Climate Profiles of Countries in Southern Africa: Namibia

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The following climate factsheet[7] provides an overview of the climate of Namibia, one of ten countries of interest for the Finnish Red Cross Food Security Study, 'Interventions to improve food security in a changing climate in Southern Africa'. Each of the factsheets were written as a compilation of information from peer-reviewed academic papers, government publications, and INGO documentation, and are also available in one compiled document.

1. *What is the general climate of Namibia, and what are its climate zones?*

The general climate of Namibia is characterised by hot and dry conditions throughout the year. 92 percent of the country is classified as hyper arid or semi arid (FAO 2005). Cumulatively, mean annual rainfall over the country is estimated around 285 mm (FAO 2005). Average temperatures are high and range from an annual average of 16 °C on the southern coast, 22°C in the central highlands, and over 22°C in the north (FAO 2005).

Namibia has broadly three topographical and climatic zones. The low lying and coastal Namib desert extends along the far western portion of the country with hot and dry conditions throughout the whole year; and the Kalahari desert merges with the Namib in the central and south-west portions of the country. The Namibian Highlands run along the middle of the country, through the capital city of Windhoek; these areas are generally cooler yet arid throughout the year mainly due to altitude and can experience frost on rare occasions. The flat plains of the Caprivi strip and the Otavi mountains in the northern part of Namibia are the most humid parts of the country. (FAO 2005, Republic of Namibia 2015)

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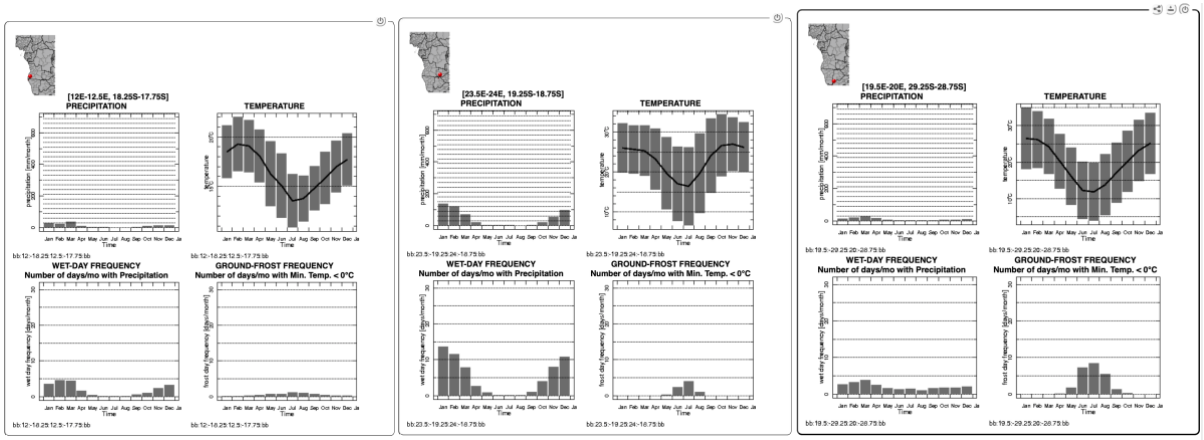

Figure 1. Climate Statistics for northwest Namibia (Namib Desert) (1a), extreme eastern Namibia (Caprivi Strip) (1b) and southeastern Namibia (Kalahari Desert)

1.1. How does precipitation vary throughout the year?

Precipitation in Namibia is very low but there are two distinct seasons. The rainy season runs generally from October to April, with most precipitation falling in December, January, and February. In March and April, the rainy season generally subsides, and precipitation is very low from May to September.

Precipitation is also highly spatial. For instance, the flat plains of the Caprivi strip and the Otavi mountains in the north have an annual cumulative rainfall between 600 and 700 mm while annual precipitation amounts in the central highlands in the desert can be as low as 25 mm per year (Ministry of Environment and Tourism, 2011).

1.2. How does temperature vary throughout the year?

Temperatures generally follow the same bi-seasonal pattern as precipitation, and have similar spatial patterns. Generally, they are at their highest from December to February where average daily temperatures in the deserts and Highlands can reach as high as 30*C. In Windhoek, for example, daily maximum temperatures in December are around 31*C (WeatherSpark). Temperatures then decrease in April and are at their lowest in June and July, where the high altitude areas even see frost.

2. What types of extreme weather and climate does Namibia experience?

In Namibia, droughts and floods are the most common extreme weather events, and the incidence and intensity of impacts are growing (Iijma et al. 2018). Droughts can span multiple years and floods occur year round, however are more common in the summer where the most

precipitation falls. Large-scale floods mainly occur in the rainy season, and at the latest in May or June (ECHO 2003).

- The Namibian National Drought Task Force defines the threshold for a drought disaster as "14 mm of rain on monthly average (168 mm annual rainfall)". These are a common and severe phenomenon in Namibia. Orti and Negussi (2019) demonstrate that they have a probability of occurring over 90% in any decade; the likelihood of two droughts in a 10-year period is approximately 75% (Orti and Negussi, 2019). It is important to note here, however, that the complexity of this phenomenon requires further research and analysis than is within the scope of this paragraph.

- Flooding is also a severe hazard in Namibia. For instance, in 2007, floods in the Caprivi region displaced over 15'000 people who lived in makeshift camps for months, leading the IFRC to call it "the forgotten disaster" (IFRC 2007). More recently, in March 2020, heavy rain in the northern part of the country caused rivers to overflow and displaced hundreds of people (Floodlist 2020). In addition to riverine floods, flash floods are of particular concern given the aridity of the land. In 2019, for example, severe storms over most of southern Africa created flash floods in the far north of the country which severely damaged infrastructure and crops (Floodlist 2019).

- The impacts of ENSO on floods and droughts in Namibia are important to note here. During El Nino years, most of the country experiences below average rainfall and early cessation of the rainy season. In the Caprivi strip, however, El Nino years are periods of more unpredictable rainfall, sometimes causing above average rainfall, particularly in the early period of the rainy season, from October to December (MAWRD 2003). Research has shown that both droughts and floods in Namibia have coincided with El Nino years in many years (1963–1964, 1965–1966, 1997–1998, 2002–2003) (Orti and Negussi 2019). La Nina years are generally periods of above average rainfall totals and sometimes see an extension of the rainy season into April and May (MAWRD 2003). Droughts and floods have also coincided with these years as well, although less frequently, on record in 2007-2008) (Orti and Negussi 2019).

- Every few years, the country's coast also experiences an anomalous phenomenon known as the Benguela Niños and Ninas which shifts southwards the normal fronts of the Benguela current (Imbol Koungue et al. 2019). In years where this occurs, annual temperatures in coastal Namibia increase significantly; for instance, in the 1963 Benguela Niño, recorded annual temperatures were above average by 2-4°C (Gyory 2013).

3. *What are certain current and projected impacts of climate change in Namibia?*

Climate change poses a threat to Namibia's infrastructure, food and economic security and livelihoods more broadly.

3.1. Observed changes

- Diurnal temperature ranges are consistently increasing over Namibia since 1961 (New et al. 2006). In their Climate Change Vulnerability and Adaptation Assessment, the Namibian Ministry of Environment and Tourism noted that temperatures in the second half of the 20th century increased by 1-1.2°C compared to the first half (Ministry of Environment and Tourism 2011).
    - Temperature has increased by approximately 0.2°C every decade on record (Republic of Namibia 2015).
    - The annual number of days above 25 C have increased between 1961–2000 (New et al. 2006).
- The amount of precipitation during wet days and heavy precipitation events have increased in southern Namibia between 1961 and 2000 (New et al. 2006).
    - The amount of dry days per year have been gradually increasing through Southern Africa (New et al. 2006). Important to note here is that establishing trends in rainfall for Namibia is particularly difficult given the low amounts of precipitation where a single rainfall event can produce most of the rainfall a region will see in a year (Ministry of Environment and Tourism 2011).

3.2. Projected changes

- Projections of temperature increases range between 0.6 and 3.8°C from 2035 and 2065, compared to the baseline period of 1961 to 2000 (Republic of Namibia 2015). Models estimate that these increases will be greatest inland, and in the winter months (Ministry of Environment and Tourism 2011, Republic of Namibia 2015).
- Over most of southern Africa, rainfall trends are particularly difficult to project. Research has shown that the clearest trend is for a prolongation of the summer rainy season, particularly in January and April, and a decrease in winter rainfall in the southern and western regions of the country (Ministry of Environment and Tourism 2011). Groundwater recharge is estimated to decrease by 30-70% by the mid 21st century (Ministry of Environment and Tourism 2011).

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