

Vulnerability assessment and response measures to reduce climate change impacts on South African Biomes.

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Introduction

- South Africa is home to a significant portion of global biodiversity (Cowling *et al.*, 1996; Myers *et al.*, 2000), and many of its natural ecosystems are relatively intact (Scholes & Biggs, 2005), despite the changes in land cover that have accompanied societal development.
- Anthropogenic climate changes are likely to cause increasingly adverse impacts on the country's ecosystems and biodiversity (Midgley & Thuiller, 2005).
- Biodiversity is a national asset and a powerful contributor to economic development, natural resource management, ecological infrastructure and human wellbeing.
- Climate change affects biodiversity complex interaction, thereby disturbing and shaping natural ecosystems, human socio-economic needs and the environment.



Problem statement

Millennium Ecosystem Assessment (2005) – climate change and loss of natural habitat are two greatest threats to biodiversity. Loss of natural habitat through land-use changes, climate change and ecosystem degradation accounts for the loss of biodiversity around the globe.

South Africa's National Spatial Biodiversity Assessment (2004) found that 34% of terrestrial ecosystems, 82% of the main river ecosystems and 65% of marine ecosystems are threatened, with few of these threatened ecosystems currently afforded any formal protection.

National Biodiversity Assessment (2011) found that 40% of terrestrial, 57% of the river, 65% of the wetlands, 44% of estuaries, 41% of offshore and 59% of coastal and inshore ecosystems are threatened, with few of these threatened ecosystems currently afforded any formal protection.

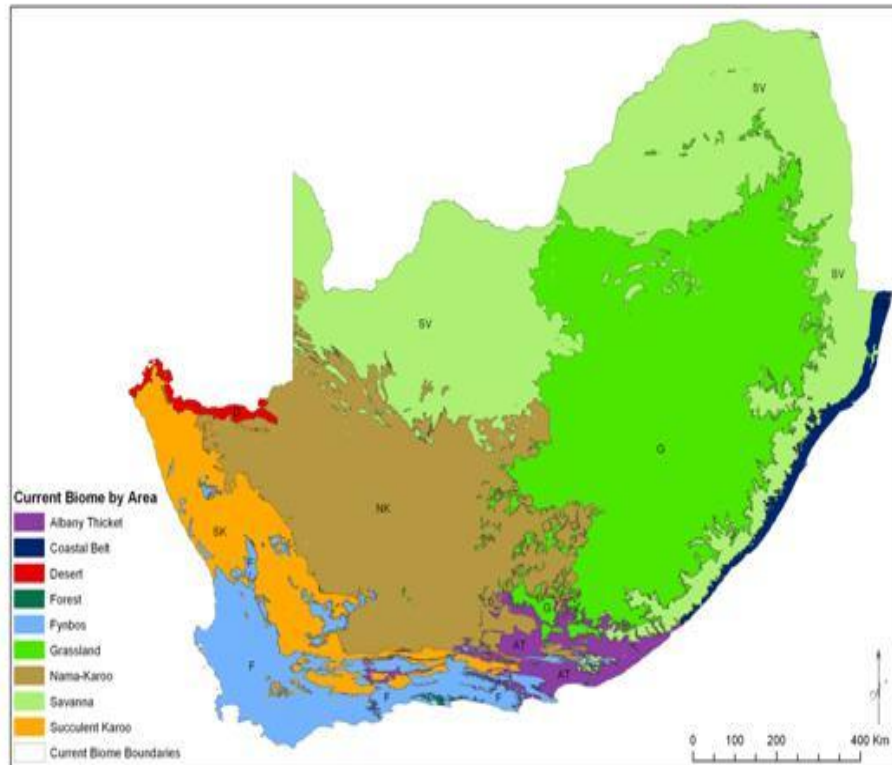


Biodiversity Vulnerability Assessment

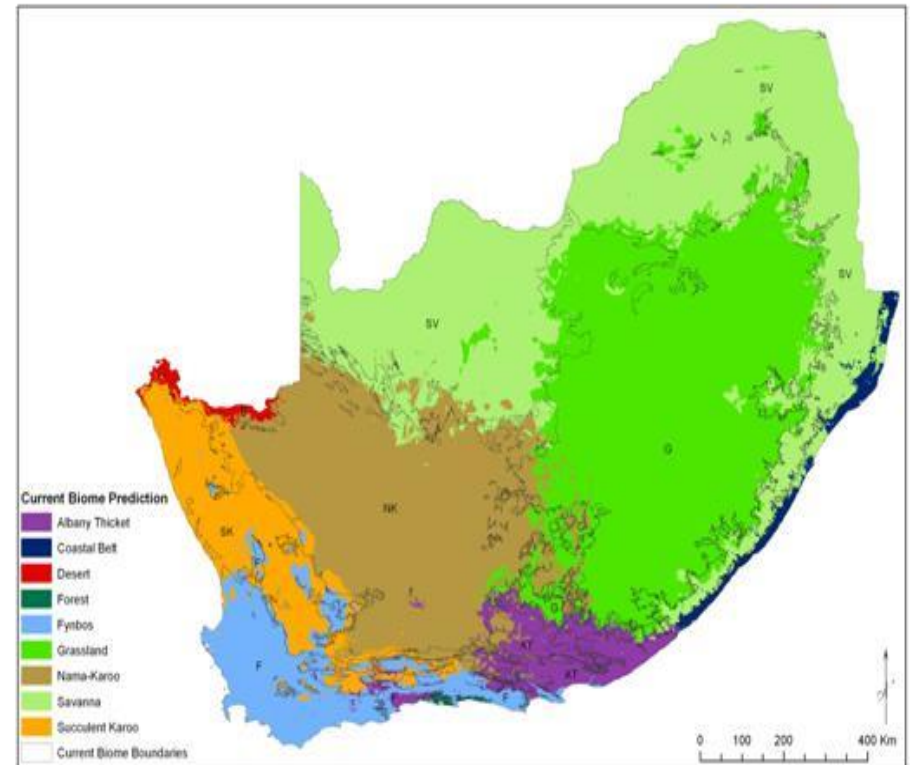
- Biodiversity is facing the greatest environmental challenge known as climate change. Climate change has emerged as a major threat to biodiversity and continues to affect the survival of plants, animals, and ecosystem services and functioning,
- Climate change has the potential to undermine sustainable development, increase poverty, and delay or prevent the realization of the Millennium Development Goals
- To ensure the long-term well-being of the biodiversity, ecosystems and people of Southern Africa, it is essential to understand the specific vulnerabilities of the region, biomes and ecosystems to climate change and define the urgent priority actions needed to ensure that people and biodiversity can adapt to these changes,
- The vulnerability assessment component aims to assess the potential vulnerability of biomes and their biodiversity to projected climate change over the medium and long term (i.e. from 2020 to 2050), that is to identifying which biomes, species or ecosystems are likely to be most strongly affected by projected changes and to understanding why they are likely to be vulnerable.

Credible, coherent climate projections are limited: A2 emission scenario, 15+ GCMs using statistical downscaling; CSIR projections using mechanistic downscaling; new impacts projections contrast with previous projections.

1a Actual Current

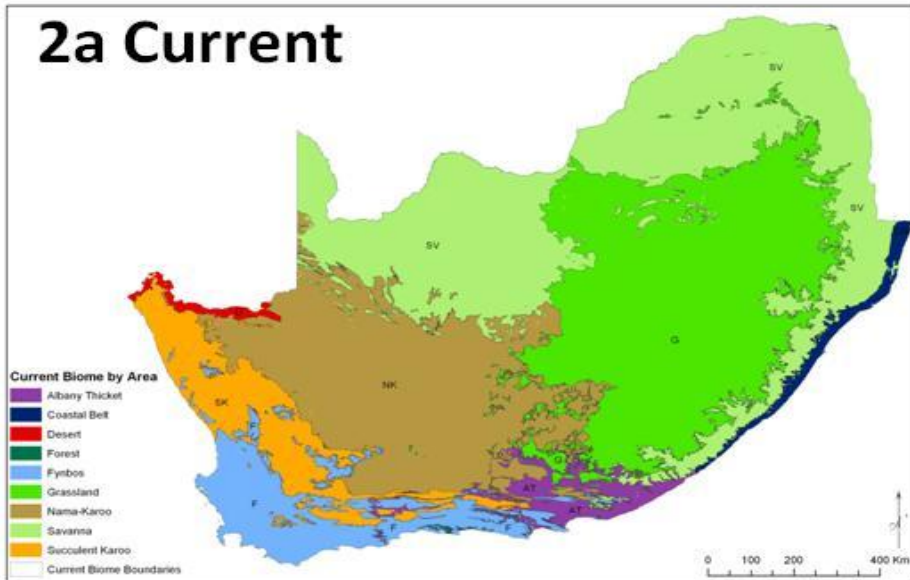


1b Modelled current

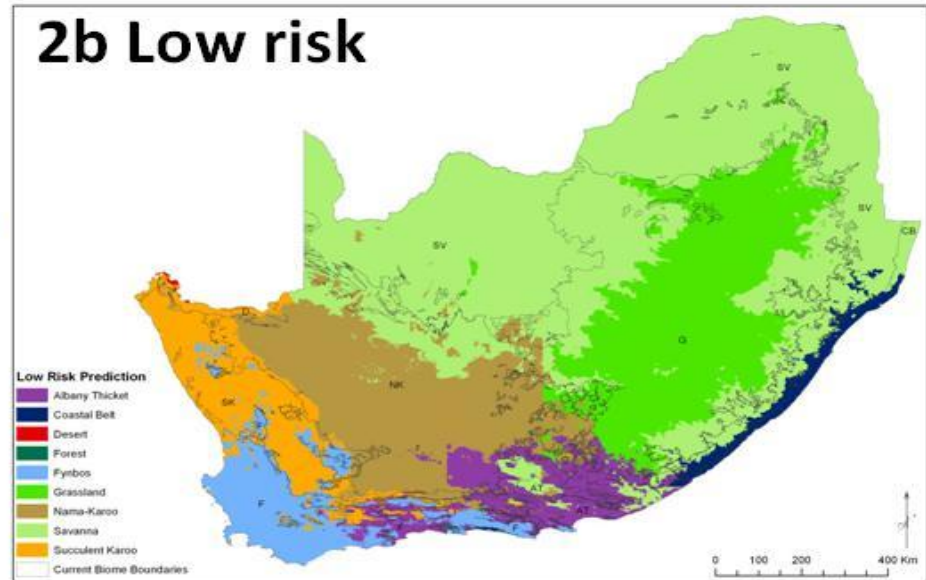


2050 – a2 emissions scenario

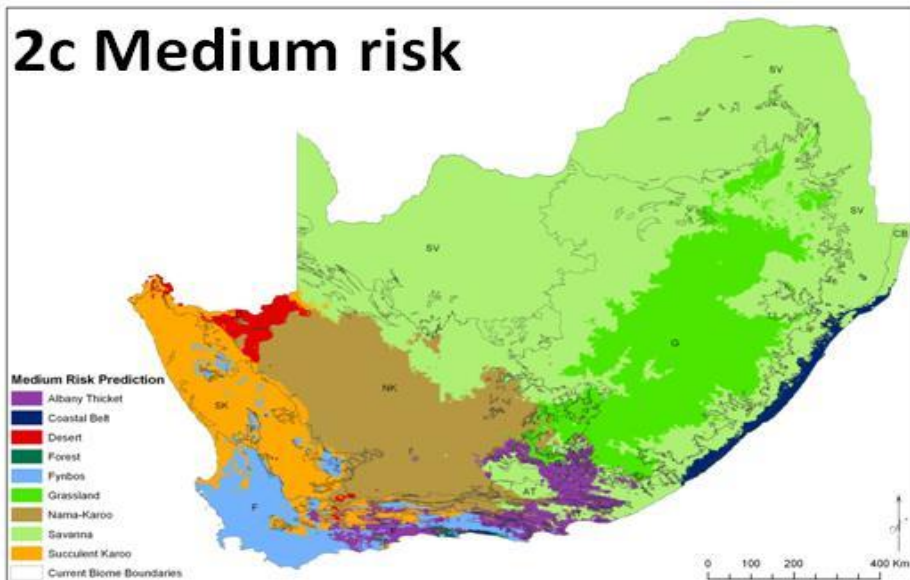
2a Current



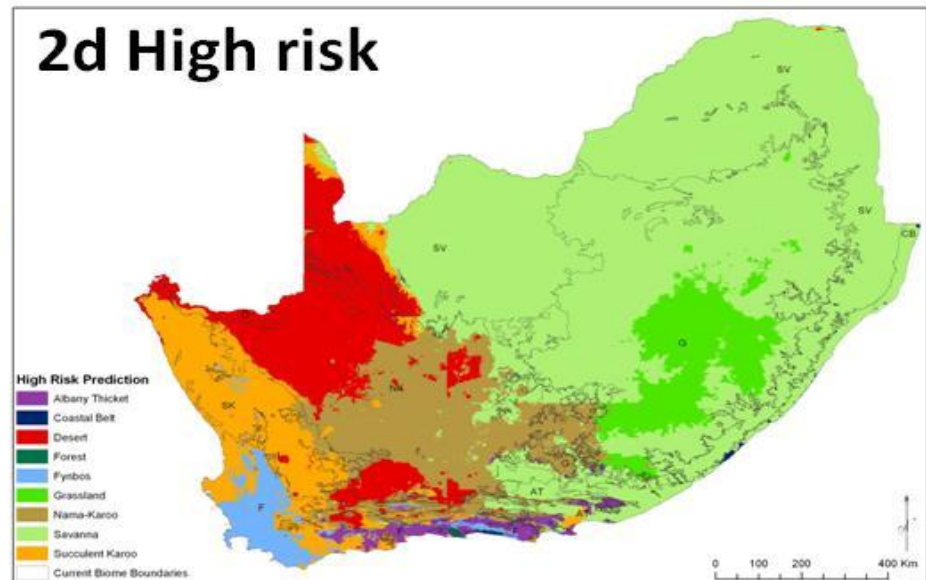
2b Low risk



2c Medium risk



2d High risk



Summary of Biomes

- The **Grassland biome** appears to be at most risk of significant change.
- **Nama-Karoo** is likely to resemble an arid Savanna under the best case and intermediate scenarios, and a Desert climate envelope under the worst case scenario.
- The **Indian Ocean Coastal Belt** increases under the best case scenario with the warm moist conditions which favour this biome expanding southwest along the coast and extending inland.
- Areas with a climate envelope characteristic of **Succulent Karoo** largely persist under all the scenarios.
- The eastern and northern sections of **Fynbos** are likely to be more like Succulent Karoo or Albany Thicket.
- Areas with an **Albany Thicket** get replaced by Nama-Karoo and Savanna conditions under the worst case scenario.
- Areas with a climate similar to the current **Desert biome** are likely to expand in the future into areas which are now Nama-Karoo.
- Although the climate envelope suitable for **Savanna** is likely to expand significantly in the future, and specific Savanna species are likely to benefit, this does not necessarily benefit existing habitats and species assemblages

Response measures to reduce biodiversity vulnerability to climate change impacts

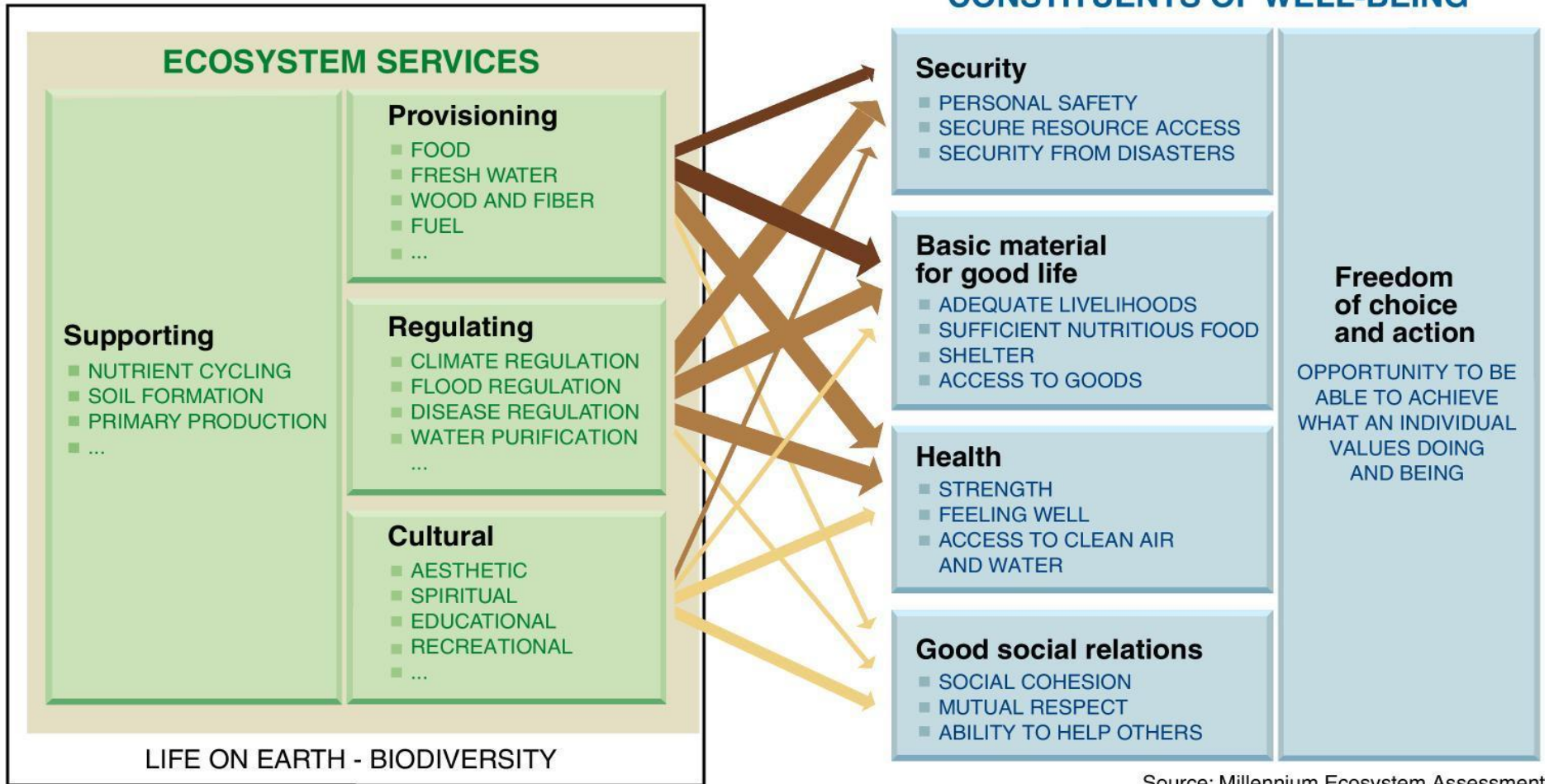
- The vulnerability assessment report explains the science behind climate change and its potential impacts on ecosystems.
- The response measures seeks to address the role of ecosystems in climate change adaptation and mitigation, and assist to identify and develop response measures for threatened biomes and ecosystems.
- Response measures- develop effective and sustainable response measures to biodiversity, lining that with ecosystem services, ecosystem-based adaptation, working for programmes and community based natural resource management.
- The focus of the work will be on understanding and highlighting response measures that should be taken to reduce the vulnerability of SA biomes.



Proposed Approach

- **The response measures project will:**
- Increase the focus on scientific attention towards response measures and adaptation in light of inevitable changes in ecosystem functioning and services, through ecosystem-based adaptation,
- Strengthen our understanding of the linkages among biological diversity, ecosystem functioning, ecosystem services and societal needs and adaptability,
- Identify key biodiversity resources in different biomes and the threats to these resources,
- Propose and provide methods to mitigate or reduce the threats that have been identified for the most valuable resources,
- Identify biome specific response measures that could/should be undertaken to reduce their vulnerability, coupled with response matrix options to afford the best possible response activities for each biome,

Critical Ecosystem Services



Source: Millennium Ecosystem Assessment

ARROW'S COLOR
Potential for mediation by socioeconomic factors

- Low
- Medium
- High

ARROW'S WIDTH
Intensity of linkages between ecosystem services and human well-being

- Weak
- Medium
- Strong

Ecosystem-based adaptation

- Ecosystem-based adaptation to climate change will be a major focus of South Africa's biodiversity and climate change response strategy- significant value for societal adaptation, ability to provide additional benefits and the maintenance of diverse agricultural landscapes to support productivity under changing climate conditions.
- Ecosystem-based adaptation, if designed, implemented and monitored appropriately, can:
 - Generate multiple social, economic and cultural co-benefits for local communities,
 - Contribute to the conservation and sustainable use of biodiversity,
 - Contribute to climate change mitigation, by conserving carbon stocks, reducing emissions caused by ecosystem degradation and loss, or enhancing carbon stocks.
- Rehabilitation, conservation and economic values

International Context

- S.A. seen as both **contributor to, and potential victim of, global climate change** (has **energy-intensive**, fossil-fuel powered economy & also **highly vulnerable** to impacts of **climate variability and change**),
- UNCBD, UNFCCC, Ramsar Convention on Wetlands, UNCCD); and the UNFF explicitly recognizes relationship between **ecosystem resilience and vulnerability**, and **resilience of human communities to climate change**. **Highlight threat of climate change on biodiversity and ecosystems, combat desertification and land degradation, reduce emissions from deforestation and degradation**
- Different sessions:
 - the conservation of biological diversity,
 - tackle the impacts of climate change,
 - reverse and prevent desertification/land degradation,
 - combat deforestation,
 - the conservation and wise use of all wetlands,
 - sustainable use of the biological diversity; and fair and equitable sharing of benefits arising from the utilization of genetic resources.

Way forward

- The shrinking habitat- human livelihoods, ecosystem services (water & food)
- Adapt our economy and society to these changes. Increasing our capacity to adapt reduces our vulnerability to the effects of climate change.
- Response measures- determine effective and sustainable response measures to biodiversity, linking that with ecosystem services, ecosystem-based adaptation, working for programmes and community based natural resource management.
- Good adaptive responses may help to lessen some of the environmental, economic and social costs of climate change.
- Consultation process with province and local government, research institutions, NGOs, academic institutions, scientific community, local communities and policy makers.

A landscape photograph featuring a single green tree in the foreground on the left. In the background, a large, white, mushroom-shaped cloud formation rises from a layer of lower clouds. The sky is a clear, bright blue with several smaller, white, fluffy clouds scattered across it. The overall scene is bright and clear.

Thank you