

## Climate Profiles of Countries in Southern Africa: Botswana

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The following climate factsheet<sup>2</sup> provides an overview of the climate of Botswana, 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 Botswana, and what are its climate zones?*

The climate of Botswana is classified as arid and semi-arid, with erratic precipitation ([Batisani and Yarnal 2010](#), [Crawford 2016](#), [MEWT 2012](#)). Geographic differences are present, with the northeastern region of the country being the wettest, receiving on average 500 mm of rain annually, while the southwest, which includes part of the Kalahari desert, is the warmest and only receives 127 mm on average ([Crawford 2016](#), [Parsons 2020](#)).

The main drivers of Botswana’s climate are altitude and latitude. First, the country’s location on a high altitude plateau, with an average altitude of 1,000 m above sea level, is a primary factor influencing the climate ([Daron 2014](#)). Additionally, Botswana lies at the intersection between warm winds off the Indian Ocean and relatively cool winds from the South Atlantic, which create high and low pressure systems ([Daron 2014](#)). It is also located in the migration pattern of the Inter-Tropical Convergence Zone (ITCZ) which determines summer precipitation in the northern part of the country especially ([MEWT 2012](#)).

#### *1.1. How does precipitation vary throughout the year?*

Precipitation in Botswana is generally classified as bi-seasonal. The country experiences semi-humid summers from October to April, although these are often interspersed with frequent dry spells. Precipitation in these months are often associated with sporadic and localised thunderstorms, with peaks in January and February, which is a key period in the agricultural sector for plowing and planting ([Parsons 2020](#), [Botswana Tourism Bureau](#), [Crawford 2016](#)). The

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second season, from April to September, is the country's dry winter, where little to no precipitation falls.

### 1.2. How does temperature vary throughout the year?

Mean monthly temperatures generally range between 29.5 and 32 between October to April, and can reach up to 42°C ([Crawford 2016](#), [MEWT 2012](#)). From April to September, temperatures are significantly lower, with mean monthly temperatures ranging between 19.8 and 28.9°C ([MEWT 2012](#)). The seasonal ranges are indicative of the spatial variation described above.

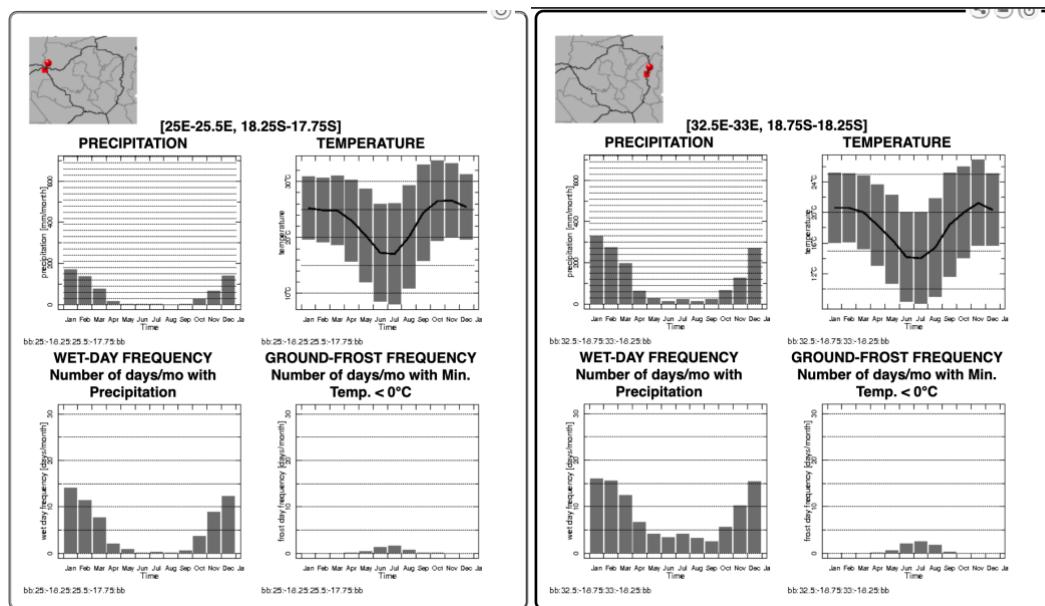


Figure 1. Climate Statistics for western (1a) and eastern (1b) Botswana

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

- Droughts of severe impact are common in Botswana, and historical data suggests it is cyclical in nature. The occurrence of droughts is difficult to predict, as is the duration of the phenomenon, which has differed from seasonal to multi-year periods of below average rainfall ([Parsons 2020](#)). It is important to note here that the complexity of this phenomenon requires further research and analysis than is within the scope of this paragraph. Most recently, drought was declared by the government in 2018-2019, brought on by erratic and strongly below average rainfall which had devastating impacts on the country's agricultural sector and water resources ([Wabai 2019](#)).
- Wind and dust storms can be extreme in Botswana and present significant societal risks. For example, when dust blows from the Kalahari desert from August to October, there is

an increased risk of dust storms which can potentially damage crops and impact water resources ([MEWT 2012](#)).

- Botswana also experiences severe convective storms, particularly in the summer (October to April) which can lead to severe flooding ([MEWT 2012](#)).
- The ENSO cycle has historically impacted Botswana, with El Nino leading to increased risk of depressed rainfall, and La Niña leading to increased risk of above average rainfall and increased risk of flooding, including flash floods, particularly to the eastern part of the country ([MEWT 2012, IFRC 2013](#)).

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

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

#### **3.1. Observed changes**

- Since 1963, there has been a clear signal of increasing temperatures in Botswana of two degrees on average; higher than average temperatures have been particularly striking during the dry winter period ([MEWT 2012](#))
- Records from the last 50 years show that the number of warm days and nights has increased, and the number of cool days and cold nights decreased ([Crawford 2016](#))
- In northern Botswana, historically the wettest region of the country, total summer rainfall amounts have decreased since 1963 ([MEWT 2012, Crawford, 2016](#))

#### **3.2. Projected changes**

- The IPCC projects that temperatures over Botswana are projected to increase by 1.1°C by 2035, 2.5°C by 2065 and 4.5°C by 2100, compared to pre-industrial temperatures (Christensen et al. 2013: 14SM-36). In particular, the Kalahari desert region is expected to see an even greater and more rapid temperature increase, possibly by 2°C by 2030 ([MEWT 2012, Crawford 2016](#)).
- Annual precipitation is projected to decrease in the currently wetter northern and eastern regions, and increase in the south, although models vary in their results ([MEWT 2012](#)); additionally, multi-decadal variability will likely continue throughout the century (Daron 2014).
- The average duration of warm spells could increase between 62 and 80 days per year, or half of this in a 1°C world, depending on the region. Additionally, the length of dry spells is projected to increase by 5-days at 1°C and by 15-19 days at 2°C. Mean annual

precipitation is projected to decrease between 5 and 12% in a 2°C world and between 2 and 7% in a 1°C world. Climate projections also show increases in indices of heavy rainfall. However, it is important to note here that the range presented by different models is large and therefore difficult to conclude upon ([Nkemelang et al. 2018](#)).

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