provides advice to different levels of government. SANBI also provides expert assessment and advice to DFFE for several multilateral environmental agreements, including the UNCBD, UNCCD, UNFCCC, the Convention on International Trade in Endangered Species (CITES), the Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES), the Sustainable Development Goals (SDGs), and the African Union Agenda 2063 (SANBI, 2020).

SANBI is a supporting agency for the development and implementation of the National Protected Area Expansion Strategy (NPAES), which is updated every five years and sets targets for the next 20-year period. The NPAES aims to achieve 'protected area expansion for improved ecosystem representation, ecological sustainability and resilience to climate change' (DEA, 2016). In this regard, SANBI also supports and facilitates collaboration between provincial governments, NGOs and conservation agencies in their

implementation of biodiversity stewardship programmes (Box 2). Biodiversity stewardship recognises the value and role of private and communal landowners in biodiversity conservation efforts and has become the primary mechanism to expand protected areas in South Africa. Indeed, between 2008 and 2016, 68% of all protected area expansion in the country was achieved through biodiversity stewardship and in five provinces it was the only mechanism for protected area expansion (SANBI, 2018b).

South African National Parks (SANParks) was established in terms of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003). Their mandate is to manage national parks, including natural and cultural assets, in a sustainable way through innovation, responsible tourism and to ensure socio-economic benefits for current as well as future generations. South Africa is a signatory to numerous international conventions that are tasked with environmental regulatory functions. The following are relevant to SANParks (SANParks, 2020): Convention on Biological Diversity (CBD), United Nations Framework Convention on Climate Change (UNFCCC), Convention on Migratory Species of Wild Animals (CMS), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Ramsar Convention, World Heritage Convention, African Convention on the Conservation of Nature and Natural Resources, United Nations Convention to Combat Desertification (UNCCD), SADC Protocol on Wildlife Conservation and Law Enforcement (1999). SANParks contributes to the NDP as it is a key component of the national tourism economy and supports rural development through corporate social investment initiatives, community development programmes, and DFFE's Environmental Programmes.

SANParks' five-year Strategic Plan (2019/20–2023/24) is aligned with government's 12 outcomes of the Medium-Term Strategic Framework (MTSF), the 13 objectives and actions of the National Development Plan (NDP), government's Nine-Point Plan,⁵ DFFE's Biodiversity and Conservation, Environmental Programmes and Administration branches (see Figure 9), and the Department of Tourism's strategic plans (SANParks, 2020). The Strategic Plan outlines five core goals: (1) sustainable conservation, (2) diverse and responsible tourism, (3) socio-economic transformation, (4) financial sustainability, and (5) capability advancement (SANParks, 2020). The first goal is to be achieved through (i) improved contribution to a growing national and global conservation estate, (ii) effectively and sustainably managed ecosystems, species and cultural heritage resources across biomes, and (iii) sustainably utilised resources for fair and equitable sharing of benefits. The latter is achieved through their Wildlife Economy and Sustainable Use Programme.⁶

The **iSimangaliso Wetland Park Authority** is responsible for managing the iSimangaliso Wetland Park, which was listed as South Africa's first UNESCO world heritage site in 1999, in accordance with section 9 of the World Heritage Convention Act (No. 49 of 1999). The Authority replaced the provincial conservation agency after the listing of the site, but still entrusts Ezemvelo KZN Wildlife with the conservation management of the park.

The **South African Weather Service (SAWS)** was established in 2001 under the South African Weather Service Act (No. 8 of 2001), with the mandate to provide accurate and reliable weather forecasts, warnings, and advisory services to the public, aviation, maritime, and agricultural sectors, including operating the Multi-Hazard Early Warning System (MHEWS), which provides meteorological, hydrological and climate information to manage various types of hazards, such as floods, fires, and storms. SAWS developed a climate change reference atlas for South Africa which provides future climate change predictions for 2036–2065 and 2066–2095, relative to the historical data for 1976–2005 (WRC & SAWS, 2017).

⁵ <https://www.gov.za/issues/nine-point-plan>

⁶ The SANParks Wildlife Economy and Sustainable Use Programme seeks to redress the historic exclusion of people from the game farming industry by supporting local communities and emerging game farmers to establish their own wildlife enterprises. This is achieved through the supply of founder herds of game to applicants (donation or loan) (SANParks, 2021).

The **Environmental Assessment Practitioners Association of South Africa (EAPASA)** was established in 2012 to advance the quality of environmental assessment practice in South Africa. This is done through the establishment and registration of Environmental Assessment Practitioners (EAPs) in terms of S24H of the National Environmental Management Act (NEMA) (Act No. 107 of 1998) and the Section 24H Registration Authority Regulations.

Provincial environmental departments and conservation authorities

Departments of the environment and/or provincial conservation authorities exist for each province (Table 36), but their separation of agency and mandate varies (Government of South Africa, 2015). In the Northern Cape, Free State, Gauteng and Limpopo, the conservation authority forms part of the department. In the rest, the conservation authority is an independent entity. However, the mandate of the conservation authorities is also variable: CapeNature and Ezemvelo KZN Wildlife work throughout the province, both inside and outside of protected areas, whereas the North West Parks Board, Mpumalanga Tourism and Parks Agency and Eastern Cape Parks and Tourism Agency work only within the provincial protected areas (Government of South Africa, 2015).

TABLE 36: Provincial departments of environment and provincial conservation authorities.

PROVINCE	DEPARTMENT RESPONSIBLE FOR ENVIRONMENT	CONSERVATION AUTHORITY
North West	Department of Economic Development, Environment, Conservation and Tourism	North West Parks Board
Mpumalanga	Department of Agriculture, Rural Development, Land and Environmental Affairs	Mpumalanga Tourism and Parks Agency (MTPA)
Gauteng	Department of Agriculture and Rural Development	-
Free State	Department of Economic, Small Business Development, Tourism and Environmental Affairs	-
Western Cape	Department of Environmental Affairs and Development Planning	CapeNature
Northern Cape	Department of Agriculture, Environmental Affairs, Rural Development and Land Reform	-
Limpopo	Limpopo Department of Economic Development, Environment and Tourism	-
KwaZulu-Natal	KZN Department of Economic Development, Tourism, and Environmental Affairs	Ezemvelo KZN Wildlife
Eastern Cape	Department of Economic Development, Environmental Affairs and Tourism	Eastern Cape Parks and Tourism Agency

Each province has developed a set of strategies and planning documents that serve as the basis for biodiversity inputs into land use and development planning processes and bioregional plans,⁷ to inform provincial EIA processes and to guide provincial protected area expansion and biodiversity stewardship programmes. These are discussed for each province below:

- In 2015, the then North West Department of Rural, Environment and Agricultural Development (READ) published the **North West Biodiversity Sector Plan** (READ, 2015), which provided an up-to-date biodiversity assessment and spatially identified a network of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). This is the first biodiversity sector plan for the province and replaced the 2009 North West Biodiversity Conservation Assessment which reported on the state of biodiversity in the province and compiled a critical biodiversity map (DACERD, 2009).
- In 2009, MTPA published the **Mpumalanga Protected Area Expansion Strategy 2009-2028** (MTPA, 2009), which provides a 20-year framework for coordinating the expansion and consolidation of protected areas in the province, in line with the requirements of the NPAES. Following this, in 2014, MTPA published the **Mpumalanga Biodiversity Sector Plan (MBSP)**, which aimed to guide decision-making to achieve Mpumalanga's biodiversity objectives. In May 2023, the MBSP was officially gazetted by the Members of the Executive Council for Agriculture, Rural Development, Land and Environmental Affairs (Provincial Gazette No. 2535 of 26 May 2023).
- In 2012, Gauteng Nature Conservation, a division of the Gauteng Department of Agriculture and Rural Development (GDARD), released the **Gauteng Conservation Plan** (known as Gauteng C-Plan v3.3), replacing the earlier version of 2007.
- The **Free State Green Economy Strategy (FSGES)** with implementation plan was released in 2014 (DETEA, 2014). In 2016, the first **Biodiversity Plan for the Free State** province was published by the Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEAT, 2016).
- The **Western Cape Protected Area Expansion Strategy 2021-2025** (CapeNature, 2021) was developed by CapeNature in collaboration with the Western Cape Department of Environmental Affairs and Development Planning (DEADP) and with inputs from the City of Cape Town, Table Mountain Fund, Conservation Outcomes, Birdlife South Africa, Overberg Renosterveld Conservation Trust, Grootbos Foundation and WWF South Africa, and SANBI. CapeNature's expansion strategy is aligned with the NPAES (DEA, 2016), the Protected Areas Act (South African Government, 2003) and the CapeNature Strategic Plan 2021-2025 (CapeNature, 2020). The identification of priority areas for the protection of biodiversity is informed by the **Western Cape Biodiversity Spatial Plan** (WCBSP) (Duffell-Canham *et al.*, 2017) and the **Conservation Action Priorities Map**, which is based on a comprehensive database and highlights cadastres targeted for protected area expansion according to objective, mechanism, organisation, and urgency (Duffell-Canham *et al.*, 2017). Furthermore, CapeNature provides annual updates through the **State of Conservation Report** (e.g. CapeNature, 2023) to inform the periodic Western Cape State of Biodiversity Report, as mandated by the Western Cape Biodiversity Act (No. 6 of 2021).
- The **Namakwa District Biodiversity Sector Plan** was released in 2008 (Northern Cape Province, 2008). While this does not cover the whole of the Northern Cape Province, it does cover a large portion of the Succulent Karoo. The **Northern Cape Critical Biodiversity Area Map** was published in 2016 (Oosthuysen & Holness, 2016), an update of the CBA map that was initially created in 2009. More recently, the **Namakwa District Municipality Climate Change Vulnerability Assessment and Response Plan** was released (Northern Cape Province, 2023) through the Local

⁷ Bioregional plans are developed at a localised scale (local or district municipality) and include a map of biodiversity priorities (identified as Critical Biodiversity Areas and Ecological Support Areas) with accompanying land use planning and decision-making guidelines, to inform land use planning, environmental assessment and authorisations as well as natural resource management by a range of sectors whose policies and decisions impact on biodiversity (DEDEAT, 2018). The guidelines for bioregional planning are NEMBA Guidelines (No. 291 of 2009) and the technical guidelines for CBA maps (see SANBI, 2017b).

Government Climate Change Support Program, which is an update of the 2012 assessment (see Bourne *et al.*, 2012).

- In 2013, the **Limpopo Conservation Plan** version 2 (LCPv2) was developed, which included two primary products – the map of Critical Biodiversity Areas (CBAs) and associated land use guidelines (Desmet *et al.*, 2013). Also in 2013, the **Limpopo Green Economy Plan** was released (LEDET, 2013). In 2016, the Limpopo Department of Economic Development, Environment and Tourism (LEDET) created **CBA maps** for the Mopani District and Waterberg District which were published as **Bioregional Plans** in 2019 in terms of section 40(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Following this, as part of the RESILIM-O Project, a **Critical Biodiversity Areas Mapbook for the Ba-Phalaborwa Municipality 2019** was published (AWARD, 2019).
- In 2010, Ezemvelo KZN Wildlife developed the **KwaZulu-Natal Protected Areas Expansion Plan (2009-2028)** that serves as a guide for the expansion process in KZN (Ezemvelo KZN Wildlife, 2010, 2015). Following this, over the period 2014–2016, **Biodiversity Sector Plans (BSPs)** were developed for all of the KZN district municipalities as a precursor to bioregional plans. In 2016, eThekweni Municipality published **Durban's Systematic Conservation Assessment** (McLean *et al.*, 2016).
- The Eastern Cape Parks and Tourism Agency (ECPTA) holds a dual mandate of ensuring the maintenance of the province's wilderness and protected areas as well as promoting and facilitating the province's tourism. In 2018, a revised **Eastern Cape Biodiversity Conservation Plan (ECBCP)** was produced (DEDEAT, 2018). This replaces the ECBCP of 2007 in its entirety. ECPTA has acknowledged the potential benefits of a biodiversity economy strategy with a focus on game farming in previously disadvantaged communities (Mokotjomela & Nombewu, 2019) particularly in South Africa. To address this social inequality, the Biodiversity Economy Strategy (BES). In the **ECPTA Strategic Plan 2020/21–2024/25**, the authority is recognised as being a well-positioned strategic implementer of the biodiversity economy strategy.

Depending on who has the mandate for conservation outside of protected areas, the environment and/or provincial conservation authorities also take responsibility for implementation of biodiversity stewardship (Box 2).

BOX 2:

BIODIVERSITY STEWARDSHIP IN SOUTH AFRICA. SOURCE: SANBI, 2018B.

Biodiversity stewardship involves the establishment of conservation management arrangements on private or communal land. There are three categories of land under stewardship: (1) protected areas; (2) conservation areas; and (3) partnership areas. The first involves the highest level of commitment, whereas the last are informal arrangements. Category 1 biodiversity stewardships have the highest level of biodiversity importance, support from conservation authorities, and commitment to conservation. The first National Biodiversity Stewardship Guideline was developed in 2009 and reviewed in 2018 (see SANBI, 2018b) and serves as a best practice implementation guide for biodiversity stewardship in the country. One of the main strengths of biodiversity stewardship as a conservation mechanism is that it is cost effective, representing just a fraction of the cost of land acquisition. It is between 70 and 400 times less costly to establish a protected area through biodiversity stewardship than through state acquisition of land and between four and 17 times lower for ongoing management than state-managed areas (SANBI, 2017a).

TABLE B1: Biodiversity stewardship categories, *with text missing*. Source: adapted from SANBI, 2017a.

TYPE OF AGREEMENT	LEGAL MECHANISM	DESCRIPTION
BIODIVERSITY STEWARDSHIP CATEGORY 1: PROTECTED AREAS		
Nature Reserve or National Park	National Environmental Management: Protected Areas Act (Act 57 of 2003)	• Suitable for sites with highest biodiversity importance. • Binding on property: declaration of Nature Reserve, and a title deed restriction. • Binding on landowner: contract with landowner usually for 99 years/in perpetuity*. • Considered to be part of South Africa's protected area estate, and contributes to meeting protected area targets.
Protected Environment	National Environmental Management: Protected Areas Act (Act 57 of 2003)	• Suitable for declaration over multiple properties. • Less restrictive land use than Nature Reserve or National Park. • Binding on property: declaration of Protected Environment. Optional title deed restriction. • Binding on landowner. • Considered to be part of South Africa's protected area estate, and contributes to meeting protected area targets.
BIODIVERSITY STEWARDSHIP CATEGORY 2: CONSERVATION AREAS		
Biodiversity Management Agreement	National Environmental Management: Biodiversity Act (Act 10 of 2004)	• Less restrictive than protected area declaration. • Must have a Biodiversity Management Plan (in terms of Biodiversity Act) on all/part of the property. • Binding on landowner: contract with landowner for a minimum of 5 years, or longer in 5-year increments.
Biodiversity Agreement	Contract law	• Less restrictive than protected area declaration. • Binding on landowner: contract with landowner for a minimum of 5 years or longer.
Conservation Servitude	Property	• Less restrictive than protected area declaration. • Binding on landowner: notarial deed registered at the Deeds Registry for a minimum of 99 years or in perpetuity. • Binding on successor in title. • Provides management conditions particular to the area in question.
Business, Industry and Biodiversity initiatives		Examples: • Conservation Champions Programme. • Water Stewards. • Sustainable Farming.
Conservation agreements		• Offers direct incentives for conservation through a negotiated benefit package in return for conservation actions by communities. • Signed for a 3-year duration (with the option for renewal).

BIODIVERSITY STEWARDSHIP CATEGORY 3: PARTNERSHIP AREAS

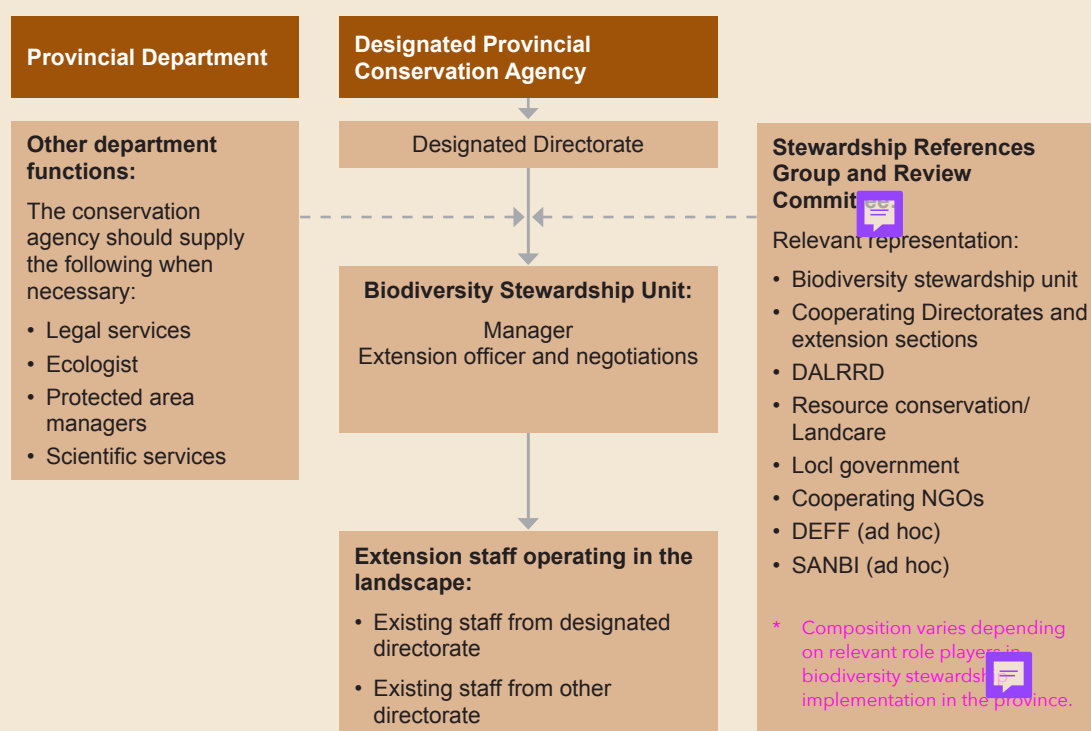
- This is an informal category of biodiversity stewardship which involves a registration of a site within this category by the provincial conservation authority or conservation NGO.
- No legal certainty, duration and intent.
- Involves collective action by landowners or communities.
- Biodiversity conservation management benefits without formal agreements or accountability.
- Registration of mechanisms is advised.

Examples of such include (but are not limited to):

- Conservancies.
- Buffer Zones and Transition Zones of Biosphere Reserves.
- Sites of Conservation Significance.
- Community conservation areas.

* Eligibility for tax incentives requires a minimum of a 99-year or in-perpetuity title deed restrictions.

The operation and implementation of biodiversity stewardship happens at the provincial scale, typically following provincial protected area expansion targets (SANBI, 2018b). Initiated provincially in the Western Cape in 2003, by 2012 all nine provinces had some form of biodiversity stewardship programme in operation. Biodiversity stewardship agreements (see figure below) are negotiated between the provincial conservation authority and a landowner or group of landowners. The conservation authority also provides ongoing support for biodiversity stewardship sites and is responsible for conducting annual audits to ensure compliance (SANBI, 2017a). The provincial conservation authorities are supported at national level by DFFE and SANBI. The figure below shows the basic institutional model for a provincial biodiversity stewardship programme (SANBI, 2018b).



Of relevance to the biome-level implementation plans for the Biodiversity Adaptation Strategy is the way in which the different biomes intersect with the provinces (Table 37). A third of the country falls within the Savanna biome, which covers just under 395 000 km². Most of this biome falls within the provinces of Limpopo, Northern Cape and North West. The Grassland biome covers close to 332 000 km² (28%) of South Africa, mostly within the Free State, the Eastern Cape, KwaZulu-Natal and Mpumalanga. The Nama-Karoo covers just under 250 000 km² of the country, mostly in the Northern Cape (74%) and the Eastern Cape (12%). The Succulent Karoo, which covers 7% of South Africa, is found in the Northern Cape and Western Cape. Fynbos covers just 7% of South Africa and is found mostly within the Western Cape, as well as in the Eastern Cape and Northern Cape. The remaining biomes, Indian Ocean Coastal Belt (78% in KwaZulu-Natal), Desert (100% in the Northern Cape) and Forest (patches scattered across the country), make up less than 3% of the South African mainland. Thus, most provinces contain a variety of biomes, with the highest diversity being in the Eastern Cape, Northern Cape and Western Cape (Table 37).

TABLE 37: The extent (in km²) of each biome within each province. IOCB = Indian Ocean Coastal Belt.

PROVINCE	FOREST	SAVANNA	GRASSLAND	IOCB	SUCCULENT KAROO	NAMA-KAROO	ALBANY THICKET	FYNBOS	DESERT
Eastern Cape	1 312	17 197	70 304	2 576	1 740	29 231	31 780	10 363	-
Free State	6	8 875	109 798	-	-	7 893	-	-	-
Gauteng	-	6 055	12 123	-	-	-	-	-	-
KwaZulu-Natal	2 077	30 120	50 819	9 116	-	-	-	-	-
Limpopo	261	120 970	3 903	-	-	-	-	-	-
Mpumalanga	403	26 787	49 292	-	-	-	-	-	-
Northern Cape	3	111 541	4 139	-	48 654	184 765	-	6 472	6 263
North West	6	72 558	30 325	-	-	-	-	-	-
Western Cape	641	-	148	-	27 813	27 462	3 527	64 818	-

Other public sector institutions with a role in managing biodiversity

Other public sector institutions that have a direct role in managing biodiversity or that have an impact on the environment and biodiversity, are involved in its monitoring or in developing the green economy are discussed in some detail below. Of these, the Department of Water and Sanitation (DWS) and the Department of Agriculture, Land Reform and Rural Development (DALRRD) are priority institutions for mainstreaming biodiversity, where efforts need to be made to ensure alignment of policies with biodiversity strategies and plans.

The **Department of Water and Sanitation (DWS)** is responsible for ensuring the country's water security, including the quantity and quality of water allocated to users and to sustain aquatic ecosystem health (Government of South Africa, 2015), and manages extractions and polluting effluents through allocation of rights. It therefore plays a critical role in the maintenance of freshwater and estuarine ecosystem biodiversity, managing the tension between water demand by users and the environment. DWS monitors the quality of wastewater treatment plant outputs to the environment through the Green Drop programme (Bega, 2022), and is responsible for monitoring the health of aquatic ecosystems. It aims to increase the

number of rivers with eco-status monitoring programmes and to reduce pollution, especially mine and wastewater discharge, into the environment. The department also acknowledges the importance of investing in ecologically healthy catchment areas, termed ecological infrastructure,⁸ to protect and complement its grey infrastructure.

There are nine Catchment Management Agencies (CMAs) in South Africa – Limpopo, Olifants (Mpumalanga Province), Inkomati-Usutu, Pongola-Umzimkulu, Vaal, Orange, Mzimvubu-Tsitsikamma, Breede-Gouritz and Berg-Olifants (Western Cape Province) – that perform specific water management functions and plan for the protection, use, development, conservation, management and control of water resources in their respective Water Management Areas through a catchment management strategy (Karar, 2017). South Africa's CMAs were established in terms of section 78(1) of the National Water Act (Act No. 36 of 1998).

The **Department of Agriculture, Land Reform and Rural Development (DALRRD)** has the mandate to improve agricultural production and food security (South African Government, 2020). Its strategy focuses on expansion of the agricultural sector to support sustainable and inclusive economic development, particularly in rural areas, in alignment with the national government's Medium Term Strategic Framework (2019–2024) priority area 1: Economic transformation and job creation (DPME, 2020). The department is responsible primarily for the Acts that relate to agriculture value chains, land tenure reform, land redistribution, spatial planning and land use management, all of which impact on biodiversity management (Government of South Africa, 2015).

Extension and advisory support services are provided to farmers through DALRRD and the provincial agricultural departments (Table 38) in line with the **National Policy on Extension and Advisory Services** (DAFF, 2016). The policy provides for the establishment of institutional mechanisms to strengthen relationships between extension agents, research, and farmers. Such services aim to provide commercial and smallholder farmers with the knowledge and skills to improve their agricultural production and promote sustainable rural development. DALRRD is responsible for training programmes to support skills development in the sector for commercial as well as small-scale and emerging farmers, farmworkers, and community members, and through extension services, to distribute up-to-date information on agricultural practices, market trends, and government policies using a mix of print and online publications as well as community workshops. Extension programmes are executed by the provincial agricultural departments that have an established directorate or branch for extension and advisory services. In practice, extension services have reportedly been poorly implemented. It is the provincial directorate that is responsible for the design and implementation of these services and associated strategies, with support at the national level from DALRRD through forums to ensure integrated service delivery. In many cases existing structures such as producer organisations or commodity groups partner with local and district municipalities to act as overarching forums (DAFF, 2016). Extension practitioners help to facilitate these partnerships.

The mandate of the **Department of Mineral Resources and Energy (DMRE)** is to regulate, transform and promote the minerals and energy sectors, providing sustainable and affordable energy for growth and development (as legislated in the Mineral and Petroleum Resources Development Act, Act 28 of 2002). The department has six programmes which were developed to align with the core objective to develop a sector that 'promotes economic growth and development, social equity and environmental sustainability' (DMRE 2023). Given the impacts that mining can have on biodiversity, the recognition and integration of biodiversity considerations into the mining sector is important. In 2013, the then DEA and DMR (and other key stakeholders) released the **Mining and Biodiversity Guideline: Mainstreaming Biodiversity into the Mining Sector** (DEA et al., 2013), which provides a manual for integrating biodiversity considerations into planning processes and managing biodiversity during the full lifecycle of a mining project, from exploration to closure (DEA et al., 2013).

⁸ Ecological infrastructure refers to the natural or semi-natural structural elements of ecosystems that deliver important ecosystem services.

TABLE 38: Provincial agricultural departments in South Africa.

PROVINCE	DEPARTMENT
North West	Department of Agriculture and Rural Development (NWDARD)
Mpumalanga	Department of Agriculture, Rural Development, Land and Environmental Affairs
Gauteng	Department of Agriculture and Rural Development
Free State	Department of Agriculture and Rural Development (ARDFS)
Western Cape	Department of Agriculture
Northern Cape	Department of Agriculture, Environmental Affairs, Rural Development and Land Reform (DAEARDLR)
Limpopo	Department of Agriculture and Rural Development (LDARD)
KwaZulu-Natal	Department of Agriculture and Rural Development (KZNDARD)
Eastern Cape	Department of Rural Development and Agrarian Reform (DRDAR)

The **Department of Trade, Industry and Competition (DTIC)** recognises the importance of small businesses for job creation, promoting economic growth, and addressing poverty and inequality. It operates through its provincial departments (Table 39). The DTIC supports entrepreneurs through various programmes and initiatives, such as through the Small Enterprise Development Agency (SEDA) and the Small Enterprise Finance Agency (SEFA). It has its own development finance institution, the National Empowerment Fund (NEF), which facilitates black economic participation through financial and non-financial support. The department has made efforts to move towards greener industrial policies, focusing on cleaner energy and reducing water use (DTIC, 2021), and has also been involved in developing small business opportunities linked to the invasive plant biomass economy.

TABLE 39: Provincial-level departments of trade and industry in South Africa.

PROVINCE	DEPARTMENT
North West	Regional office: Department of Trade and Industry
Mpumalanga	Mpumalanga Economic Growth Agency (MEGA)
Gauteng	Regional office: Department of Trade and Industry
Free State	Department of Economic, Small Business Development, Tourism and Environmental Affairs (DESTEAT)
Western Cape	Regional office: Department of Trade and Industry
Northern Cape	Northern Cape Economic Development, Trade and Investment Promotion Agency (NCEDA)
Limpopo	Trade and Investment Limpopo (TIL)
KwaZulu-Natal	Trade and Investment KZN (TIKZN)
Eastern Cape	Regional office: Department of Trade and Industry

Statistics South Africa (Stats SA) produces the country's official statistics to support development and economic growth, including data relevant to the biome implementation plans, such as the Census for Commercial Agricultural and the Natural Capital Accounts, which are being implemented in collaboration with SANBI (Stats SA, 2021). The natural capital accounts will keep track of land cover, ecosystem extent and condition, and selected species populations, and are supported by a land cover data series going back to 1990.

Local government (district and local municipalities) has an important influence on biodiversity outcomes through the development of Integrated Development Plans (IDPs) and Spatial Development Frameworks (SDFs), which map out where different types of developments will be located, as required under the Municipal Systems Act (Act 32 of 2000). They are supported in this by DFFE, which provides IDP toolkits and environmental guidelines. Local government is also responsible for the development and implementation of strategies that focus on sustainability, particularly within the urban and peri-urban context. The Spatial Planning and Land Use Management Act (SPLUMA) (Act 16 of 2013) provides the framework for spatial planning and land use management in the country, which is where biodiversity can be integrated into development planning (SANBI, 2014).

Other organisations that support the biodiversity sector

There are numerous public research organisations and non-government organisations (NGOs) that play a central role in supporting and funding research related to biodiversity conservation and management and providing dedicated support through partnerships with government.

Research organisations and institutions

The **National Research Foundation (NRF)**, established under the National Research Foundation Act (Act No. 23 of 1998), has a number of divisions that work directly on biodiversity. The **South African Environmental Observation Network (SAEON)** is the most relevant to this plan. SAEON facilitates and conducts research important for detecting, understanding and predicting environmental changes. The organisation was founded in 2002 with initial funding coming from the Department of Arts, Culture, Science and Technology (SAEON, 2020). SAEON's vision is to provide world-class environmental research platforms and to create the knowledge needed to support ecosystem conservation. It generates data and research outputs and supports research in several environmental sciences. SAEON platforms include long-term research sites where data is permanently maintained, laboratories and other environmental research equipment, datasets and models, scientific and technical support, and data portals for public access (SAEON, 2020).

The **Water Research Commission (WRC)** was established in terms of the Water Research Act (Act No. 34 of 1971) to promote coordination, cooperation and communication in the area of water research by establishing water needs and priorities, stimulating and funding water research, promoting transfer of information and technology and enhancing knowledge and capacity building.

The **Council for Scientific and Industrial Research (CSIR)** and **Agricultural Research Council (ARC)** were established by Acts of Parliament as science councils and are partly funded through parliamentary grants (Government of South Africa, 2015). The CSIR is mandated to conduct diverse research and innovation to encourage industrial and socio-economic progress in South Africa, including research on natural resources and the environment. The ARC is the principal agricultural research institution in South Africa, and is overseen by the Department of Agriculture, Land Reform and Rural Development (DALRRD) (Agricultural Research Council, 2021).

Universities across South Africa play an important role in quantifying and monitoring the status quo and changes in biodiversity and ecosystem services. They support research on pressures, threats and adaptation of the different biomes and provide a better understanding of ecosystem responses to climate change. Universities have supported various biodiversity programmes, such as the Grasslands Programme and the Tsitsa Project, which provided funding for MSc, PhD and post-doctorate students.

Non-governmental organisations (NGOs)

NGOs play a critical role in the biodiversity sector in South Africa, including in the conservation and management of natural ecosystems in all of South Africa's terrestrial biomes, and in combatting climate change. They provide much needed technical and research support as well as financial support through accessing private funding that is usually not available to government. NGOs play a significant role in implementing biodiversity stewardship in South Africa through their support to conservation agencies, landowners and communities in communal land. There are numerous biodiversity-related NGOs active in South Africa. Some of those that are active in the protection and management of biodiversity in the terrestrial landscapes of South Africa, as is relevant for this study, are as follows:

- African Conservation Trust (ACT)
- Birdlife South Africa
- Botanical Society of South Africa (BotSoc)
- Conservation South Africa (CSA), part of Conservation International (CI)
- Endangered Wildlife Trust (EWT)
- IUCN (International Union for Conservation of Nature)
- National Association of Conservancies/Stewardship of South Africa (NACSSA)
- The Nature Conservancy (TNC)
- Peace Parks Foundation (PPF)
- Wilderness Foundation (WF)
- Wildlands Conservation Trust (WILDTRUST)
- Wildlife and Environment Society of South Africa (WESSA)
- World Wide Fund for Nature South Africa (WWF-SA)

Public-private partnerships and cooperation efforts

Over the past decade there has been a growth in the number of multi-stakeholder cooperative efforts to address environmental issues in South Africa (Midgley et al., 2021). These cooperative partnerships bring together government, private companies, NGOs, and the public (e.g. community-based organisations and landowners) in efforts to better manage biodiversity and water resources, reduce environmental risks and improve resilience to climate change. Examples include the Strategic Water Partners Network (SWPN), fire protection associations (FPAs), catchment scale partnerships, and emerging and established environmental funds such as the Greater Cape Town Water Fund (GCTWF).

Well-established catchment-scale partnerships in South Africa include the uMzimvubu Catchment Partnership Programme (UCPP), the uMhlathuze Water Stewardship Partnership (uWASP) and the uMngeni Ecological Infrastructure Partnership (UEIP). The UCPP has a particular focus on restoration, rehabilitation, and maintenance of ecological infrastructure on communal land. uWASP and UEIP have a water stewardship⁹ focus and work collaboratively with businesses, industry and communities on state, communal and private land. These are discussed in more detail in the subsequent sections, with a particular focus on their governance structure.

Similar to the catchment-scale partnerships, which focus on a catchment area for a particular river system, water source partnerships focus on the conservation of the country's 22 identified water source areas (highly high-rainfall areas that typically feed multiple catchments). These partnerships, which are supported

⁹ Water stewardship is defined by the United Nations IDO as using water in a way that is socially equitable, environmentally sustainable, and economically beneficial. This is achieved through a stakeholder-inclusive process that involves site and catchment-based actions (<https://www.unido.org/>).

by WWF-SA, may work with catchment-scale partnerships (C. Gelderblom, WWF, pers. comm.). The underlying principle is to strengthen catchment governance and support mandated institutions, including catchment management agencies (CMAs) and water user associations (WUAs). At a national level, WWF-SA is collaborating with DFFE to create and document mechanisms to secure water source areas, including reviewing the current baseline and supporting the development of policies, interventions and mechanisms to help protect them (C. Gelderblom, WWF, pers. comm.).

Developing an effective governance structure for biome-level implementation plans

South Africa's biodiversity sector has had a strong focus on biomes. This is mainly due to the fact that each biome can be characterised not only in terms of its dominant flora and fauna, but also in terms of the types of problems that it faces. This has resulted in the coordination of many biome-focused government conservation initiatives in the past, including the Cape Action for People and the Environment (C.A.P.E. Programme), which was focused on Fynbos, the Succulent Karoo Environmental Programme (SKEP), Succulent Thicket Environmental Programme (STEP) and the Grasslands Programme. Although biomes are expected to shift and be altered under climate change (Midgley, Chown & Kgope, 2007; Higgins *et al.*, 2020; Martens *et al.*, 2021), this type of thinking was further entrenched by the compilation of the first biodiversity adaptation plan along biome lines – the Biome Adaptation Plans (DEA, 2015). Government has also had a strong focus on the impacts of climate change at biome level (DEA, 2013). Biome-level shifts in vegetation were also a major focus of the vulnerability assessment that informed the revised Biodiversity Adaptation Strategy (Turpie *et al.*, 2021). While the Biodiversity Adaptation Strategy did not include any implementation plan, it discussed the relative merits of implementation at a biome level versus at the provincial level.

Climate adaptation requires multidimensional policy responses as challenges are interconnected and complex and cannot be solved in isolation. Rather, they require strategies that are integrated across sectors and that involve government, the private sector and local communities. While government structures are designed to implement measures at provincial level, experiences of managing environmental problems at catchment and biome level have shown that this can encourage better coordination among different government and non-government stakeholders. This requires developing innovative governance structures that will be effective at achieving successful long-term outcomes at the biome scale.

To this end, this section of the report introduces governance structures and discusses previous and existing programmes and partnerships in South Africa that are relevant in terms of governance structure to provide insight into learned experiences. The pros and cons of emulating these kinds of models to organise implementation at biome level are discussed, including the grouping of biomes. Following this, a draft governance structure for the biome-level implementation plans is outlined, which is taken forward in the subsequent sections.

Solving complex environmental governance problems

Good governance matters as there is a strong causal relationship between good governance and development outcomes (Kaufmann, Kraay & Zoido-Lobaton, 1999). Governance can be defined as the traditions and institutions through which governments are selected, monitored, and replaced; the capacity of governments to design and implement policies; and the respect for institutions governing economic and social interactions (Kaufmann *et al.*, 1999). Thus, governance includes legal and policy frameworks, institutions, as well as processes and mechanisms through which partnership members operate to achieve their goals (GIZ, 2019).

Addressing complex environmental issues requires the engagement, participation, and cooperation of a range of stakeholders, including government, businesses and civil society organisations (Newell, Pattberg & Schroeder, 2012). Traditional modes of purely state-based environmental regulation have been shown to be limited in their effectiveness and legitimacy. Multi-actor initiatives attempt to build and improve upon the limits of government responses to environmental threats (Newell *et al.*, 2012). Over the past two decades, the focus has moved away from government and top-down approaches towards governance and multi-level processes to create new structures which have shown to be successful in operating in diverse and overlapping spheres of authority. Indeed, it is well recognised that shared environmental issues need to be addressed through collective action (Renoka, 2021).

Governance structures specify the distribution of rights and responsibilities among different stakeholders and describe the rules and procedures for decision-making. Good governance will improve efficiency of financial resource use and increase implementation and effectiveness of planned activities and their longer-term sustainability. Good governance structures are dynamic and adaptive and need to be flexible enough to accommodate changing circumstances and evolving knowledge. This is particularly true for the biodiversity sector as environmental conditions and ecological processes are constantly changing over time (Williams, 2011). Therefore, an integrated and collaborative planning approach is essential.

Effective implementation of biome-level plans for the Biodiversity Adaptation Strategy will require multi-stakeholder governance. Building such a structure requires collaboration across all spheres of government (national, provincial, local), civil society (political parties, media, NGOs, religious groups, social organisations, community organisations, and academia) and the private sector (investors, producers, retailers, building sector, insurances, financing institutions) (GIZ, 2019). Multi-level stakeholder governance (Figure 10) refers to stakeholders having vertical and horizontal links (Jänicke, 2017; Petrie *et al.*, 2018). Vertical links refer to links across multiple levels of actors, such as different levels of government, with a role in managing the same resource or ecosystem (Jänicke, 2017; Petrie *et al.*, 2018). Horizontal links refer to different sectors operating in the same area, for example NGOs, businesses and local government working collaboratively in a specific region. Vertical integration, the process of creating strategic linkages between different levels of government for planning, implementation, and monitoring and evaluation is an ongoing effort, not just a single step in the process.

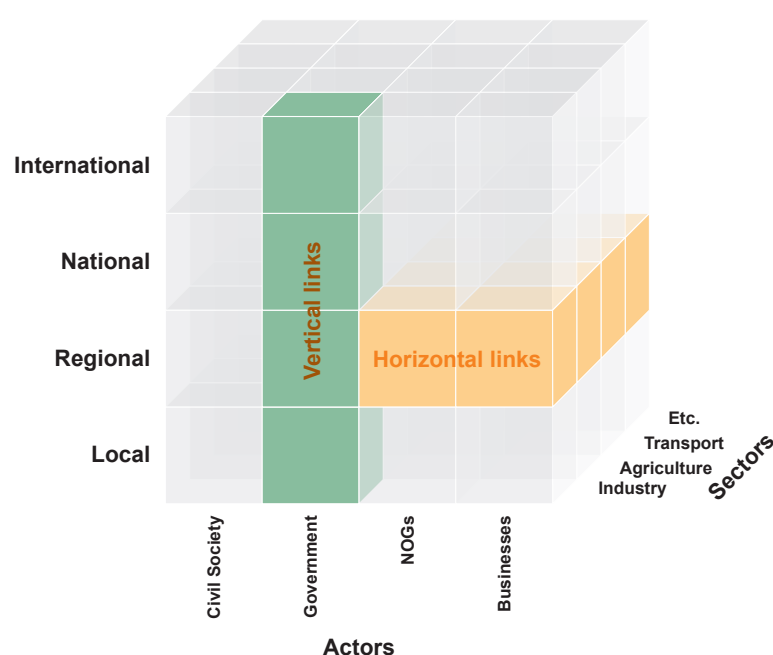


FIGURE 10: Multi-level and multi-stakeholder governance. Source: Jänicke, 2017; Petrie *et al.*, 2018.

Existing governance structures in the biodiversity sector globally can be grouped into four types: (1) government, (2) shared, (3) private, and (4) indigenous peoples and local community governance (GIZ, 2019). The first means that decision-making power as well as responsibility and accountability is held by various levels of government. Shared governance involves governmental agencies, NGOs, communities, private companies and other stakeholders sharing decision-making powers and accountabilities. In private governance structures, private landowners or private sector entities make decisions. In governance structures by indigenous people and local communities, the local stakeholders are the main drivers and beneficiaries.

To ensure that the various actors operate in a transparent, accountable and equitable manner, several key governance elements need to be established. Leadership and authority roles and responsibilities in the decision-making process need to be clearly defined; communication channels and protocols to be used to regularly update stakeholders need to be specified; and clear monitoring and evaluation procedures to evaluate performances need to be established. Figure 11 provides an example of a simple governance structure which is composed of stakeholders, a steering committee, a management committee, working groups, and the General Assembly. This forms the foundation for the development of a more elaborate structure, based on the needs and objectives of the partnership/programme.

The **Steering Committee**, typically selected by stakeholders, makes decisions on strategic development, and sets goals and objectives. The Steering Committee is responsible for overseeing the management team and reports back to stakeholders about their performance (Thomsen & Conyon, 2012). The Steering Committee provides control as well as advice and networking to the management team and is responsible for safeguarding the stakeholders' interests (Jensen, 1993). They ensure that resources are allocated efficiently and monitor progress. They could be composed of individuals from academia, civil society, government, or the private sector. The Steering Committee is elected during the creation of the partnership, approved by all stakeholders during the General Assembly, and re-elected every five years with reappointment usually being possible. It typically consists of between five and ten members.

The **management team** is employed to take care of the initiation and implementation of partnership activities. The team is responsible for overseeing the operations and is in regular contact with the Steering

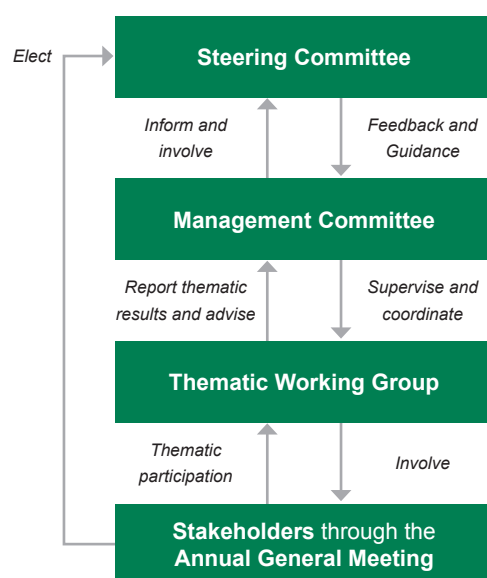


FIGURE 11: An example of a simple governance structure. Source: Adapted From Thomsen & Conyon, 2012.

Committee to keep them informed about the day-to-day activities and future developments. They work in accordance with the guidelines received by the Steering Committee. The management team is typically selected by the Steering Committee and approved by stakeholders (Gillan, 2006).

Key stakeholders form **working groups/task teams** within the partnership to focus on specific issues, commonly within their area of expertise. Each subgroup, which tends to be headed by a senior executive, is responsible for the development and implementation of specific activities and drives collaboration between partners. Each working group deals with their respective day-to-day operations of projects, strategic developments, and investments.

During the **General Assembly**, the Steering Committee reports progress and key decisions to the stakeholders, commonly once a year. The General Assembly is the main forum for multilateral discussions of decisions and issues in the partnership and consists of all partnership members. The General Assembly provides an opportunity for stakeholders to discharge any members of the Steering Committee from their duties. All documents relating to the General Assembly should be made publicly available.

Experience of programmes, partnerships and networks in South Africa

Achieving effective governance at the biome level requires a good understanding of previous and existing programmes and partnerships within the biodiversity sector. Such an assessment provides necessary background information and lessons learned, which is key to drafting a governance structure that is suitable for biome-level implementation and will ensure long-term implementation success. Therefore, this section provides a description and analysis of the governance structures of previous and existing programmes and partnerships, focusing on what can be learnt and achieved from them.

Landscape-scale biodiversity programmes

There are a number of innovative landscape-scale programmes that were established in South Africa in the early to mid-2000s. Most of these relied on single funding streams through the Global Environment Facility and were hosted by SANBI as the implementation agency, providing secretariat and management duties. These programmes brought together a wide range of stakeholders and were by and large successful at achieving their many objectives. However, long-term sustainability has been an issue for all of these programmes, largely due to funding and human resource capacity constraints. The four main programmes are discussed below.

Cape Action Plan for the Environment (C.A.P.E. Partnership Programme)

The **Cape Action for People and the Environment** or C.A.P.E. Programme was established in 2001 with the goal to conserve, restore and effectively manage the biodiversity of the Cape Floristic Region (CFR) as well as the adjacent marine environment in the Western Cape and Eastern Cape (SANBI, 2023a). The programme was a partnership between 38 entities (in the end), including government, the private sector, and civil society. Hosted by SANBI, the programme supported cross-sector collaborations to ensure the alignment of policies and priorities and to avoid duplication of efforts. In 2004 the programme was approved for implementation through the Global Environment Facility, with the World Bank and UNDP as implementing agencies. Between 2004 and 2011, over US\$45 million of international donor funding was raised and partners contributed a further US\$193 million. Funding through GEF ended in 2011.

The C.A.P.E. Programme's original 14 implementing partners signed a MoU to align strategies, workplans and budgets. Hundreds of people contributed to the programme through project task teams and landscape initiatives. The landscape initiatives, such as biosphere reserves or corridor initiatives, aimed to enable

a local level of engagement and coordination. The C.A.P.E. Implementation Committee was established through the MoU and had members from all signatory parties. Each landscape initiative had its own steering committee and Board. The Fynbos Forum was used as a space for the partnership members to share lessons learned, develop collaborations, and align work programmes.

Like the Grassland Programme, the C.A.P.E. Programme was hosted by SANBI as the secretariat and implementing agency and funding was largely provided through the GEF. Funding and resource capacity constraints over time led to the 'slowing down' of the C.A.P.E. Programme. However, many of the projects and landscape initiatives that started through the programme continue, as do the many partnerships that were formed.

Succulent Karoo Ecosystem Programme (SKEP)

The Succulent Karoo Ecosystem Programme (SKEP), a multi-stakeholder conservation and development programme, was also established in 2001, originally as a collaborative initiative between South Africa and Namibia (SANBI, 2023b). The first five years of the programme were funded through the Critical Ecosystem Partnership Fund (CEPF). The programme's objectives were integrated into a 20-year strategy to ensure longer-term sustainability. The four main aims were to increase international awareness about the uniqueness of the Succulent Karoo's biodiversity, increase the area under effective conservation by involving local landowners, promote conservation as a long-term development strategy, and to create links among governments and programmes (SANBI, 2023b).

The planning process of the project was managed by a technical working group which consisted of experts from Conservation International (CI), the Botanical Society of South Africa (BotSoc), Eco-Africa Consulting, the National Botanical Institute of South Africa (NBI), the Ministry of Environment and Tourism of Namibia (MET Namibia), the Institute for Plant Conservation (IPC), and the Terrestrial Ecology Research Unit (TERU) (Figure 12). SKEP had a central coordination team, an overall coordinator, and experienced conservation planners. An advisory group was formed to provide expert knowledge and guide conservation decisions (Driver *et al.*, 2003). Advisory committees also existed on the sub-regional level. SKEP was managed by a Steering Committee, which was guided by Terms of Reference and met once a quarter. Work was conducted in different focus areas (biodiversity, socio-political context, resource economics, and institutions) and across four different sub-regions (Southern Namibia, Namaqualand, Tanqua/Roggeveld/Hantam, Southern

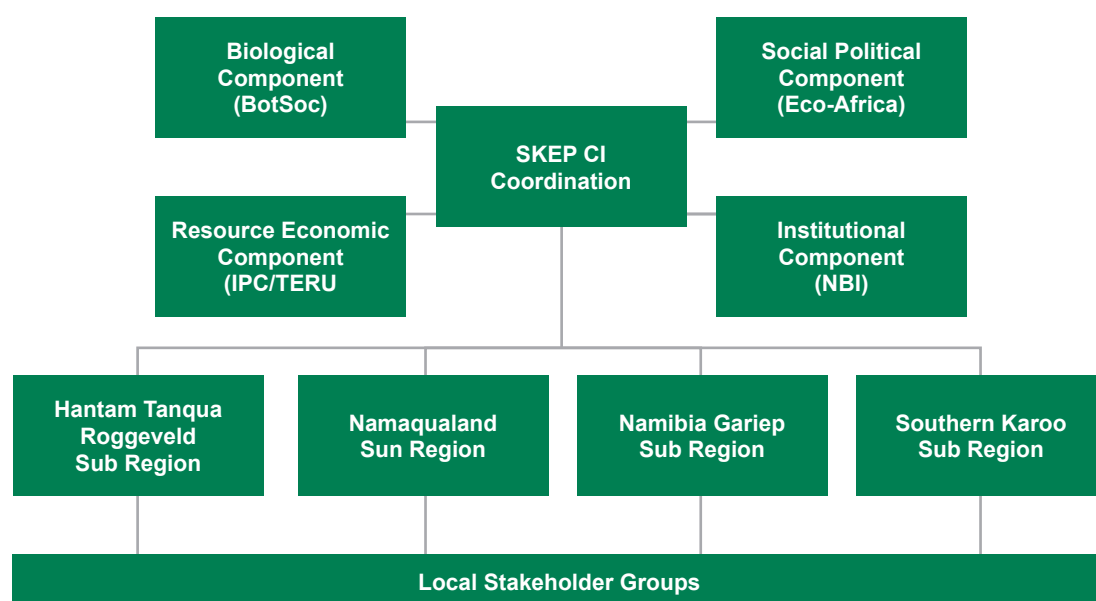


FIGURE 12: Structure of the Succulent Karoo Ecosystem Programme. Source: SKEP, 2003.

Karoo) (SKEP, 2003). Each sub-regional and thematic group had their own committee. The coordinators of each technical working group as well as the overall SKEP coordinator met regularly throughout the course of the project (Driver *et al.*, 2003).

Funding from CEPF lasted for the first five years only and during this time there was significant momentum and achievements. However, once the funding dried up so did much of the work and SKEP became 'dormant'. During the period 2016–2018, two phases of funding from WWF-SA to the Environmental Monitoring Group (EMG) were used to try to reinvigorate SKEP through an interim steering committee (ISC) to implement the remainder of the SKEP 20-year strategy (K. Forsythe, WWF-SA, pers. comm.). At this stage, SANBI offered support in terms of secretariat services. However, this funding enabled ISC meetings and a few small actions, but not much else (K. Forsythe, WWF-SA, pers. comm.). Without funding, SKEP remains inactive.

Subtropical Thicket Ecosystem Project (STEP)

The Subtropical Thicket Ecosystem Project (STEP) was established to conserve the thicket biome which most commonly occurs in the region from the Western Cape to the Eastern Cape and inland to as far as Graaf-Reinet (Pierce & Mader, 2006). The project aimed to raise awareness about the biodiversity and economic value of the thicket biome, identify priority areas for conservation, and integrate the insights derived from the project into the policy and practices of government as well as private organisations. As with the other landscape programmes, STEP was initially funded through the Global Environment Facility (GEF) through the World Bank and managed by the Terrestrial Ecology Research Unit at the University of Port Elizabeth. The project was completed in June 2004. The implementation phase was developed and coordinated by SANBI and supported by a number of government institutions, NGOs and donors (Pierce & Mader, 2006).

Grasslands Programme

The Grasslands Programme, launched in 2008, was a partnership between government, NGOs and the private sector. Being a production landscape, the programme focused on trying to balance biodiversity conservation and development needs. The programme was funded through the Global Environment Facility (GEF) managed by UNDP and implemented by SANBI (Figure 13) (Stephens & Tau, 2014). The partnership involved a total of 26 organisations but came to a close after five years when the UNDP-GEF investment ended in 2013.

During its operation, the Grasslands Programme made extensive strides in bringing together a wide range of stakeholders from various departments, including environment, water, forestry and mining, as well as from the private sector and local communities. This resulted in significant growth in biodiversity stewardship and the proclamation of extensive areas of land for biodiversity management. Furthermore, biodiversity agreements were entered into with three land reform communities, biodiversity was mainstreamed into agricultural and forestry policies and guidelines, the Umgeni Ecological Infrastructure Partnership (UEIP) was catalysed (see below), market-based mechanisms for environmentally friendly red meat production in communal lands were piloted, grazing and burning guidelines were published, and the provincial government of Gauteng was supported in the drafting of bioregional plans for all municipalities.

However, the programme was not sustained due to funding and resource capacity constraints. The programme was housed in SANBI as the coordinator and secretariat, with all of the administration and management falling to them. Representation from other stakeholders was in the form of contributions to programme units, which were again mostly coordinated by SANBI (Figure 13). With all resources and management coming from just one agency, the sustainability of the programme became compromised. The governance structure of a biome-level programme would need to have greater shared responsibility across stakeholders and beneficiaries. Shared responsibility and a degree of ownership creates the mutual self-interest to succeed over the long term. Furthermore, reliance on a single funding stream is risky and generally unsustainable.

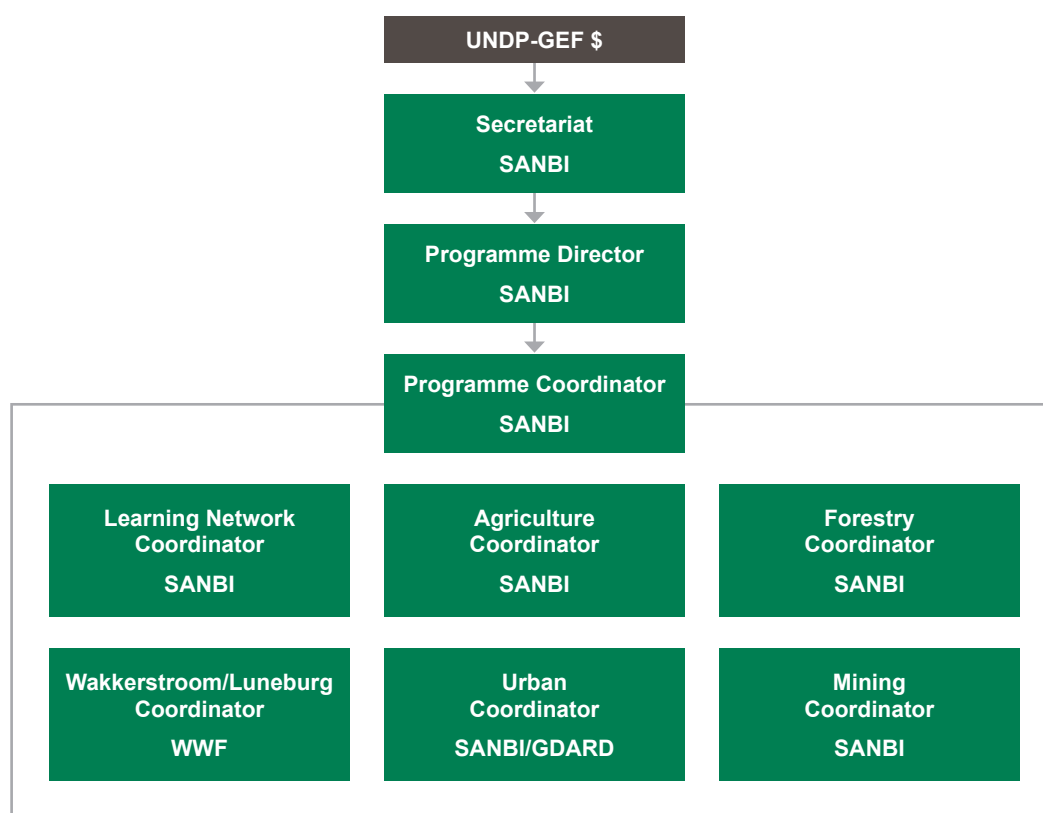


FIGURE 13: Structure of the Grasslands Programme. Source: based on information collated from SANBI.

Sector partnerships and associations

Strategic Water Partners Network (SWPN)

The Strategic Water Partners Network (SWPN) South Africa is a multi-stakeholder partnership that was established to address water resource management in South Africa. The Department of Water and Sanitation (DWS) and a representative of Nestlé co-chair the partnership, which has the aim to close the gap between water demand and supply in South Africa by 2030 (SWPN, 2023). The National Water Resources Strategy (2012) formally identifies the SWPN as the key platform to facilitate new forms of partnerships between DWS, the private sector, civil society and other key stakeholders, supporting collaborative work on water issues to increase water security. The partnership has previously sourced funding to support the DWS's initiatives and has four different working groups: agricultural supply chain, effluent wastewater management and sanitation, water use efficiency and leakage reduction, and water stewardship.

The SWPN has more than ten years of experience and over 100 members. The SWPN's governance structure (Figure 14) consists of a Secretariat, a Steering Committee which is co-chaired, a Management Committee, and four working groups, each with their own chair (SWPN, 2023). Within the working groups there are individual project steering committees. The strength of the partnership lies in the shared chairmanship (Renoka, 2021). The Director-General (DG) of DWS is a co-chair and the other is a rotating private sector chair. Having such a high-ranking government official chairing the network secures buy-in from other senior government officials as well as private sector entities (Renoka, 2021).

The Management Committee is composed of senior representatives from both the public and private sectors (SWPN, 2023). The management is responsible for the strategic direction of the SWPN and promotion of the SWPN in their professional networks. Their responsibilities include supporting the network's strategy and work plan, providing administrative and coordination support, and managing funds and procurement (Renoka,

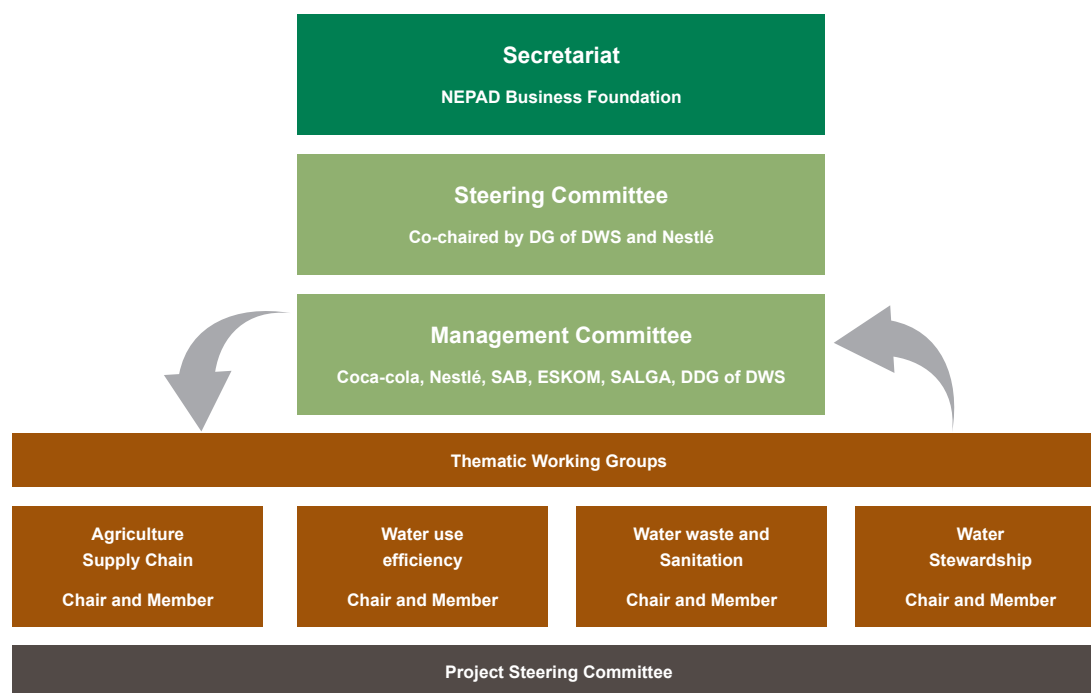


FIGURE 14: SWPN governance structure. Source: adapted from Renoka, 2021.

2021). The Secretariat is hosted by NEPAD Business Foundation, a non-profit organisation that coordinates development programmes involving public and private partnerships. The Secretariat sees to the everyday business and administration needs of the network. The SWPN's operations are financed through the private sector, development funding and public funding. The working groups undertake work in collaboration. They provide technical support to strategy development and support funding mobilisation for projects. They also provide project management support as well as administrative and coordination support.

Fire Protection Associations (FPAs)

Landowners, tenants, and local authorities in areas prone to regular wildfires can form fire protection associations (FPAs) to prevent and manage wildfires according to the National Veld and Forest Fire Act of 1998 (South African Government, 2023b). An FPAs wildfire management strategy needs to be approved by DFFE. FPAs are responsible for integrated fire management planning and fire preparedness (Greater Overberg Fire Protection Association, 2023). This includes firefighter training and fire prevention training to FPA members. They further report statistics on the number and types of veld fires in their area to DFFE.

An example of a well-functioning FPA is the Greater Overberg Fire Protection Association (goFPA) located in the Fynbos biome in the Western Cape. The Overberg region is a high fire risk area and has established its own FPA to protect its vast areas of natural veld and fynbos. Fire management planning support includes ensuring that landowners are legally compliant with national regulations, identifying high-risk areas, and planning firebreaks. To increase landowners' fire preparedness, they also offer training courses, a daily fire danger index and insights from the Advanced Fire Information System (AFIS). Funders and partners of goFPA include the Global Environment Fund (GEF) through the GEF Fynbos Fire Project, UNDP (as the implementer of the GEF Fynbos Fire Project), DFFE, Western Cape Government, Overberg District Municipality and Overstrand Local Municipality, SANParks, CapeNature, Overberg Agri and the Agulhas Biodiversity Initiative (ABI).

FPA, especially those that are well established, could be leveraged in the development of a biome-level programme. This is particularly relevant in the Fynbos biome where the Greater Overberg FPA is working directly with farmers over extensive areas, in biosphere reserves and has the support of the public and private sectors. Land restoration activities, such as IAP clearing, could be managed through FPAs given the relationship between wildfires and invasive plants. FPAs are seen as potentially very important in this regard.

Catchment-scale partnerships and water funds

Recognising the need for collective action and innovative financing approaches for securing hydrological ecosystem services, initiatives in South Africa have started to move towards more inclusive and innovative partnership approaches where a more concerted effort has been made to persuade and convince stakeholders to support investment in ecological infrastructure through collective action (Midgley et al., 2021; Letley & Turpie, 2023). The premise is that a group of stakeholders all with a vested interest in conservation management come together to raise funding and cover restoration costs and/or persuade or incentivise landowners to change land use practices using a wide array of policy mechanisms.

A partnership is an arrangement between two or more parties formalised through a Memorandum of Understanding (MoU) or a letter of intent. The programmes and partnerships discussed here consist of a mix of government, business, civil society, traditional leaders and communities, and academia. A formal partnership agreement works to align stakeholders and offers stability and operational capacity in an otherwise uncoordinated and busy space.

uMzimvubu Catchment Partnership Programme (UCPP)

Since 2011, Conservation South Africa (CSA), in partnership with Environmental and Rural Solutions (ERS), has led a process to develop a 20-year strategy with four 5-year phases for the Mzimvubu Catchment, which resulted in the formation of the uMzimvubu Catchment Partnership Programme (UCPP, 2019). The UCPP is made up of 34 participating partners, including a number of state representatives, NGOs, and private sector players, with the aim to restore the catchment to secure ecosystem services and improve local livelihoods (SANBI and Wildlands Conservation Trust, 2015). The UCPP has been helping to restore grasslands through communal herding and rotational grazing systems.

The UCPP is not a legal entity but an alliance of implementers, policy-makers, and academics whose positions and functions are stipulated in a MoU (UCPP, 2019). The participating partners raise funds and implement strategies, while the UCPP serves as a platform to make implementation more effective. ERS functions as the secretariat and has also served a coordinating role.

The main roles in the UCPP and their responsibilities are outlined Table 40. The core positions in the partnership programme are the chairperson, the deputy chairperson, the secretariat, working groups and partners. The working groups are theme-based to foster collaboration around specific issues, such as rangeland management.

TABLE 40: Positions in the UCPP, responsibilities and resources required. Source: UCPP, 2019.

POSITION	RESPONSIBILITIES	RESOURCES REQUIRED
Chairperson	Chairs meetings, decisions, guidance (responsibility shared with deputy chairs) Signatory of key documents	Attend and prepare meetings
Deputy chairpersons	Shares responsibilities with chairperson as required	Limited time commitments Travel to meetings
Secretariat (UCPP coordinating staff)	Administrative roles related to minutes of meetings, registers of attendance, email information sharing, compilation of newswatches to share activities by implementing partners Event management (organising venues, agendas, timing, delegate coordination) Website management UCPP information management General partner liaison and information sharing Coordination	Time spent arranging events (ERS has been supported by Green Trust and SANBI) Venues and catering Website maintenance Back-up systems to cache information Time answering emails and inquiries
Working groups/task teams	Drive collaboration between partners around specific issues (e.g. to consolidate information for learning/sharing/influencing; to co-create strategy or planning: rangeland management and alien clearing) Theme-based according to needs and aligned with M&E framework, e.g. Socio-economic; Governance; Ecological	Time of people from partner organisations Participation will presumably be driven by shared interests of partners Benefit of shared learning has generally outweighed time cost
Partners	Sign the MoU and appoint a representative to represent the partner at meetings Collaborate with other partners towards achieving the goals of the UCPP Respond to the UCPP secretariat Monitor and review, independently and jointly with other partners, implementation of projects Share news and recent/relevant information via available platforms (email list, website blog, at quarterly planning meetings)	Time of representatives Travel costs associated with attending meetings

uMngeni Ecological Infrastructure Partnership (UEIP)

uMngeni Ecological Infrastructure Partnership (UEIP) was established in 2013 through a Memorandum of Understanding (MoU) with the aim to incorporate ecological infrastructure into water resource management. The partnership is led by SANBI and the eThekweni Metropolitan Municipality, together with Umgeni Water and the KwaZulu-Natal regional office of DWS. The partnership, which currently has 17 members, mostly comprises NGOs and government departments but also one private sector partner in SAPPI (Jewitt *et al.*, 2020). SANBI, a co-founder of the UEIP, has been the secretariat for the partnership providing strategic, management and administrative support and capacity to the UEIP. The Institute of Natural Resources (INR) provides offices and management support to the partnership. The programme receives financial support from the Ecological Infrastructure for Water Security (EI4WS) Project, which is a five-year Global

Environmental Facility (GEF) funded project implemented in the Greater uMngeni catchment in KwaZulu-Natal and Berg-Breede catchments in the Western Cape. The UEIP relies heavily on donor funding with very little funding from the private sector. SANBI provides the lion's share of coordination and management resources.

uMhlathuze Water Stewardship Partnership (uWASP)

The uMhlathuze River catchment area in Richards Bay, KwaZulu-Natal, is dependent on water for irrigation, agriculture, plantations, industries and mining (UWASP, 2019). The uMhlathuze Water Stewardship Partnership (uWASP) was established to improve water use efficiency, support IAP clearing and wetland restoration, and improve lake and dam management. An integrated approach to water resource management requires stakeholder engagement and integrative decision support systems that enable good governance.

UWASP was created through a partnership of the GIZ's International Water Stewardship Programme (GIZ-IWaSP), the National Business Initiative, Strategic Water Partners Network and WWF South Africa, local businesses including Tongaat Hulett, Mondi South Africa, Grindrod, Transnet and Richards Bay Minerals, as well as government stakeholders including DWS and Pongolo-uMzimkulu Proto-Catchment Management Agency. The project was endorsed by the Minister and acting Director-General of DWS (WWF South Africa *et al.*, 2017).

The partnership has been constituted through a letter of intent and outlines each party's intention to cooperate. A partnership work plan and governance structure were approved and focus on five priority areas: downstream water use efficiency opportunities; agricultural water stewardship practices; ecological infrastructure requirements (alien invasive plant clearing and wetlands); the development of local community environmental champions for pollution control; and enhanced management of the region's coastal lakes and surface water dam (NBI, 2018).

UWASP has a consultative advisory platform which meets bi-annually and a management committee which meets twice a month and reports to the NBI project manager, a GIZ technical advisor, and the WWF project manager. Two staff from NBI and WWF are employed full time and receive support from GIZ-IWaSP. Funding for coordination is secured through Tongaat Hulett, WWF, Mondi, and GIZ (WWF South Africa *et al.*, 2017). In the early days of the uMhlathuze partnership the team found a mechanism to bring in funding securely and to ring-fence the funding. The National Business Institute (NBI) was able to set up a separate bank account for money coming in from private partners, allowing for the funding to be ring-fenced.

Greater Cape Town Water Fund (GCTWF)

Water funds are a funding and governance mechanism that engages public, private, and civil society stakeholders to contribute to water security through nature-based solutions and sustainable resource management (TNC, 2018). They provide a means by which finance and assistance from downstream hydrologic service beneficiaries (e.g. water service providers and consumers) and donors (motivated by developmental and/or biodiversity conservation benefits) can be channelled to the actors that implement management changes or accommodate conservation actions in important water catchment areas (Letley & Turpie, 2023). Water funds thus provide a mechanism for linking downstream water consumers with upstream land users, typically taking the form of a public-private partnership (Figure 15).

This structure provides stability and operational capacity to manage numerous stakeholders, while at the same time providing the vehicle for pooling and deploying the collective investments (TNC, 2019). Most water funds are established organisations or trusts with an endowment fund structure. An endowment fund is an investment fund established by a foundation, trust or other non-profit organisation that makes consistent withdrawals from invested capital. An endowment is therefore a legal structure and is the portion of money that is raised and invested over the very long term (in perpetuity) in order to earn a relatively

steady and predictable stream of income year after year. This interest-based, non-capital reducing financing is sustainable and less vulnerable to market fluctuations.

The Greater Cape Town Water Fund (GCTWF) is one such water fund. The GCTWF operates at a large scale, focusing restoration efforts, particularly IAP clearing, in the catchments that feed the Western Cape Water Supply System (WCWSS), where the users include the Cape Town metropolitan area, the agricultural sector, and small municipalities (TNC, 2019). A quarter of the required budget for the first six-year restoration phase for the GCTWF came from private investors (L. Stafford, TNC, pers. comm.).

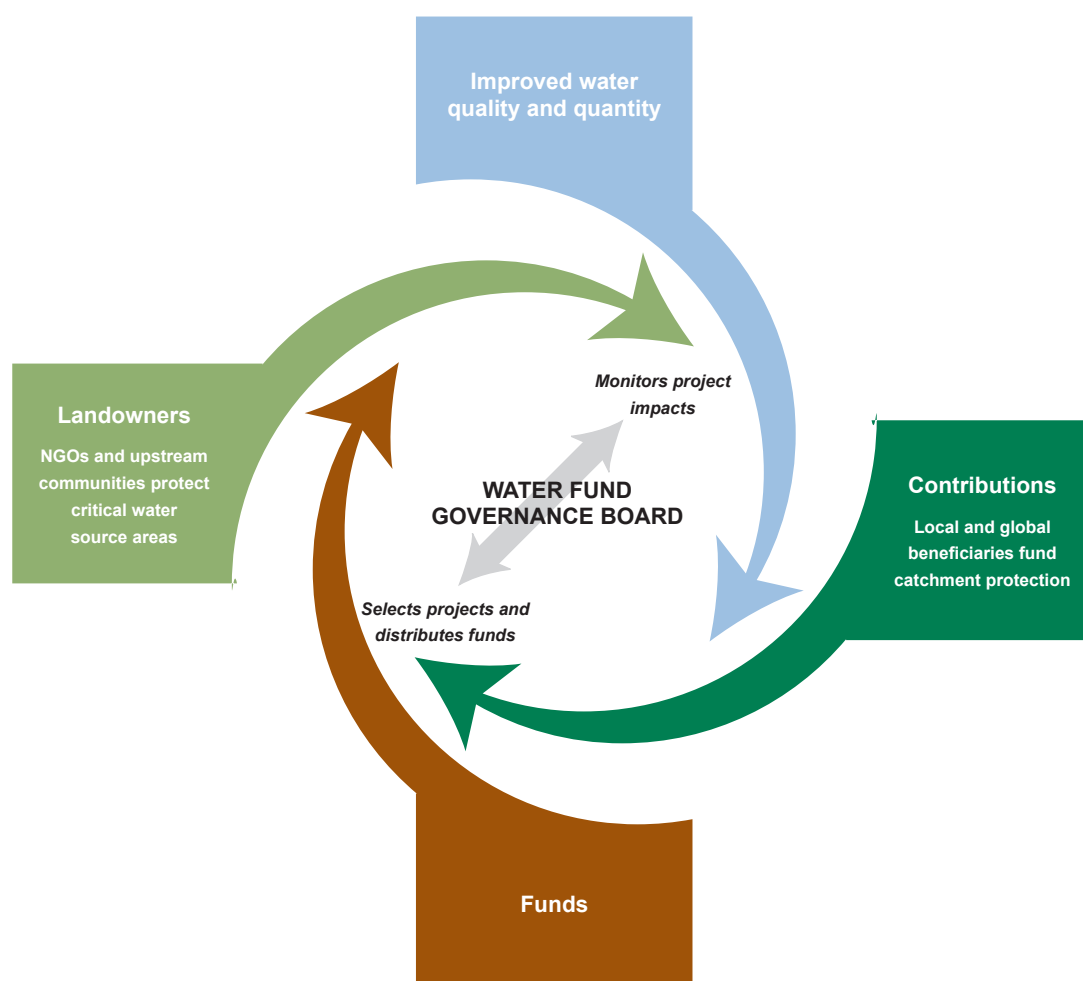


FIGURE 15: Illustration of how a water fund works. Source: Letley & Turpie, 2023, adapted from TNC, 2015.

A framework for multi-stakeholder partnership models

For a partnership to succeed, certain conditions must exist or be established, including political will, public awareness, civil society capacity, and private sector interest. Public sector authorities need to be concerned about the environmental situation and be motivated to act (Cáceres & Fernández Fernández, 2022). Equally, civil society needs to have the resources and knowledge to engage. The private sector needs to acknowledge the environmental threats and realise the benefits of partnering with public and civil sectors. Having a precedent of successful public-private partnerships in the area can facilitate the creation and execution of multi-stakeholder partnerships (Cáceres & Fernández Fernández, 2022).

The Natural Resources Risk and Action Framework (NRAF) (Figure 16), which has been developed by the Natural Resources Stewardship (NatuReS) Programme, provides a tool to design and implement a multi-stakeholder partnership model for improved natural resource management and resilient economic growth.

NatuReS is a programme funded by the European Union, UKaid and Germany's Federal Ministry for Economic Cooperation and Development (BMZ). It is a continuation of the International Water Stewardship Programme (IWaSP), which created more than 38 partnerships with more than 180 partners (Renoka, 2021). The framework aims to help the public sector, private sector, and civil society navigate partnerships for managing stewardship (NatuReS, 2021). The NRAF has been developed based on experiences from 45 stewardship programmes and consists of five phases and 27 tools. Each phase lists several key points which should be achieved for successful completion. The elements of each phase do not need to be achieved linearly; some elements can occur in parallel, and others might be iterative.

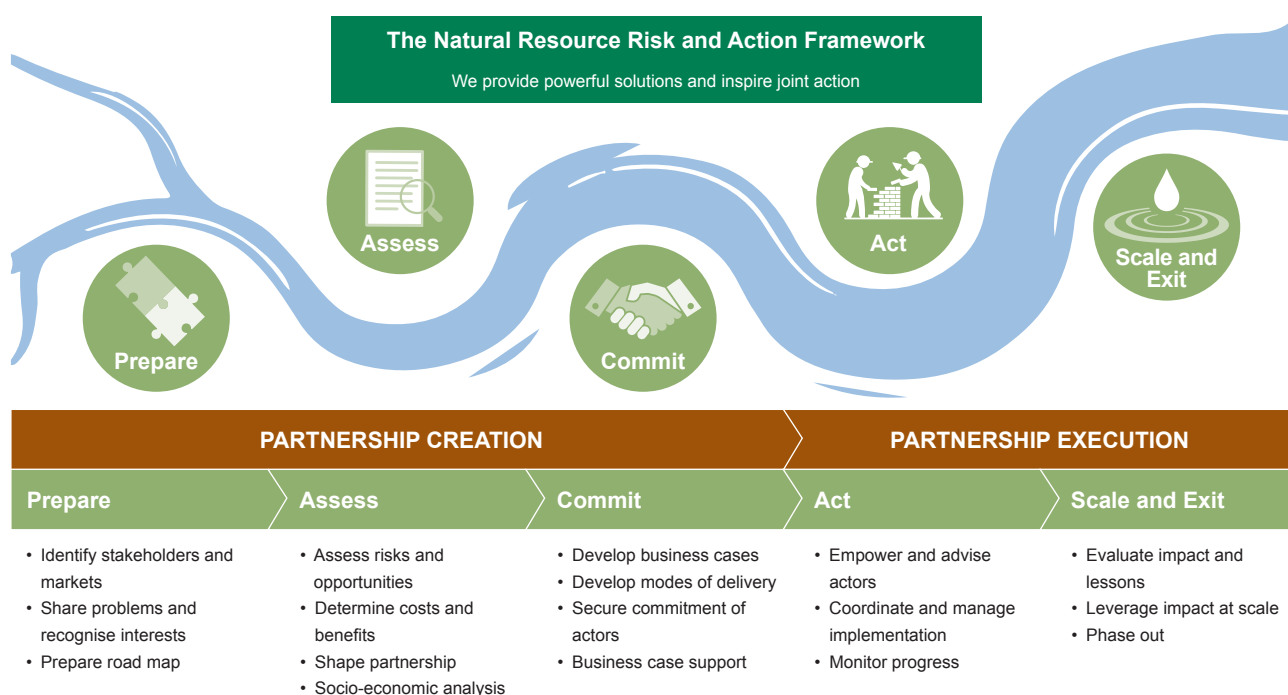


FIGURE 16: The Natural Resources Risk and Action Framework. Source: NatuReS, 2021.

Discussions with stakeholders need to be initiated, capturing their concerns and interests and highlighting the partnership as a way to collaboratively address the issues. Such processes can be facilitated by an experienced NGO or another entity which has the mandate and experience to initiate a partnership. The initiator team needs to engage with stakeholders through meetings and have in-depth consultations with key decision-makers.

- The first phase, 'Prepare', includes the identification of stakeholders and markets, recognition of problems and interests and preparation of a road map. This requires mapping of key stakeholders, including their level of interest and influence, and ensuring that perspectives from diverse stakeholders are included. Discussions with stakeholders are initiated to assess what interests and expectations future partners of the network have. Roles and responsibilities also need to be agreed on and it needs to be assessed what capacities and resources partners would invest into the partnership. An initial set of actions is agreed upon to shape the formation of the partnership. The mandate and scope of the partnership needs to be clarified. All stakeholders need to be

engaged in the designing of the roadmap as this contributes to transparency and accountability. When outcomes and activities are agreed upon, roles and responsibilities can be assigned. A letter of intent should be written and form the formal agreement of the partnership.

- In the second phase, 'Assess', risks and opportunities are assessed, and costs and benefits are determined. The partnership is shaped, and a socio-economic analysis is conducted. The risk and opportunity assessment includes analysing environmental conditions in the area, resource use, socio-economic conditions, existing policies and governance structures, and any cultural aspects that would affect natural resources. Based on the analysis, natural resource related risks as well as their impacts and options for mitigation are defined. A cost-benefit analysis of the planned interventions is conducted. Stakeholders affected by the risks that could benefit from the partnership's measures are brought on board and measurable goals and objectives of the partnership are defined.
- In the third phase, 'Commit', a business case is developed, modes of delivery are developed, and the commitment of the various actors is secured. It needs to be ensured that the partnership is financially feasible for all partners involved and that they see the long-term benefits that it provides. Initial funding needs to be available and the longer-term financing options need to be clear. The modes of partnership delivery need to be agreed upon, including who takes which responsibilities and by when they need to achieve their tasks. All activities need to be aligned with the availability of funding. If there is not enough funding available, interventions should be ranked according to importance and be prioritised accordingly. A monitoring and evaluation framework needs to be included, including ways to measure successful completion of a task and potential baseline data collection. A written formal agreement (Memorandum of Understanding) needs to be signed, confirming each partnership participant's commitment.
- The partnership creation steps are followed by partnership execution: 'Act' and 'Scale and Exit'. The fourth phase, 'Act', requires empowering and advising partnership members on the implementation of the plan, coordinating and managing the implementation, and monitoring progress. Experts for the various key programmes are identified and help build capacities through training and workshops within the network. The communication with stakeholders needs to be clear, effective and efficient. The Project Action Plan should be used as a Partnership Monitoring Plan. The partnership needs to remain flexible to allow for future growth and transition. Governance agreements need to allow for adjustments being made depending on scaling up or changing the structure of the partnership.
- The 'Scale and Exit' phase, the fifth phase, focuses on evaluating impact and deriving lessons learned, ensuring sustainability of the partnership's impact and phasing out the partnership or transferring it. The 'phase out or transfer' step is optional and depends on the structure of the partnership. Progress, results, and impacts of the partnership need to be reviewed regularly and feedback should be sought from different partners. The Project Action Plan should be reviewed carefully, and partners should decide which initiatives should be amended. Lessons learned should be recorded.

APPENDIX 2:

Stakeholders consulted

TABLE 41: Stakeholders consulted during the process of developing the implementation plans. Those listed by province attended the provincial workshops, either in-person or virtually, as indicated 

NAME	ORGANISATION/INSTITUTION
EASTERN CAPE (IN-PERSON)	
Luyana Mafumbu	ADM
Phinda Dyonta	BCMM-IEMP
Noma Gazi	DALRRD
Phakama Vilana	DALRRD
Zukiswa Nxowa	DALRRD
Eric Qonya	DEDEAT
Unam Ncapai	DEDEAT
Anelisa Metula	DEDEAT
B. Mzano	DEDEAT
Sinawo Mqunyana	DEDEAT
Reinaldo Bishop	DEDEAT
Lelethu Nombemu	DEDEAT
Bathabile Skosana	DEDEAT
Abongwe Keteb	DEDEAT
Moses Wulana	DEDEAT
Mbuleo Hamza	DEDEAT
Sigcobile Gxaba	DEDEAT
Sinazo Songca	DEDEAT
Tamara Gqamane	DEDEAT
Thabo Gwiji	DEDEAT
Khanyisa Mpisane	DEDEAT
Vusi Mthombeni	DEDEAT
Mihlau Moni	DEDEAT
Yongani Mbangezeli	DEDEAT
Lucy Ndlovu	DEFF
Ntando Mkhize	DFFE
Sello Phusoe	DFFE
Kepino Bomanu	DFFE

NAME	ORGANISATION/INSTITUTION
EASTERN CAPE (IN-PERSON)	
Mrikayde Dandala	DFFE
Unathi Makati	DFFE
Nakisane Mathivha	DFFE
B. Kgysi	DFFE
Lwando Royimani	DRDAR
S. Matshamule	DRDAR
Malaika	ECPTA
Nomatile Nombewu	ECPTA
Kagiso Mangwale	ECPTA
Senzo Dunywa	ECPTA
Unathi Kraai	ECPTA
Ostar Mashego	Humana People to People SA
James Gamiza	Rhodes University
Sheunesu Ruwana	Rhodes University
Nthabe Munyai	SANParks
FREE STATE (in-person)	
Mias vd Westhuizen	DALRRD
Pfariso Razweidani	DESTEA
T. Mhlomi	DESTEA
Fusi Kxgoi	DESTEA
Atendaha Maige	DFFE
Ntando Mkhize	DFFE
Barney Kgope	DFFE
Z. Kutana	DFFE
Laina Ramuvhunda	DFFE
Sebolele Mofokeng	DFFE
Mapato Baloyi	DFFE
SammyBoy Mlumunye	DFFE
Sakhile Mthembu	DFFE
Xolelwa Skefile	DFFE
Lungisa Sisuba	DFFE
Silindile Thabetha	DFFE
Zikhona Vabaza	DFFE
Zethu Mfiki	DFFE
Kelebagite Setilo	DFFE
Tshifhiwa Munyai	DFFE
Tapiwa Puling	DFFE
Matshidiso Mokhatla	DFFE
Tangansozatu Mushiane	DFFE
Millalo Ndwa	DFFE

NAME	ORGANISATION/INSTITUTION
FREE STATE (in-person)	
Nthomanhle Hlengwa	DWS
Phindi Sobuwa	DWS
Tebogo Moja	Kepe Kepe Organisation
Tildon Mosha	SALGA
Nomalanga Mohlomi	SANBI
Nthabeleng Mpharane	SANBI
Sbongile Moyana	SANBI/DESTE
Nthabiseng Sesana	SANBI/DESTE
Sarah Modiba	SANBI/DESTE
Natalie Duof	SANBI/DESTE
Saul Msmokalee	Tokolgo
Teboho Moepi	Tswelopele
M. Makhasane	Working for Climate
P. Ndabeleng	XXX
GAUTENG (in-person)	
Amogelang Sefara	DFFE
Xolelwa Skefile	DFFE
Ntando Mkhize	DFFE
Mandla Shabangu	DFFE
Tshifhiwa Munyai	DFFE
Barney Kgope	DFFE
Edward Nemukela	DFFE
Jane Mavhutha	DFFE
Ndivmota Managa	DFFE
Lungile Nduma	DFFE
Eddy Tshabala	DFFE
K. Berona	DFFE
Thilulani	DFFE
Matome Mahasha	DWS
Mzo Mabho	GDARDE
Marc Leroy	GDARDE
Zanele Nxumalo	Nsinu Medical Group
Vusi Mngomezulu	Private
Mahlodi Tau	SANBI
S. Manyike	SANDE
Lebo Mabenaad	XXX
KwaZulu-Natal (virtual)	
Sabelo Nkosi	eThekweni Municipality
Sebataola Rahlao	Ezemvelo KZN Wildlife
Warren Botes	eThekweni Municipality

NAME	ORGANISATION/INSTITUTION
KwaZulu-Natal (virtual)	
Kwazi H	XXX
Madisa S	XXX
Dikeledi D	XXX
Notshaya A	XXX
Asivhanzhi	XXX
Kazi Nogqala	XXX
Riaan Cedras	iSimangaliso Wetland Park
Liam Cogill	Stellenbosch University
Mbali Goge	KZN Dept Economic Development, Tourism & Environmental Affairs
N. Moya	XXX
Claudette James	XXX
Greg Mullins	XXX
Nhlakanipho Nkwanyana	XXX
Melanie Luck-Vogel	XXX
Thandeka Skosana	XXX
Kerina Singh	XXX
Camerson Mclean	eThekweni Municipality
Nonjabulo Mnguni	XXX
Felicity Elliott	XXX
Barney Kgope	XXX
Ntando Mkhize	XXX
LIMPOPO (in-person)	
Philani Mkabela	Ba-Phalaborwa Muni
Arnot Ravele	Capricorn District Muni
Mabwe	DALRRD
Kefiwe Bokwana	DFFE
Ntando Mkhize	DFFE
Barney Kgope	DFFE
Dess Setsabe	DFFE
Xolelwa Skefile	DFFE
Mahlatse Weber	Enviro Vito
Tshepo Madiba	Enviro Vito
Lepeke Mogashao	Farmers
Motlabo Mohele	Farmers Woman
Seloba Cheune	LEDET
Nqobile Mthabele	LEDET
F. Munyai	LEDET
Karen Steenkamp	LEDET
Angwenyi	LEDET

NAME	ORGANISATION/INSTITUTION
LIMPOPO (in-person)	
Thiolafuni	LEDET
Manoko	LEDET
Antoaneta Lestoala	LEDET
Tshemane Mogano	LEDET
Portia Mokobi	LEDET
Koketso Raholane	LEDET
Mashanyoane Tshegofetso	LEDET
Happy Mafala	LEDET
Blessings Pitadi	Polokwane Municipality
Grace Matseba	SALGA
Norma Mathebu	Uni Limpopo
Mpho Ramashala	Waterberg Biosphere Reserve
Vincent Raphunga	Waterberg Municipality
Tebogo Masebe	XXX
MPUMALANGA (virtual)	
Londiwe Ntshangase	City of Mbombela
Butshabelo	XXX
Barney Kgope	XXX
Doreen S	XXX
Love Shabane	XXX
Connie Mafuwane	XXX
Mary M	XXX
Mervyn Lotter	XXX
Mokome Daphney Molewa	XXX
Mthupana	XXX
Mutshabi	XXX
Ntando Mkhize	XXX
Phumla Nkosi	XXX
P Kershaw	XXX
Rhandzu	XXX
Silindile M	XXX
Sindisiwe K	XXX
Thobile Stuurman	XXX
Tommie	XXX
Willem van Staden	XXX
Juliet Mathebula	XXX
Elmarie vd Merwe	XXX

NAME	ORGANISATION/INSTITUTION
NORTHERN CAPE (virtual)	
Lucy Ndlovu	XXX
Lynn Joy Isaacs	XXX
Mandla Shabangu	DFFE
Milingoni Ratshikopha	XXX
Mirriams Motsepe	XXX
Mngubane	XXX
Ntando Mkhize	XXX
Ntsieni Manngo	XXX
Roy Mackenzie	XXX
Adriaan van Straaten	XXX
Aluwani Tshili	XXX
Audrey Vanya	XXX
Barney Kgope	XXX
Benedictor M	XXX
Jacobeth Kenanao Lelaka	XXX
Ntando Mkhize	XXX
Mukhethwa Wa Mulalo	XXX
Raesibe M	XXX
Ray	XXX
T. Munyai	XXX
Tholakele Nkosi	XXX
Tsakani	XXX
WESTERN CAPE (in-person)	
Rolta Nesengeni	Biodiversity Officer
Radzhedzhe Mio	Biodiversity Officer
Ruida Pool-Stanvliet	Cape Nature
Michele Mqnal	Cape Winelands Biosphere
Thabisa Sikobi	COA
R. Romukhesa	DALRRD
Lynn Jacobs	DEA&DP
Kefiwe Bokwana	DFFE
Mahlogonolo Sekhukhene	DFFE
Lusanda Gxalo	DFFE
Asnath Hlungweni	DFFE
Tshifhiwa Munyai	DFFE
Ntando Mkhize	XXX
Malge Atendaho	DFFE
Mapato Baloyi	DFFE
Lifa Malatji	DFFE
Lucy Ndlovu	DFFE

NAME	ORGANISATION/INSTITUTION
WESTERN CAPE (in-person)	
Amogelang Sefara	DFFE
Xolelwa Skefile	DFFE
Mandla Shabangu	DFFE
Asive Qikwa	DFFE
Mpho Mabala	DFFE
Michael Braack	DFFE
Matshidiso Mokhatla	DFFE
Steve du Toit	GCBR
Binotebsho Makhanyane	Green Anglican
John Paul Roberts	Green Anglican
Christo Marcus	Praxismr
Graham von Maltitz	SANBI
Huisani Magadu	SANBI
Cornelius vd Berg	XXX
Individual stakeholders consulted through online interviews	
Guy Deacon	Meat Naturally Pty
Sarah Frazee	Meat Naturally Pty
Dr Ernst Baard	CapeNature
Natalie Hayward	CapeNature
Anita Wheeler	CapeNature
Michael Braack	DFFE
Dr Andy Blackmore	Ezemvelo KZN Wildlife
Ian Rushworth	Ezemvelo KZN Wildlife
Pravin Pillay	Ezemvelo KZN Wildlife
Mandy Driver	SANBI
Wendy Foden	SANParks
Kristal Maze	SANParks
Dr Ian Little	EWT
Felix Reinders	SWPN
Estelle Gautier	SWPN
Sarshen Scorgie	Conservation South Africa
Peter Shisani	Conservation South Africa
Jan Coetzee	WWF SA
Kat Forsythe	WWF SA

APPENDIX 3:

Protected area targets

TABLE 42: A summary of the current (2023) protected and conservation areas in each biome and the targets to achieve the CBD 30% by 2030. PA=Protected Area, CA=Conservation Area, DLP=Direct Land Purchase, BS=Biodiversity Stewardship, IOCB=Indian Ocean Coastal Belt. Source: South African Protected and Conservation Areas Database ([SAPAD](#)), 2023.

PA EXPANSION THROUGH BS (KM²)	2 801	-	-	3 296	59 582	2 715	48 512	41 997	11 791	170 694
PA EXPANSION THROUGH DLP (KM²)	311	-	-	366	6 620	302	5 390	4 666	1 310	18 966
CA TARGET 15% OF CBD (KM²)	-	320	-	-	9 150	639	10 309	-	-	20 418
PA TARGET 85% OF CBD (KM²)	3 113	-	-	3 662	66 202	3 017	53 902	46 663	13 101	189 660
CBD TARGET (30%)	8 738	2 150	1 333	25 183	95 961	4 285	74 484	119 900	24 985	357 019
2023 % OF LAND IN CAS	5.5%	0.0%	13.5%	28.6%	1.6%	0.03%	0.3%	10.3%	10.4%	
2023 EXTENT OF CAS (KM²)	1 614	2	598	23 984	5 244	4	863	41 087	8 639	82 035
2023 % OF LAND IN PAS	14.8%	26.3%	40.9%	21.1%	4.8%	4.4%	3.8%	13.8%	9.8%	
2023 EXTENT OF PAS (KM²)	4 315	1 883	1 818	17 743	15 365	625	9 409	55 252	8 136	114 546
BIOME OF SA AREA (%)	2%	1%	0%	7%	27%	1%	21%	34%	7%	
AREA OF BIOME (KM²)	29 128	7 166	4 444	83 944	319 871	14 282	248 280	399 666	83 284	1 190 064
BIOME	Albany Thicket	Desert	Forests	Fynbos	Grassland	IOCB	Nama-Karoo	Savanna	Succulent Karoo	Total

APPENDIX 4:

Costing assumptions

The activities listed in the biome implementation plans were costed using data collated from the literature, existing government reports (such as annual reports or performance reports), existing cost datasets (e.g. the Working for Water programme) and stakeholder interviews. Therefore, the cost estimates are indicative and provide an order of magnitude approximation of what could be expected in the implementation of the planned for activities. The per unit costs were split into set-up or once-off costs and ongoing costs (maintenance, monitoring, etc.) and were then combined into a total per unit cost for the ten-year evaluation period 2025–2034 using a discount rate of 3.66% (see Addicott, Fenichel & Kotchen, 2020). The cost estimates are based on current 2023 prices and do not account for inflationary costs over the ten-year period.

The per unit cost assumptions are shown in Table 43, general assumptions in Table 44, and a summary of protection and conservation area targets in Table 42.

TABLE 43: The per unit cost assumptions used in calculating the total cost of activities listed in the biome implementation plans. All costs are in 2023 Rands.

COST ASSUMPTION	UNIT	SET UP/ ONCE-OFF COSTS (R/ UNIT)	ONGOING COSTS (R/ UNIT)	TOTAL COSTS OVER PERIOD 2025-2034 (R/UNIT)
Average cost of PA expansion through Direct Land Purchase	ha	4 408	211	4 998
Average cost of PA expansion through Biodiversity Stewardship Arrangements	ha	150	21	209
Average cost per game animal for creating founder herds (wildlife economy)	animal including transport	12 226		
Preparation of management plans, strategies, guidelines, policy documents	consultant/ day	9 600		
Preparation of spatial maps and interactive tools/ databases (per consultant, per day)	consultant/ day	12 000		
Average cost of OECM establishment (lower-tier stewardship)	ha	150	21	209
Updating/revising NPAES 2030	consultant/ day	12 000		
Disbursement costs of stakeholder engagement (venue, materials, food, etc.)	workshop (60 pax)	40 000		

COST ASSUMPTION	UNIT	SET UP/ ONCE-OFF COSTS (R/ UNIT)	ONGOING COSTS (R/ UNIT)	TOTAL COSTS OVER PERIOD 2025-2034 (R/UNIT)
Salary cost of middle management	year		689 883	3 656 836
Salary cost of senior management	year		1 236 818	6 555 954
Salary cost of top management	year		2 339 677	12 401 836
Salary cost of two field researchers to undertake stock assessments and monitoring	year		659 378	3 495 140
Field assistant rate	day		800	
Ave. salary of agricultural extension officer	year		250 000	1 325 165
Training cost per employee/officer	year		12 975	
Cost of implementing a sustainable land use programme in communal areas	ha	150	15	192
Marketing of certification scheme (media relations, website, campaigns)	year		3 000 000	3 000 000
Eflow data collection and monitoring on a national level	year		68 000 000	
Ave. cost river riparian stewardship programme	ha	500	200	1 059
Ave. cost for active land restoration/ rehabilitation	ha	15 333	6 450	33 349
Average cost IAP clearing and follow-up maintenance	c.ha	11 233	3 867	22 033
Ave. cost bush clearing and follow up	ha	3 800	550	5 336

TABLE 44: A list of general assumptions used in the calculation of total costs for the activities listed in the biome implementation plans.

ASSUMPTIONS	
Area under protection by 2030	30%
% of priority areas for biodiversity conservation made up of OECMs	15%
% of priority areas for biodiversity conservation made up of strict PAs	85%
% of strict protected area to be secured through Biodiversity Stewardship	90%
% of strict protected area to be secured through Land Acquisition	10%
Management effectiveness score to be achieved	80%
Increase in funding for PA management	10%
% of time spent by mid-level manager on securing additional funding	30%
Number of farmers per extension officer	250
% of communal land where sustainable livestock programme is implemented	15%
Discount rate	3.66%



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