

Climate Profiles of Countries in Southern Africa: Zimbabwe

Dr Meghan Bailey, Senior Technical Advisor, Red Cross Red Crescent Climate Centre
Dorothy Heinrich, Technical Advisor, Red Cross Red Crescent Climate Centre
Andrew Kruczkiewicz, Technical Advisor, Red Cross Red Crescent Climate Centre

The following climate factsheet¹⁰ provides an overview of the climate of Zimbabwe, 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 Zimbabwe, and what are its climate zones?

The general climate of Zimbabwe is subtropical, but can further be divided into five distinct climatic zones as classified by Köppen-Geiger ([Bradley et al 2020](#), [Republic of Zimbabwe 2016](#)). Temperatures and precipitation are particularly influenced by the country's high average elevation and topography. Notably, the north and eastern regions (the Lowveld) are the warmest and wettest, and classified as humid and subtropical, with a highland zone in the centre-east. The high elevation plateau in the west (the Highveld) experiences cooler temperatures and is protected from the rain in the shadow of the eastern highlands, bringing a climate that is nearer to semi-arid ([Bradley et al 2020](#)). This semi-arid zone extends to the southern region of the country, which also includes a small region of near desert conditions in the southeast. There is even a small area classified as tropical savanna in Köppen-Geiger terminology (Aw). Average annual temperatures range between 18°C in the Highveld and 23°C in the Lowveld ([Republic of Zimbabwe 2016](#)); annual average rainfall ranges between 300mm in the south and southwestern regions to over 1,000 mm in the north and northeast ([Zimbabwe 2015](#)).

The Zimbabwe Meteorological Services Department divides the year in four seasons. The rainy season falls in the austral summer, and generally lasts from November to March – this is followed by a 'post-rainy season' from March to May. The winter is the dry season, from May to November – the latter includes both a 'cool' season from May to September and a 'hot' season from September to November ([Bradley et al 2020](#), [Republic of Zimbabwe 2016](#)).

¹⁰ Suggested citation: RCRC (Red Cross Climate Centre) (2021) Climate Profiles of Countries in Southern Africa: Zimbabwe. The Hague: RCRC.

1.1. How does precipitation vary throughout the year?

Most of the country's precipitation falls in the summer months, between October/November and March. It is in this period that monsoon winds, coming off the Indian Ocean, bring high intensity rainfall events to the country, and in particular in the exposed eastern region ([Bradley et al 2020](#), [Republic of Zimbabwe 2016](#)). It has been noted that 90% of the country's precipitation is driven by convective forces; the remaining amounts of precipitation are linked to orography and frontal systems ([Republic of Zimbabwe 2016](#)). There are two distinct periods within the rainy season however - from October to December, westerly clouds bring the rainfall while from January to March precipitation is mainly driven by the migration of the Intertropical Convergence Zone. The rainy season is also commonly intermixed with dry spells - notably, in their Third Communication to the UNFCCC, the government of Zimbabwe note that a common occurrence is a dry spell from the last week of December to mid-January, termed "the mid-season dry spell" and caused by a high pressure system moving from Botswana (the Botswana Upper High) ([Republic of Zimbabwe 2016](#)).

1.2. How does temperature vary throughout the year?

October and November are on average the warmest months of the year in Zimbabwe, with variations related to altitude. For instance, the city of Inyanga, in the eastern region, lies at 5,500 feet and sees average daily temperatures of 18°C in October. Much higher in elevation, the capital city of Harare (at 4,800 feet) sees temperatures around 21°C in the summer months ([Sanger 2020](#)). Although October is generally the warmest months, delays in the onset of the rainy season can extend the hot season into November. When there are delays in the rainy season onset, however, temperatures November can be even higher ([Republic of Zimbabwe 2016](#)) - national averages for November temperatures are around 24°C. Temperatures then decrease throughout the rainy season, and reach their lowest in June and July; then, mean temperatures over the country lie around 15°C. Mild to severe ground frost also sometimes occurs in the mid-May to early August period, and is of particularly high risk in June and July ([Republic of Zimbabwe 2016](#)).

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

In a year, Zimbabwe can experience a wide range of extreme weather events including droughts and dry spells, flooding, the impact of tropical cyclones, thunderstorms, hail, ground frost, and heatwaves ([Zambuko and Zimbabwe Meteorological Services Department](#)). Indeed, the IFRC Go-Platform has recorded 38 emergency operations for Zimbabwe since 1982, mainly for droughts and food insecurity as well as floods ([IFRC 2020](#)).

- The impacts of droughts in Zimbabwe have been extensively researched, in particular given strong coupling between the success of the country's agricultural system and

rainfall, and the ensuing vulnerability of this sector to dry spells and droughts ([UNDP](#)). Many droughts have been recorded, varying in intensity and spatial extent as well as impact. Notably, in the country's Third Communication, important droughts are listed as having occurred in 1915-16, 1921-22, 1923-24, 1946-47, 1967-68, 1972-73, 1982-83, 1986-87, 1991-92, 1994-95, 2002-03, 2015-16, most recently in 2018-19 ([Republic of Zimbabwe 2016](#), [Frischen et al. 2020](#)). These droughts can span multiple years and have affected the whole country but especially the south-western provinces ([Frischen et al. 2020](#)). At smaller timescales, dry spells as well can have significant impact, particularly if they occur at key moments in the agricultural calendar such as the beginning of the planting or during the growing season.

- Additionally, Zimbabwe experiences the impact of tropical cyclones from the Indian Ocean that can make landfall from December to March but with peak risk in February (see below) ([Republic of Zimbabwe 2016](#)). These events can have opposite effects on the climate of Zimbabwe, depending on their strength, position, and how close they are to the country when they make landfall. For instance, they can create extended dry spells at the end of December or bring heavy precipitation events which cause severe flooding ([Dube 2012](#), [Republic of Zimbabwe 2016](#)). For example, in February 2000, cyclone Eline brought intense precipitation events which caused severe flooding, affected over 250,000 farmers, caused 96,000 people to need emergency assistance, and 217,900 who would need support in the medium to long term ([FAO 2000](#)). More recently, initial assessments of cyclone Idai in March 2019 by the IFRC calculated that the flooding caused killed over 138 people, displaced more than 4,300, and affected over 12,719 ([IFRC 2019](#)).
- Finally, Zimbabwe feels the effect of ENSO. Generally, in El Nino years, the country receives below average rainfall while, in La Nina years, rainfall is above average ([Republic of Zimbabwe 2016](#), [Brazier 2018](#)). However, there are exceptions to these as well as spatial variations which must be taken into account and would require further analysis.

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

The impacts of climate change and variability have been recorded and studied in recent years in Zimbabwe. It is interesting to note here that the country's five agro-ecological zones mentioned above have even been reclassified in recent years, with the zones themselves staying the same but their boundaries overall area changing to account for increased rainfall variability (see [Mugandi et al. 2012](#), [Brazier 2018](#)).

3.1 Observed Changes

- Records show clear trends of increasing temperatures over Zimbabwe; since 1900, temperatures have risen by 0.4°C over the country ([Brazier 2018](#)). There are also

distinctive patterns of seasonal warming. Temperature increases have been most obvious in the dry seasons ([Brazier 2018](#)). For example, the record shows that the warmest winters (May-June-July) on record occurred after 1990 while the coldest ones occurred before the 1980s. 2005 was the warmest year on record and 1978 the coldest ([Republic of Zimbabwe 2016](#)). Additionally, maximum and minimum surface air temperatures have increased, and there has been a notable increase in the number of hot days and nights and a decrease in the number of cold days and nights ([Zimbabwe 2015](#), [Republic of Zimbabwe 2016](#)).

- There is less of a clear trend of changing precipitation patterns than there is for temperature. Nevertheless, records seem to show modest to significant changes in precipitation patterns over the last few decades, and a slight decrease of total rainfall ([Zimbabwe 2015](#), [Girvetz et al. 2018](#)). Data reported in the Third Communication to the UNFCCC shows shifts in seasonal patterns since the 1960s, with later onsets of the rainy season in all of the country's agro ecological zones; the intensity of extreme rainfall events have also increased ([Republic of Zimbabwe 2016](#)). Finally, in the last 50 years, there have been longer series of wetter than average years which have been interspersed with years of higher than average rainfall deficits ([Republic of Zimbabwe 2016](#)).

3.2. Projected Changes

- Temperatures are projected to continue increasing under all emission scenarios through the century. National projections of average monthly temperatures show a warming around 2°C by 2080 ([Zimbabwe 2015](#)). Other climate models project increased temperatures of up to 4°C by 2100 ([Brazier 2018](#)). For example, projections of this trend are given in analysis provided for the district of Nkayi in the northwest, where temperatures are projected to increase by 2-3°C by 2050 and 2-5°C by 2100 (Masikati et al. 2015).
- Many climate models project a general decrease of precipitation under many different emission scenarios but with a wide range of uncertainty ([Sibanda et al. 2020](#)). For instance, analysis reported by Brazier (2018) shows a decrease in annual rainfall between 5% and 18% over the country, particularly significant in the south and west. However, some models also project that the northern and eastern regions may even see small increases in rainfall before the end of the century ([Brazier 2018](#), [Republic of Zimbabwe 2016](#)). Rainfall is projected to be more variable and erratic as well ([Brazier 2018](#)). Rainy season onset dates are also projected to be later or more irregular, and dry periods more frequent and longer ([Brazier 2018](#), [Republic of Zimbabwe 2016](#)).
- Net primary productivity is projected to decrease due to increased temperatures and rainfall variability ([Zimbabwe 2015](#)). The risk of failed growing seasons due to drought is projected to increase; the probability of this occurring is projected to be as high as 100%

in certain regions, particularly in the south ([Zimbabwe 2015](#), [Republic of Zimbabwe 2016](#)). Maize yields are also projected to decrease by 30% by 2030 in some models, such as the one presented by the government of Zimbabwe in its NDC.

References

- Bradley, K., Ingham, K., et al. (2020). Zimbabwe. *Encyclopædia Britannica*. <https://www.britannica.com/place/Zimbabwe>
- Brazier, A. (2017). Climate change in Zimbabwe. A guide for planners and decision-makers. *Konrad-Adenauer-Stiftung, Harare, Zimbabwe*.
- Dube, G. (2012). Dry Spell Caused by Tropical Cyclone Funso Devastates Zimbabwe Crops *VOA*. <https://www.voazimbabwe.com/a/tropical-cyclone-funso-dry-spell-devastates-zimbabwe-crops-138502124/1456868.html>
- FAO. (2000). Assessment of the Impact of Cyclone Eline (February 2000) on the Food, Agriculture and Natural Resource Sector in Zimbabwe. <https://fews.net/sites/default/files/documents/reports/1000050.pdf>
- Frischen, J., Meza, I., Rupp, D., Wietler, K., & Hagenlocher, M. (2020). Drought Risk to Agricultural Systems in Zimbabwe: A Spatial Analysis of Hazard, Exposure, and Vulnerability. *Sustainability*, *12*(3), 752. <https://pdfs.semanticscholar.org/00df/5d00846c655355579170e86f490dcc4b88c3.pdf>
- Girvetz, E., Ramirez-Villegas, J., Claessens, L., Lamanna, C., Navarro-Racines, C., Nowak, A., ... & Rosenstock, T. S. (2019). Future climate projections in Africa: where are we headed?. In *The climate-smart agriculture papers* (pp. 15-27). Springer, Cham.
- IFRC. (2019). Zimbabwe - Cyclone Idai. <https://go.ifrc.org/emergencies/3485#details>
- IFRC. (2020). All Zimbabwe Emergencies. *Go*. <https://go.ifrc.org/emergencies/all?country=13>
- Masikati, P., Descheemaeker, K., & Crespo, O. (2019). Understanding the Role of Soils and Management on Crops in the Face of Climate Uncertainty in Zimbabwe: A Sensitivity Analysis. In *The Climate-Smart Agriculture Papers* (pp. 49-64). Springer, Cham.
- Mugandani, R., Wuta, M., Makarau, A., & Chipindu, B. (2012). Re-classification of agro-ecological regions of Zimbabwe in conformity with climate variability and change. *African Crop Science Journal*, *20*, 361-369.
- Republic of Zimbabwe (2016). Zimbabwe Third National Communication to the United Nations Framework Convention on Climate Change. <https://unfccc.int/sites/default/files/resource/zwenc3.pdf>
- Sibanda, S., Grab, S. W., & Ahmed, F. (2020). An evaluation of the CORDEX regional climate models in simulating future rainfall and extreme events over Mzingwane catchment, Zimbabwe. *Theoretical and Applied Climatology*, *140*(1), 91-100.
- UNDP. (2020). Zimbabwe. *Climate Change Adaptation*. <https://www.adaptation-undp.org/explore/eastern-africa/zimbabwe>

Zambuko, C. (2011). Climate Issues and Facts: Zimbabwe. *Zimbabwe Meteorological Services Department*.
https://www.itu.int/en/ITU-D/Emergency-Telecommunications/Documents/Zimbabwe_2011/Climate%20Issues%20and%20Facts-%20Zimbabwe%20-%20Dept%20of%20Met.pdf

Zimbabwe. (2015). Zimbabwe's Intended Nationally Determined Contribution (INDC) Submitted to the United Nations Framework Convention on Climate Change (UNFCCC).
<https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Zimbabwe%20First/Zimbabwe%20First%20NDC.pdf>