

Climate Profiles of Countries in Southern Africa: Malawi

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The following climate factsheet⁵ provides an overview of the climate of Malawi, 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 Malawi, and what are the climate zones?

Malawi has a generally mild subtropical climate ([Jury 2014](#)). There is a great amount of spatial and geographic variation within this, particularly driven by elevation, and the country can be subdivided into three separate climatic zones: the semi-arid Shire Valley and the Lakeshore Plain, the Medium Altitude Plateaus which are semi-arid to sub-humid, and the sub-humid High Altitude Plateaus and hills.

Malawi sees a wide range of average temperatures. On an annual scale, Temperatures are highest in the Shire Valley that sees daily averages around 25-26°C ([MRREE 2011](#)). Average temperatures are lowest in the high elevation portions of the country, especially in the Nyika, Viphya, Dedza, Mulanje and Zomba plateaus, Misuki Hills and the Kirk Range ([MRREE 2011](#)). Mean daily temperatures in the valley are of 38°C ([Jury 2014](#)), while Dedza, a town in the centre of Malawi and at elevation of 1,500m, has mean daily temperatures between 10 and 20°C throughout the year ([Kadzamira et al. 2020](#)). Precipitation is highest in the northern highlands of the country and in the Mulanje Massif in the south, both regions which can receive over 2'300 mm of rain in a year ([Kadzamira et al. 2020](#)). Generally speaking, 95% of precipitation falls during the summer rainy season which stretches from November to April ([MetMalawi](#)).

1.1. How does precipitation vary throughout the year?

The months of January and February are the months of most precipitation, when daily average humidity is around 87% ([MetMalawi](#)). There is a high degree of inter- and intra-seasonal

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variability in precipitation amounts and patterns in Malawi. This is notably driven by elevation as well as the annual migrations of the InterTropical Convergence Zone (ITCZ) and the Congo Air Mass/Zaire Air Boundary. In the Shire River valley, mean rainfall falls around 2-3 mm per day, at 500 and 1000 m in elevation respectively ([Jury 2014](#)). Relative humidity throughout the country ranges between 50% in September/October and 87% in January/February ([MRREE 2011](#)).

1.2. How does temperature vary throughout the year?

October and early November are the warmest months, with mean monthly temperatures between 25 and 37°C and low average humidity, around 50% ([MetMalawi](#) ; [MRREE, 2011](#)). The winter is the country's cooler dry season, generally from May to October; the coldest months are from May to July when mean daily temperatures fall between 17 and 27°C. June and July are the coldest months, when frost can occur, particularly in the high elevation areas such as the Nyika Plateau in the northern part of the country ([MetMalawi](#), [MRREE 2011](#)).

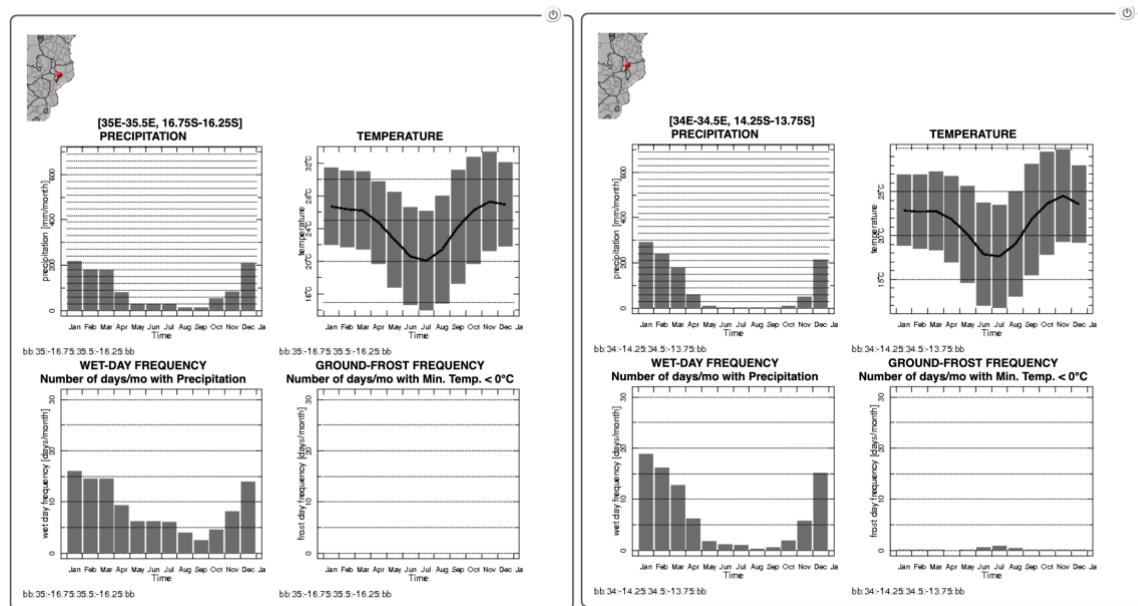


Figure 1. Climate Statistics for Southern Malawi (Shire River basin) (1a) and Central Malawi (Central Plateau) (1b).

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

In Malawi, riverine and flash floods and severe droughts are among the most common extreme weather events. In their second communication to the UNFCCC, the Government of Malawi highlights that, between 1970 and 2008, Malawi has experienced over 40 weather-related

disasters; 40% of these were recorded between 1990 and 2008 ([MRREE 2011](#)). It is interesting to note that the same document also mentions the experience of compound disasters linked to floods and droughts occurring in the same or alternate years ([MRREE 2011](#)).

- The [IFRC Go-Platform](#) has a record of severe floods in 1989, 2000, 2001, 2006 2007, 2012, 2013, 2015, 2017, and 2019. In 2019, for instance, over 840,000 people were impacted, 577 died, and 94,000 were displaced ([IFRC 2019](#)).
- Dry spells and droughts are also a major concern, causing crop failure and widespread food insecurity. In their second communication, the Government of Malawi notes a total of five severe droughts (lasting more than a year) between 1946 and 2008, twice over the whole country and three times in specific districts ([Pauw et al. 2010](#)). Shorter droughts have also significant impact and are more frequent; these were recorded in 1986/87, 1993/94, 1996/97, 1997/98, 2001/02, 2004/05, 2005/06 and 2007/08 ([MRREE 2011](#), [Pauw et al. 2010](#)). This phenomena has a severe impact on Malawi's agricultural sector; for instance, the 2001-2002 drought led to a crop deficit of over 300,000 tonnes ([MRREE 2011](#)). A highly severe drought in 2017 affected over 6.5 million people throughout Malawi, linked to El Nino ([IFRC 2017](#)).
- Dry spells and droughts have a significant impact on the water levels of Lake Malawi which is a central feature of the country (and region's) water security. Negative fluctuations in the level of the lake can then cause rivers to run dry, and have been linked to cholera outbreaks and other water-scarcity related disasters.
- Finally, cyclones are a relatively rare but high impact event; the country experienced seven between 1946 and 2008 ([MRREE 2011](#)). In 2020, cyclone Idai tore through Malawi, killing hundreds and leaving thousands homeless notably due to the high winds and flooding it caused.

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

Climate change poses a threat to Malawi's infrastructure, food and economic security, and livelihoods more broadly. Some impacts are already being felt and projections show that certain impacts will worsen in the years to come. Malawi has been described as highly vulnerable to these shocks and long-term changes , particularly due to the high poverty levels and predominantly rain-fed agriculture sector ([Warnatzsch and Reay 2019](#)).

3.1. Observed changes

- Observations taken between 1961 and 2005 indicate increases in precipitation in the summer months, averaging above 225mm at the peak in January. However, the same record shows significant decreases in precipitation amounts during the winter, averaging

less than 12 mm per month from June to September. Overall, precipitation has slightly been increasing every decade, with annual precipitation averaging 1140.8 mm in 1961–1970 and 1042.4 mm in 1991–2000 – however, there is a great amount of intra-annual variation within this ([Warnatzsch and Reay 2019](#)). There have also been increases in drought signals, using standard-precipitation indices between 1971 and 2000 ([Warnatzsch and Reay 2019](#)).

- There is clear evidence of changes in average temperatures; temperatures have generally increased, despite a small decrease between 2000 and 2006 ([MRREE 2011](#)). Generally, temperatures have risen from 0.03°C every year between 1961 and 2005. A change has also been visible on a decadal time scale pushing the national daily average of 22°C from 1961 to 1970 to 22.6°C in the 1991 and 2000 period ([Warnatzsch and Reay 2019](#)).
- Finally, increasing levels of Lake Malawi have been noted since 2010, but at slower rates than in the late 1990S when the rates of decreased levels were the highest ([Mulumpwa et al. 2018](#))

3.2. Projected changes

- Climate projections by the Government of Malawi using general circulation models show a general trend of decreasing mean monthly rainfall throughout the country. Particularly in the summer growing season, a decrease of between 0.7 and 4.8 % between 2010 and 2075 has occurred. In particular, lower than average rainfall is projected to be felt more severely in the Shire Valley (a decrease by 4.8%) and in eastern and southern Malawi, with little change in the northern region of the country ([MRREE 2011](#)). However, in their analysis of GCMs over Malawi, Warnatzsch and Reay ([2019](#)) underscore a high level of uncertainty and contradictions between different models and methodologies to project rainfall in the country, which pose a cautionary tale for the interpretation of the data to project trends.
- Temperatures are also projected to continue increasing throughout the century, with mean national temperatures are projected to increase by 2.7°C by 2075 ([MRREE 2011](#)). Warmer winters, hotter summers, and higher annual temperatures are expected. Additionally, between 2010 and 2075, the projections done by the Government of Malawi show that average growing-season temperatures will increase between 2010 and 2075, particularly in the Ngabu and Bvumbwe regions in the south of the country ([MRREE 2011](#)).

References

- IFRC. (2017). In Pictures: Malawi drought affects 6.5 million people. <https://www.ifrc.org/en/news-and-media/news-stories/africa/malawi/in-pictures-malawi-drought-affects-65-million-people/>
- IFRC. (2020). All Malawi Emergencies. *Go*. <https://go.ifrc.org/emergencies/all?country=110>
- Jury, M. R. (2014). Malawi's shire river fluctuations and climate. *Journal of Hydrometeorology*, 15(5), 2039-2049.
- Kadzamira, O.J., Mitchell, J.C., et al. (2020). Malawi. *Encyclopædia Britannica*.
<https://www.britannica.com/place/Malawi>
- MetMalawi (n.d.). Climate of Malawi. <https://www.metmalawi.com/climate/climate.php>
- MREE. (2011). The Second National Communication of the Republic of Malawi to the Conference of the Parties (COP) of the United Nations Framework Convention on Climate Change (UNFCCC).
<https://unfccc.int/sites/default/files/resource/mwinc2.pdf>
- Mulumpwa, M. C., Wilson, J., Mathews, L., & Austin, M. (2019). Modelling and forecasting Lake Malawi water level fluctuations using stochastic models. *African Journal of Rural Development*, 3(3), 831-841.
- Pauw, K., Thurlow, J., van Seventer, D., (2010). Droughts and floods in Malawi. *International Food Policy Research Institute*. <https://www.ifpri.org/publication/droughts-and-floods-malawi>
- Warnatzsch, E. A., & Reay, D. S. (2019). Temperature and precipitation change in Malawi: Evaluation of CORDEX-Africa climate simulations for climate change impact assessments and adaptation planning. *Science of The Total Environment*, 654, 378-392.