Africa Adaptation Project
Namibia
CCA Ambassador Themes
1: Risks, impacts and policy implications
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1. Introduction

In this text you will find an overview of climate change risks and potential impacts in Namibia. Risks are the estimated extent of climate change in the near future. Potential impacts or effects are the consequences we can expect when the risks materialise. All this needs to be taken into consideration in various sector policies.

The text provides basic information on:
- Climate projections for Namibia
- Impacts on a range of policy areas, namely: agriculture, water and wetlands, fisheries health and energy
- Relevant further reading

The information is largely based on the Vulnerability and Adaptation (V&A) Assessment study, commissioned by the Government of Namibia and conducted by the Desert Research Foundation (DRFN) of Namibia in 2008.

2. Climate projections for Namibia

Climate projections for Namibia are estimates of how the climate will change. They are based on the Vulnerability and Adaptation (V&A) study conducted by DRFN in 2008 and assessment reports by the Intergovernmental Panel on Climate Change (IPCC).

2.1 Temperature

Namibia will become hotter. The V&A Assessment projected that the summer temperatures would increase between 1°C and 3.5°C and winter temperatures between 1°C to 4°C in the period 2046-2065. Maximum temperatures have been getting hotter over the past 40 years, as observed in the frequency of days exceeding 35°C. Equally, the frequencies of days with temperatures below 5°C have been getting less. This suggests an overall warming.

2.2 Rain patterns

Detecting trends in rainfall is more difficult than detecting trends in temperatures, especially in highly variable arid climates such as Namibia. However, projections show that the intensity of rainfall will increase. The total rainfall might decrease, but this is uncertain. Based on the available data, it appears as if the northern and central regions of Namibia are experiencing a later onset and earlier cessation of rains. This would mean shorter seasons in these areas. There has been a statistically significant decrease in the number of consecutive wet days in various locations, and increases in measures of rainfall intensity.

3. Impacts on policy areas
3.1 Agriculture

Risks and impacts
Rain-fed crop production is confined to the communal areas in the north-central and north-eastern parts where the highest rainfall is received. Change in rain patterns will significantly impact agricultural outputs. Periodic droughts will result in reduced grain production. Higher temperatures will cause changes in the development of pests and pathogens and this will lead to a reduction in crop yields. To determine the impacts of climate change, the V&A Assessment developed models for potential yields and planting windows for the middle of the 21st century for Namibia’s main staple grains, maize and millet, at sites of major crop production. The models are inconclusive in their results. For example, there is a tentative indication that the potential for crop production in the Grootfontein area might increase.

Climate change will have impacts on livestock too, mainly by changing vegetation structures on which various breeds of livestock are dependant. Changes in rainfall and temperatures will result in significant changes in vegetation structure and functions in several areas in Namibia. Vegetation types such as grassy savannah are predicted to lose their dominance. They will be replaced by desert and arid shrubland vegetation types. Bush encroachment is projected to increase in the north-eastern parts of the country. In general, vegetation is projected to suffer some reduction in cover and reduced net primary productivity (NPP) in most parts of the country. This will have a negative impact on browsing livestock such as cattle. Increase in bushes will potentially benefit some animals, such as goats.

Crop reduction and negative impacts to livestock can lead to temporary or even longer-term food shortages, poor nutrition and malnutrition. There will also be indirect negative impacts of climate change, such as changes in soil quality, introduction of pests, and possible increases in water-borne diseases.

Policy implications
Because about 70% of Namibians are directly dependent on agriculture for their daily livelihood, agricultural policy will need to deal with these impacts of climate change. A major policy challenge is to deal with different situations. For example, compared to their commercial counterparts, communal farmers are generally more vulnerable to climate change because many of them depend on rain and therefore have less capacity to adapt to climate change. Commercial farmers, on the other hand, are better placed because they have the capacities to adapt (e.g. they use irrigation).

Policy will also have to consider the differing implications on crop and livestock. For instance, according to the V&A assessment, the threshold for conception in some popular breeds of cattle will be reached as average maximum temperatures exceed 34°C during the hot season. This is not the only issue agricultural policy will have to deal with. Policies also will have to deal with an increase in the water demand of animals and with an increase in animal diseases, e.g. tick-borne diseases. Animal health may also be affected by heat stress. Reproductive rates of livestock may decline, especially of breeds that are not well adapted to the local climatic conditions. As for crop, agricultural policy will have to deal with decrease and increase of crops in different areas.
3.2 Water and wetlands

Risks and impacts

**Water:** Increase in temperatures will result in an increase in evaporation. It will also cause evapo-transpiration to increase to a range of 5-15%. Without the impacts of climate change, Namibia is to face absolute water scarcity by 2020. This means that water demand by all users cannot be fully met by available supplies. A reduction of 10-20% in rainfall by 2045-2065 over the catchments of the Zambezi, Kavango, Cuvelai and Kunene rivers is expected to lead to a reduction in runoff and drainage in these river systems by +/- 25%. Under the V&A assessment, models were developed on the impacts on run-off, peak flows, and sustainable dam yields for the fish river basin. The results of this were that runoff may increase in the far south of the country and dam yields are expected to be influenced by increased evaporation.

**Wetlands:** Climate change will generally have negative impacts on wetlands in Namibia. Wetlands are likely to provide reduced ecosystem services such as water retention, flood attenuation and water purification in the face of climate change. The latter may negatively affect rural livelihoods and tourism. The mouths of the Kunene and Orange rivers are likely to be affected, with possibly serious implications for their qualifications as Ramsar sites. Floodplains in the Caprivi and oshanas in the Cuvelai remain particularly vulnerable, as smaller areas will be inundated, and because they may dry out sooner due to increased evaporation. The Okavango delta may be strongly affected in similar ways, as a result of which it may potentially shift to a seasonal river.

Policy implications

About 75% of the water in Namibia is used in the agriculture sector. Agriculture is a major contributor to the national economy, with more than half of the population dependent on this sector for their survival. The climate change challenges for water and wetlands call for adequate policy measures. Policy also needs to deal with groundwater issues because many researches suggest that groundwater recharge – a water harvesting technique, in which water from the surface works its way into the subsurface, replenishing groundwater supplies – may suffer a reduction of 30-70% across the country. A potential exception could be found in the recharge of alluvial aquifers (aquifer formed by the deposition of weathered materials such as sand and silt particles) that have their origins in central areas of Namibia, where more late summer rainfall can be expected by the middle of the 21st century.

3.5 Fisheries

Risks and impacts

Changes in air temperature and in evapo-transpiration will affect the temperature of surface water. An increase of temperature may exacerbate eutrophication. This process leads to depletion of oxygen in the water. The result is a negative impact on water quality. It may lead to or exacerbate various forms of water pollution.
Native fish species may be negatively affected and individual species may disappear. A trend of warmer sea surface temperature has been noted over the Northern Benguela Current. This warming trend may be one of the several environmental factors that have contributed to declining fish stocks in recent years. Positive effects could be that more food for fish might be available. However, no final and conclusive information on the expected impacts is available at this time.

**Policy implications**

Policies have to be developed to increase resilience in fisheries.

### 3.6 Health

**Risks and impacts**

Drought is likely to impact the food supply, particularly within the rural population. It also will reduce the availability of clean water. Limited food supply during the dry season and prolonged drought, in the absence of safe water provision and secure nutrition, can result in poor nutritional and mental status particularly in rural areas. Higher temperatures in areas that are already experiencing very high temperatures are likely to increase mortality among the elderly, infants and people with a disease. About 60% of the population live in areas where malaria is prevalent. These areas are predicted to expand southwards into the central inlands. Such a shift may already be occurring. Increased flood risk also increases the risk of the spread of serious waterborne diseases such as Cholera and Bilharzia.

**Policy implications**

Health policy has to deal with issues such as an increase in malaria and waterborne diseases. It also has to take into consideration that flooding leads to various health risks, such as flooded sanitation facilities and the limited opportunities for hygienic sanitation during floods.

### 3.7 Energy

**Risks and impacts**

Rural Namibia already uses biomass fuel to meet energy needs. Less rain or increased evaporation, will impact the availability of fuel wood in the remote areas. Floods might have an impact on the transportation of fuel wood. On a positive note, bush encroachment in vulnerable parts of the country may increase as a result of climate change, and so total fuel wood supply may be enhanced.

**Policy implications**

Energy policies will have to deal, on a larger scale, with hydro electrical projects such as at Ruacana, that may be affected by changes in flood regimes, siltation and related challenges. Furthermore, public services may be interrupted for prolonged time periods during flood events.

### 4. Relevant further reading
- **Initial National Communication (INC):** The Namibia INC to the UNFCCC covers inventories on greenhouse gases, anticipated impacts of climate change, actions taken and action planned to avoid and respond to climate change. Seven sectors important to Namibia’s economy are identified to be the most vulnerable to climate change: 
  [http://unfccc.int/resource/docs/natc/namnc1.pdf](http://unfccc.int/resource/docs/natc/namnc1.pdf)

- **Climate Change Vulnerability and Adaptation (V&A) Assessment for Namibia:** The V&A assessment was carried out in preparation of the Second National Communication to the UNFCCC. The report focuses on the vulnerability of the water and agricultural sectors to climate change, and suggests some possible adaptation measures to cope with climate change particularly in Karas and Caprivi region: 

- **The Potential Impact of Long-Term Climate Change on Vector-Borne Diseases: The Case of Malaria:** The website contains information on the potential impact of long-term Climate Change on vector-borne diseases: the case of Malaria: 