

CBA series  
#7

Biodiversity  
& Climate change



# Climate change is one of the biggest challenges facing humankind.

Even if we achieve significant reductions in emissions of greenhouse gases (CO<sub>2</sub>, methane etc.), global climate change is now inevitable. The 'business as usual' approach to climate change will cost as much as between 5 % and 20% of global Gross Domestic Product every year.

**Climate change poses significant threats to the basic provisions of life: water, health, food production & the environment, while the poorest communities are most likely to be hit the hardest**

In the Limpopo Province, climate projections strongly suggest that we are entering a hotter climate (Davis et al. 2010; DEA, 2015). In Maruleng and Ba-Phalaborwa Local Municipalities, historical trends indicate that average temperatures have already increased between 1979 and 2014, and are expected to continue to increase in the coming decades. Projections for rainfall, on the other hand, are less certain with some assemblages of climate models projecting mostly no change (Kong et al. 2017 and 2018), and others projecting increased rainfall (Davis et al. 2010; DEA, 2015).

These changes may have significant consequences for biological triggers and crop calendars. With an increase in temperature, it is likely that evaporation and evapotranspiration rates are likely to increase. This may intensify the knock-on effects for the incidence and intensity of drought events, even if rainfall does increase (Davis et al., 2010).

The draft Climate Change Bill (2018), Disaster Management Amendment Act (2015), and Limpopo Province Green Economy Plan (2013) identify municipalities as key role-players in implementing adaptive actions to support sustainable development under climate change.

Leads to an overall increased vulnerability of our communities, economy, to extreme events such as droughts and flooding which are expected to increase in frequency and severity under climate change.

People leave the area because they can no longer make a decent living.

The local economy declines, prices increase.

Decline in livelihoods based on ecotourism, farming:

Increasing crime rates and exploitation:

Changes in the distribution of some vector-borne diseases

Overall decline in biodiversity:

The impact of increased temperatures in the Olifants River Catchment on the management of natural resources and biodiversity.

Shifting biomes and species distribution:

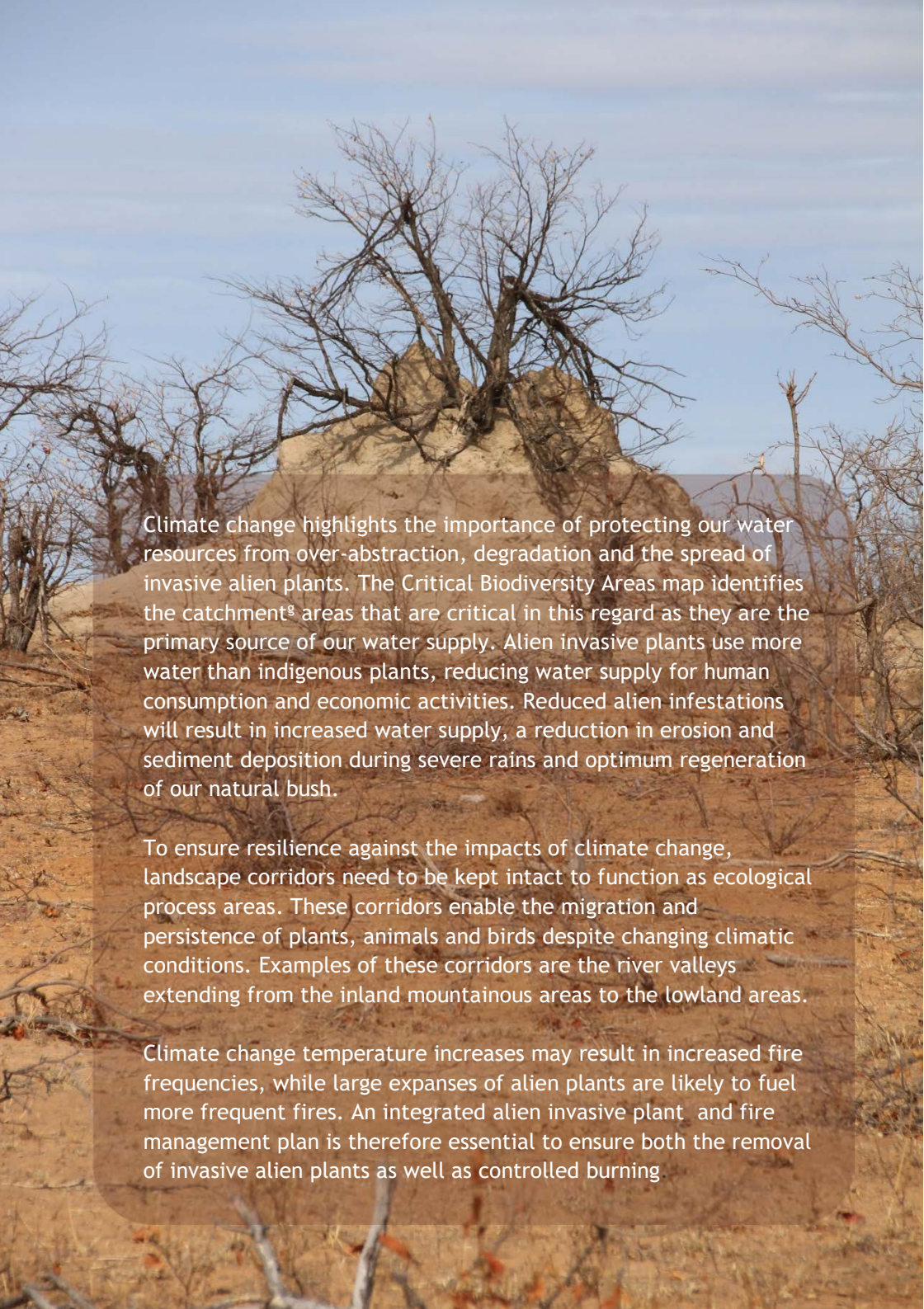
Increased rates of soil erosion:

Increased evaporation rates reduce water quality and supply:

Decreased river flows

Increased spread, density & impact of invasive alien plants:

Increased risk of veldfire:

A photograph of a dry, arid landscape. In the center, a large, leafless tree with a thick trunk and many bare branches grows on a prominent, light-colored rock outcrop. The ground is sandy and brown, with several other smaller, leafless trees scattered around. The sky is a clear, pale blue. The overall scene conveys a sense of drought and environmental stress.

Climate change highlights the importance of protecting our water resources from over-abstraction, degradation and the spread of invasive alien plants. The Critical Biodiversity Areas map identifies the catchment<sup>8</sup> areas that are critical in this regard as they are the primary source of our water supply. Alien invasive plants use more water than indigenous plants, reducing water supply for human consumption and economic activities. Reduced alien infestations will result in increased water supply, a reduction in erosion and sediment deposition during severe rains and optimum regeneration of our natural bush.

To ensure resilience against the impacts of climate change, landscape corridors need to be kept intact to function as ecological process areas. These corridors enable the migration and persistence of plants, animals and birds despite changing climatic conditions. Examples of these corridors are the river valleys extending from the inland mountainous areas to the lowland areas.

Climate change temperature increases may result in increased fire frequencies, while large expanses of alien plants are likely to fuel more frequent fires. An integrated alien invasive plant and fire management plan is therefore essential to ensure both the removal of invasive alien plants as well as controlled burning.

## **What can Municipalities do to increase our resilience to climate change?**

At the local level, one of the most effective ways of mitigating against climate change is to manage land use in Critical Biodiversity Areas and Ecological Support Areas. As a strategy against the impacts of climate change, the CBA Map has identified a network of important biodiversity areas linking the inland mountains to the lowland areas, as well as along the key rivers (Section 2.6 in Biodiversity Handbooks).

### **The following step by step guidelines assist in integrating climate change adaption into landuse planning & decision-making:**

1. Securing the CBA network (Figure 13 in Biodiversity Handbooks).
2. Maintain intact riparian (river bank) vegetation to avoid flooding and to protect water resources.
3. Protect wetlands and rehabilitate degraded wetlands (as they act as sponges thereby reducing downstream flooding).
4. Protect water resources and encourage recycling and re-use of water.
5. Restrict building to above the 1:100 year flood-line, or higher (where necessary); and beyond natural floodplains.
6. Protect major landscape corridors<sup>g</sup> with biodiversity-compatible land uses to allow for species migration (persistence) and carbon storage.
7. Restore and maintain biodiversity for carbon storage<sup>g</sup> to reduce the impacts of rising temperatures due to global warming.
8. Remove alien invasive plants to yield more water and reduce fire damage.
9. Implement appropriate fire management practises to reduce fire damage and maintain biodiversity.

*These guidelines also assist with Disaster Management, using preventative rather than costly reactive measures.*

## Climate Change Mitigation & Adaptation

In the face of escalating water needs and global climate change, it is vital that landscape corridors, as well as dolomite aquifers, wetland and riparian buffers, are managed effectively against the loss of intact habitat and that the natural landscape is not fragmented into disconnected portions.

*Ecological-process issues important for climate change mitigation and adaptation include*

- **Large-scale hydrological processes:** The Northern Drakensberg supplies large quantities of fresh water to the Maruleng and Ba-Phalaborwa Municipalities via the rivers that flow from the mountain through the municipality. It is thus a high priority water production area, referred to as a Strategic Water Source Area, which should be protected through careful management or just simply monitored and managed by ensuring rights to use of the resources are adhered to.
- **Wetlands, riparian areas and associated buffers:** Retaining wetlands, riparian areas (riverbank vegetation) and associated buffers are important for the range of ecosystem services these provide, particularly flood attenuation and regulation.
- **Dolomitic aquifers:** These are valuable subterranean water reservoirs that act as rainfall sponges, thereby reducing downstream flooding. Land use in these landscapes should not significantly degrade the recharge of these aquifers. Maruleng supports key karst/limestone/dolomite aquifers. The Pong Dolomite Mountain Bushveld represents some of the areas that would support important aquifers.

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- **Climate change refugia:** These include high altitude grasslands, kloofs and south facing mountain slopes as well as high species diversity; high topographic diversity; and, strong biophysical gradients (e.g. high altitude, rainfall or temperature gradients).
  - **Large, intact landscapes:** Large, intact landscapes regulate good quality water supplies, reduce flooding downstream and store larger quantities of carbon, thereby mitigating against potential future climate change impacts (refer ecosystem services below).
  - **Corridors and connectivity:** Retaining landscape connectivity is critical for the long-term persistence of biodiversity and for adaptation to climate change. It allows species to respond and adapt to the impacts of climate change, such as migrations up the elevation gradient to cooler climatic conditions.
  - **Avoiding High-Risk Zones:** An important consequence of climate change is the likely increase in extreme flooding. Retaining intact natural habitat, especially wetlands, riparian habitat and floodplains, is crucial to reducing the severity of flood events; as they play an important role in regulating hydrological processes, such as storm water runoff. Wetlands, riparian areas, and especially active floodplains, are considered high-risk zones. Where possible, settlements, infrastructure and agricultural activities should avoid these high-risk zones to reduce the long term impacts of climate change. This is of particular relevance to the poorer communities.



# award

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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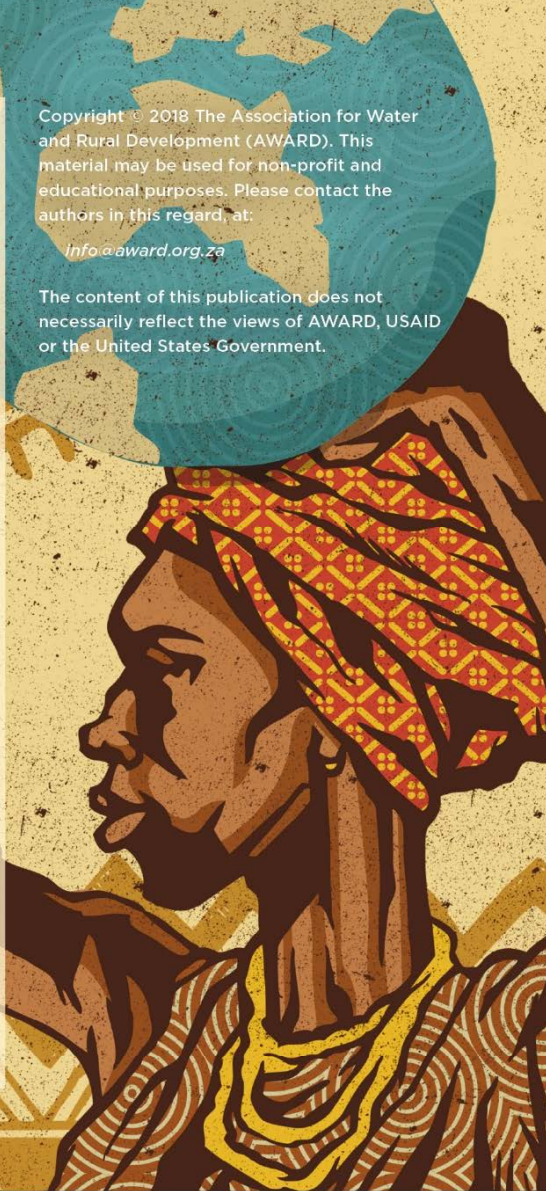
## About USAID: RESILIM-O

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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