UNDERSTANDING CLIMATE CHANGE PROJECTIONS IN THE OLIFANTS CATCHMENT 2

How is the climate changing in the Olifants River catchment?

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Acknowledgements

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This document shares the results of a localised analysis of historical trends and climate projections for the Olifants River Catchment summarised in the technical brief *An analysis of historical and projected climate for the Olifants River Catchment* (Eds. Dr Sharon Pollard, Dr Taryn Kong and Ancois de Villiers) based on an analysis conducted by Climate System Analysis Group (CSAG) from the University of Cape Town (UCT).

This analysis was conducted as part of the Resilience in the Limpopo Basin Program – Olifants Catchment (RESILIM-O) project, which is funded by the United States Agency for International Development (USAID) under USAID/Southern Africa Resilience in the Limpopo Basin Program (RESILIM). The project is implemented by the Association for Water and Rural Development (AWARD) in collaboration with partners. AWARD contracted CSAG to perform the analysis.

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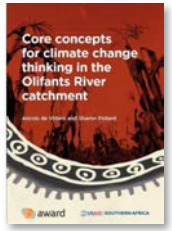
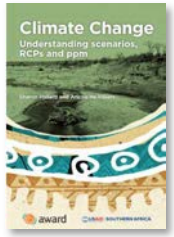
Series 1
Understanding core concepts of climate change

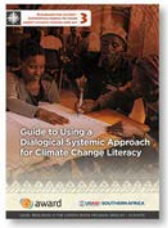


Core Concepts for Climate Change Thinking in the Olifants River Catchment
A basic brochure describing the difference between climate and weather, and outlining climate change and its impacts. The brochure is available in English or Sepedi.



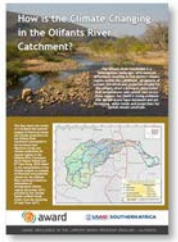
Climate Change: Understanding Scenarios, RCPS and PPM
A technical brochure that explores greenhouse gas scenarios and helps to understand Representative Concentration Pathways (RCPs) and parts of carbon dioxide per million parts of air – or parts per million (ppm). Find out what the 400 ppm figure is and why an increase of 2°C is so important.

Series 3
Dialogues for action - Supporting people to think about climate change and act



Guide to using a dialogical systemic approach for climate change literacy
Short guidelines on how to facilitate meaning-making dialogues about climate change, potential impacts and adaptation to support climate literacy and action.

Series 2
Understanding climate change projections in the Olifants Catchment



How is the climate changing in the Olifants River Catchment?
Within the Olifants River Catchment, the local climate has changed and is continuing to change. Importantly, these changes are not uniform across the catchment, partly because of the diversity and complexity of the landscape as well as weather patterns. This brochure describes the five distinct climate regions within the catchment. It can be used to inform planning and action to address climate change by reporting on the historical changes (from 1979 to 2013) and future projections (over a period including 2020, 2040 and 2080) in rainfall and temperature patterns for each climate region.

Technical brief series on historical trends and climate projections for local municipalities
A series of technical briefs which capture historical trends and projected changes in rainfall and temperature patterns for 5 local municipalities within the Olifants River Catchment: 1) Ba-Phalaborwa, Mopani District; 2) Maruleng, Mopani District; 3) Tzaneen, Mopani District; 4) Elias Motsoaledi, Sekhukhune District Municipality; and 5) Lepelle-Nkumpi, Capricorn District Municipality.

Series 4
Supporting adaptation plans

AWARD has developed several guides and tools to support identifying, developing and implementing potential adaptation plans for natural resource management.

See http://award.org.za/index.php/resources

1 Introduction

Climate change is recognised as one of the major challenges to South Africa's development. Changes in temperature and rainfall patterns have implications for our water security, food security, and the sustainability of our livelihoods.

Within the Olifants River Catchment, the local climate has changed and is continuing to change. Understanding what these changes are likely to be in the future relies on projections from models. Importantly, these changes are not uniform across the catchment, partly because of the diversity and complexity of the landscape as well as weather patterns. These different areas are called ***climate regions*** by climatologists in South Africa.

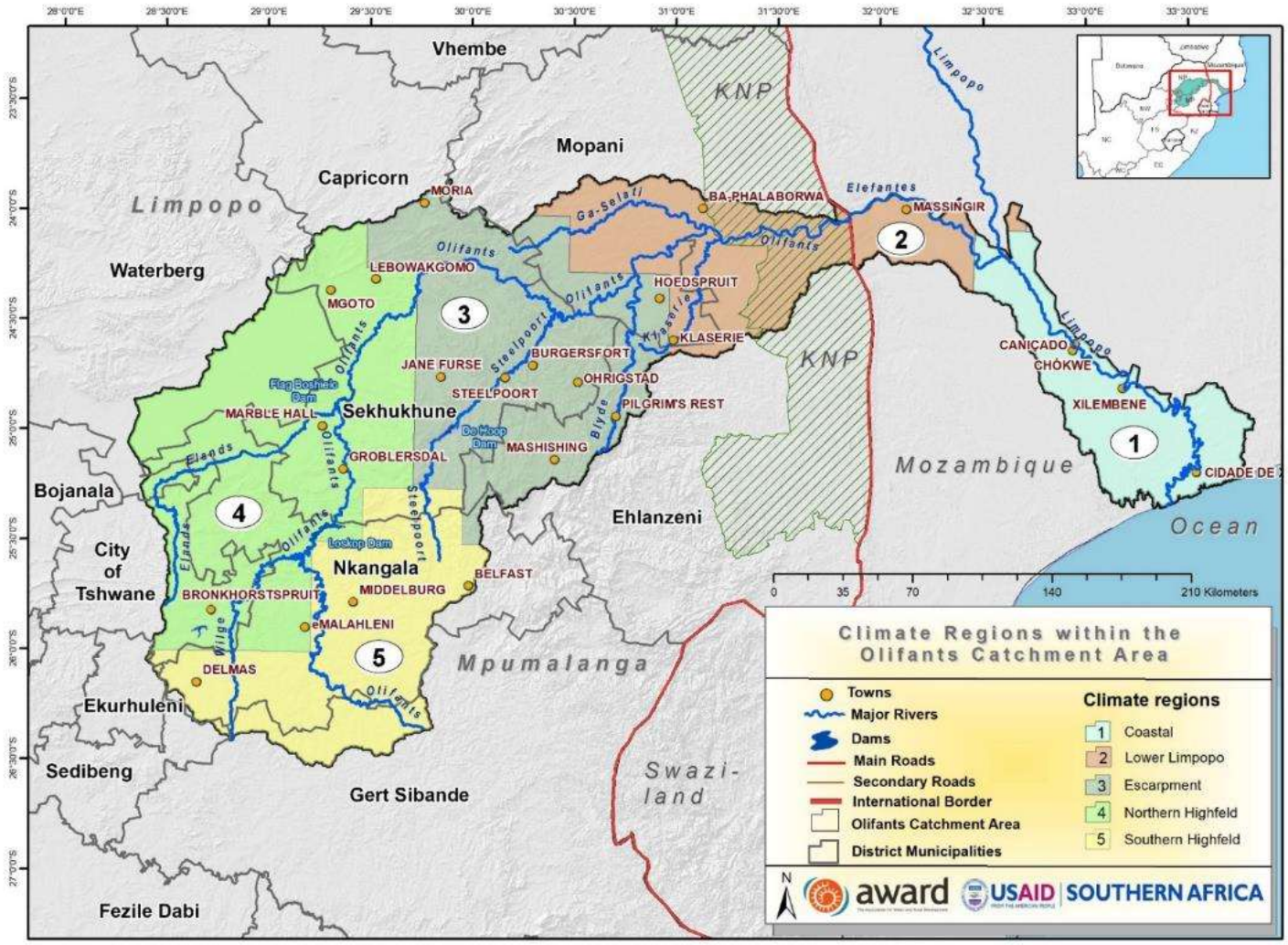
The purpose of this document is to support planning and actions to address the impacts of climate change. Readers can use this document to:

- Locate their district municipality, local municipality or town within a climate region of the catchment (Section 2);
- Explore the distinct climate regions within the Olifants River Catchment (Section 3);
- Understand historical changes (from 1979 to 2014) and future projections (over a period including 2020, 2040 and 2080) in rainfall and temperature patterns for each climate region (Section 4); and
- Identify the potential systemic climate change impacts of these changes in local climate, and adaptation options to support the resilience of communities within the Olifants River Catchment (Section 5).

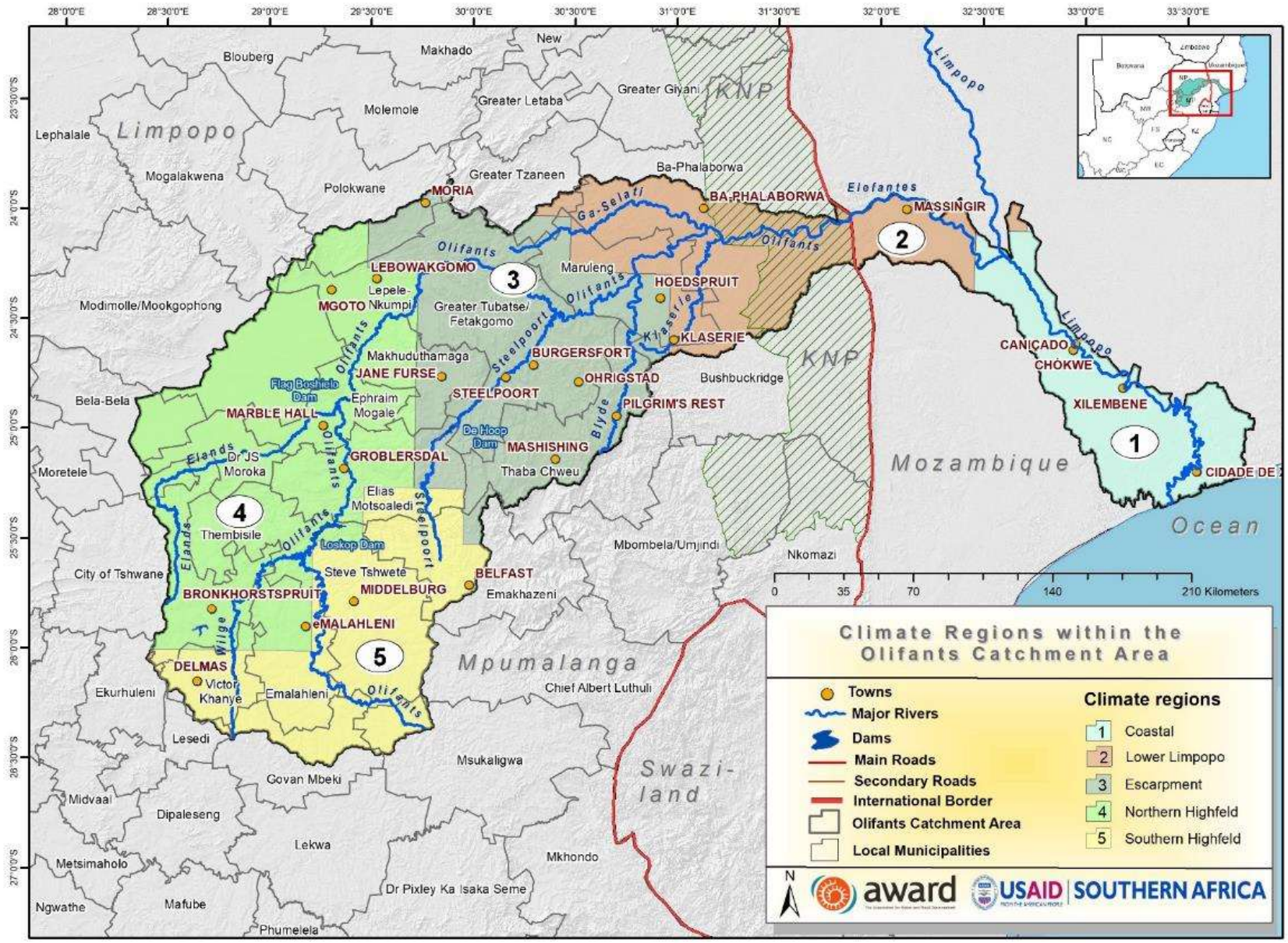
This information can inform the selection and implementation of appropriate adaptation interventions for district municipalities, local municipalities, towns, communities and individuals within the Olifants River Catchment.

2 Where are you in the catchment?

Use the following maps to identify your district municipality, local municipality or town within the catchment and its climate region.



Map of the climate regions with provinces, **district municipalities** and towns.



Map of the climate regions with provinces, **local municipalities** and towns.

3 Profiles of the climate regions

1 Coastal		2 Lower Limpopo		3 Escarpment		4 Northern Highveld		5 Southern Highveld	
									
Subcatchment	Lower	**Subcatchment**	Lower	**Subcatchment**	Middle	**Subcatchment**	Middle	**Subcatchment**	Upper
Current climate	Hot and wet	**Current climate**	Hot and dry	**Current climate**	Warm and wet	**Current climate**	Warm and dry	**Current climate**	Warm and wet
Landscape features	Savana & coastal mangroves	**Landscape features**	Savanna	**Landscape features**	Grassland, savanna, & some indigenous agromontane forests	**Landscape features**	Grassland & savanna	**Landscape features**	Grassland
Main land-use features	Agriculture	**Main land-use features**	■ Intensive irrigated agriculture ■ Mining ■ Ecotourism	**Main land-use features**	■ Mining ■ Agriculture ■ Tourism	**Main land-use features**	■ Intensive agriculture supported by large irrigation schemes ■ Tourism ■ Mining	**Main land-use features**	■ Mining (especially coal to support power stations) ■ Intensive irrigated agriculture

4 Historical trends & projected climate futures for Climate Regions

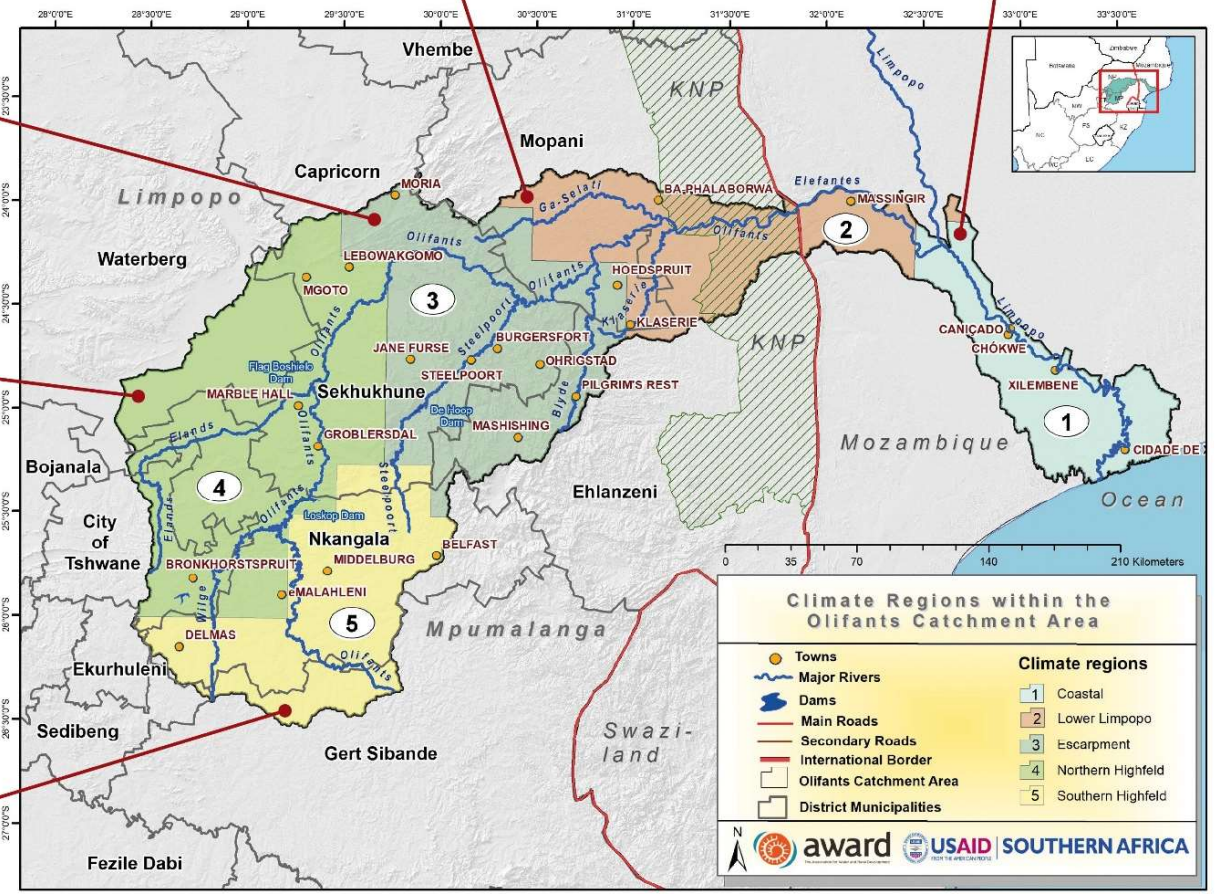
LOWER LIMPOPO	Current characteristics	Historical trends (1979 to 2013)	Climate projections by 2040		
			Optimistic	Worst-case	Climate variable
Temperature	Mean annual 23°C	↑0.25°C mean daily maximum ↑0.19°C mean daily minimum	↑1 to 2°C	↑2°C	↑Mean daily maximum
			↑30 to 37	↑46 to 54	↑Number of days with maximum > 36°C
Rainfall	Mean annual 558mm	No change	Mostly no change, but some models project increases and others decreases		

COASTAL	Current characteristics	Historical trends (1979 to 2013)	Climate projections by 2040		
			Optimistic	Worst-case	Climate variable
Temperature	Mean annual 24°C	↑0.26°C mean daily maximum	↑1 to 2°C	↑2°C	↑Mean daily maximum
			↑22 to 27	↑28 to 39	↑Number of days with maximum > 36°C
Rainfall	Mean annual 848mm	↑67.82 mm total annual ↑1.29 days with rain >20 mm/day ↑2.82 days in dry spell duration	Mostly no change, but some models project increases and others decreases		

ESCARPMENT	Current character-istics	Historical trends (1979 to 2013)	Climate projections by 2040		
			Optimistic	Worst-case	Climate variable
Temperature	Mean annual 18°C	↑0.33°C mean daily maximum	↑2°C	↑2°C	↑Mean daily maximum
			↑4 to 11	↑9 to 13	↑Number of days with maximum > 36°C
Rainfall	Mean annual 818mm	No change	Mostly no change, but some models project increases and others decreases		

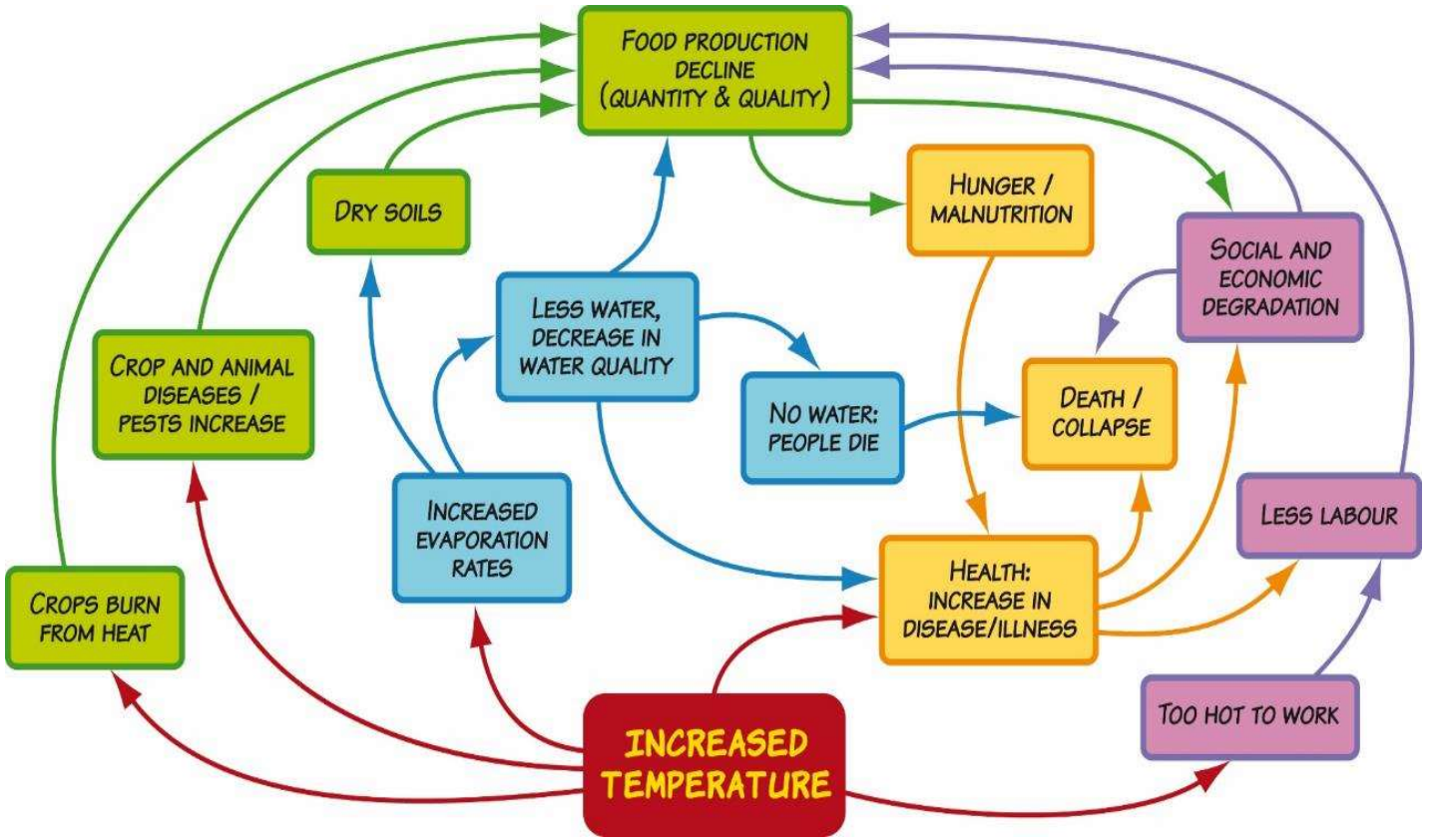
NORTHERN HIGHVELD	Current character-istics	Historical trends (1979 to 2013)	Climate projections by 2040		
			Optimistic	Worst-case	Climate variable
Temperature	Mean annual 19°C	↑0.4°C mean daily maximum	↑1 to 2°C	↑2°C	↑Mean daily maximum
		↑1.22 days with max. > 36°C	↑7 to 22	↑19 to 26	↑Number of days with maximum > 36°C
Rainfall	Mean annual 604mm	No change	Mostly no change, but some models project increases and others decreases		

SOUTHERN HIGHVELD	Current character-istics	Historical trends (1979 to 2013)	Climate projections by 2040		
			Optimistic	Worst-case	Climate variable
Temperature	Mean annual 16°C	↑0.35°C mean daily maximum	↑1 to 2°C	↑2°C	↑Mean daily maximum
			↑0 to 1	↑1 to 3	↑Number of days with maximum > 36°C
Rainfall	Mean annual 718mm	No change	Mostly no change, but some models project increases and others decreases		



5 Climate change impacts and adaptation for resilience

The graphic on the previous page shows the recorded historical changes of temperature and rainfall within the climate regions, and the projected changes for the coming decades. All the climate regions have already recorded changes in their average temperatures, and temperatures are expected to continue to increase under climate change. Increases in temperatures in the Olifants River Catchment will lead to interlinked impacts on food production, water resources, human health and the economy. Transitioning to a new climate will require us to adapt our practices for natural resource management in the Olifants River Catchment to align with the new context and to remain resilient in a time of instability.



Adaptation is defined as the "process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate harm or exploit beneficial opportunities. In natural systems, human intervention may facilitate adjustment to expected climate and its effects" (IPCC 2014, p.1).

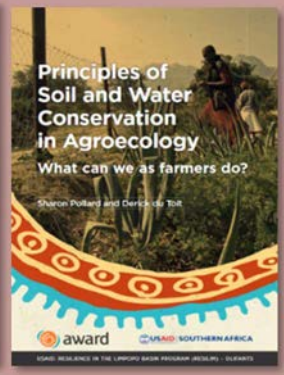
Below are a few examples of adaptation actions to address the impacts of climate change within the Olifants River Catchment.

Monitoring river flows and dam levels using the FlowTracker app as an early warning system to **support collective planning and action** for water governance

Clearing invasive alien plants from Water Priority Areas to support water security while providing employment and skill-building opportunities

Rehabilitating mangroves to support fish hatcheries for alternative livelihoods, and to prevent salt water intrusion to protect fresh water resources

Practising agroecology to support food security under hotter drier conditions in our communities

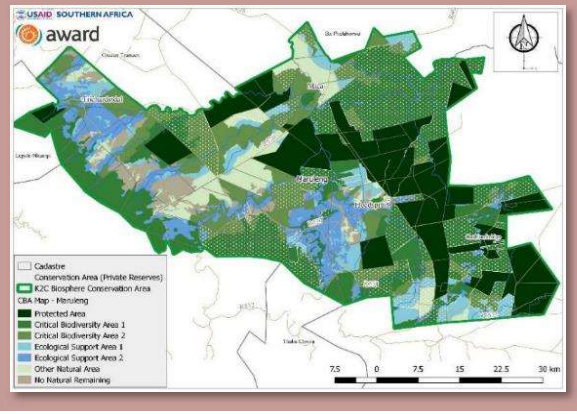


Supporting co-management agreements between communities and other stakeholders to support priority water resource areas to support water resources

Supporting water quality by improving the functioning of Waste Water Treatment Works (WWTWs) including developing feasible turnaround plans and business plans to increase staff skills and maintain the plants

Climate-induced hazards are expected to increase in frequency and severity under climate change. To address this, adaptation can be embedded into disaster management practices by building and enhancing networks for learning, collaboration and coordination amongst disaster management centres at the local, provincial and national level.

Guidelines and practices on how to include biodiversity, water and climate risks in land-use planning can help to secure ecosystem services to support sustainable development under climate change.



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The Association for Water and Rural Development

AWARD is a non-profit organisation specialising in participatory, research-based project implementation. Their work addresses issues of sustainability, inequity and poverty by building natural-resource management competence and supporting sustainable livelihoods. One of their current projects, supported by USAID, focuses on the Olifants River and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems to sustain livelihoods and resilient economic development in the catchment.

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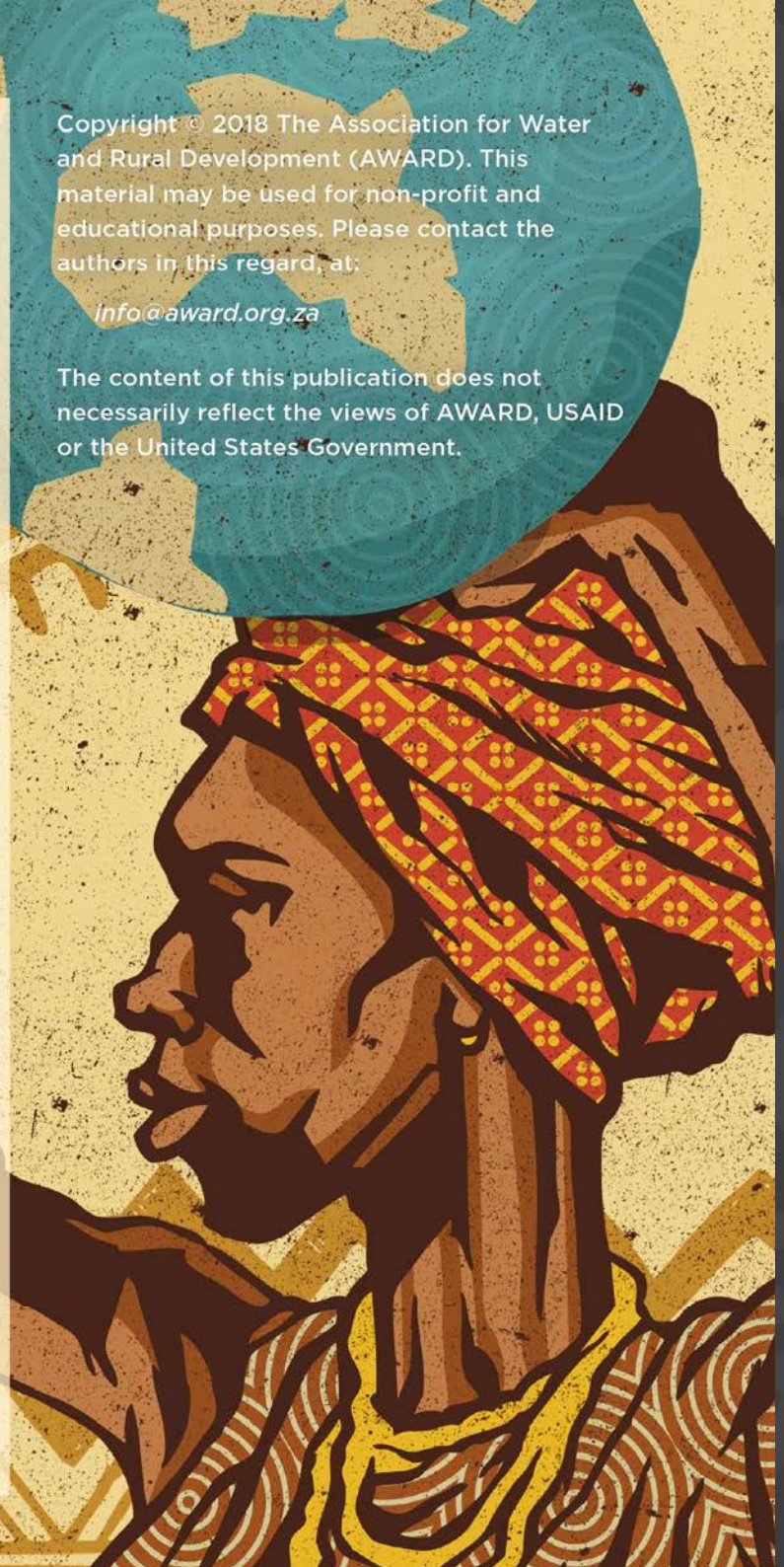
About USAID: RESILIM-O

USAID: RESILIM-O focuses on the Olifants River Basin and the way in which people living in South Africa and Mozambique depend on the Olifants and its contributing waterways. It aims to improve water security and resource management in support of the healthy ecosystems that support livelihoods and resilient economic development in the catchment. The 5-year programme, involving the South African and Mozambican portions of the Olifants catchment, is being implemented by the Association for Water and Rural Development (AWARD) and is funded by USAID Southern Africa.



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