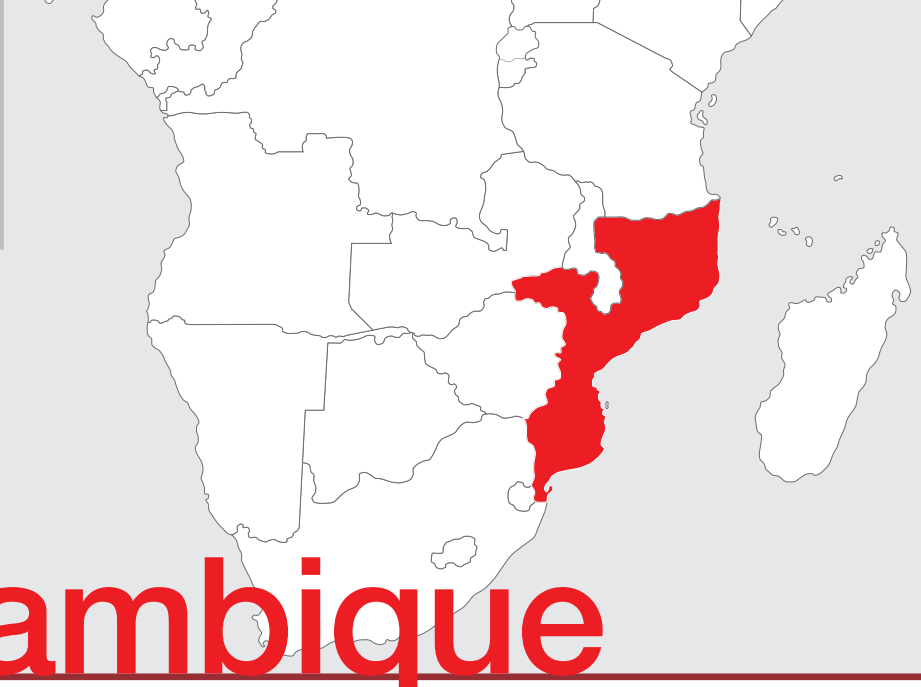
Climate Centre

Climate fact sheet | 2024



Mozambique

This climate fact sheet summarizes the available information on the climate of Mozambique and the impact of climate change on humanitarian activities in-country. Each fact sheet in the series was written using information from peer-reviewed academic papers, government publications, and other documentation from international non-governmental organizations.

1. Climate overview

Average annual temperature: The south of the country experiences a typical temperature of 24–26°C in the summer and 20-22°C in winter. The coastal, northern and central interior regions in the Zambezi Valley generally experience higher average temperatures, around 25–27°C in summer and 20-23°C in winter (World Bank, 2021).

Average annual rainfall: Total rainfall for the country averages 1,800mm per year near the Zambezi delta to less than 300mm per year in the lowlands of the southern interior.The inland high-altitude regions in the north and central regions receive around 1,000mm, whereas the inland central and south areas receive about 600mm (World Bank, 2021; USAID, 2018).

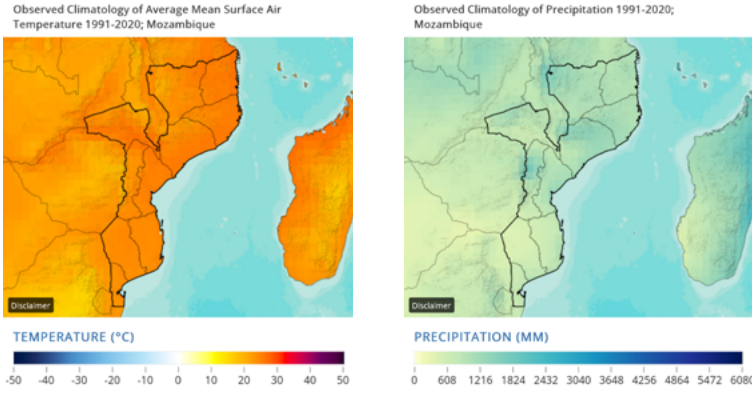


Figure 1. Observed climatology of (left to right) mean temperature and annual mean total precipitation between 1991–2020. (from World Bank, 2022).

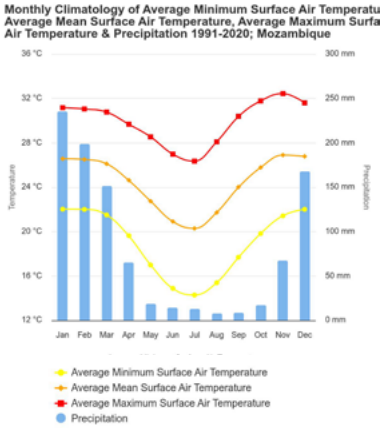


Figure 2. Observed average monthly climatology between 1991–2020 (from World Bank, 2022).

Short overview

Mozambique's climate ranges from tropical and subtropical in the north, centre and coastal areas to semiarid steppe in the south. Its climate is also modified by its elevation. The country has two main seasons, a wet season during austral summer and a dry season during winter. The rainy season begins in November and can last until April or May. Most of the precipitation falls in these summer months, with peaks in January and February. Come the end of the rainy season, relative humidity falls, and the dry summer begins. Precipitation is low from June to August.

The period between October and March is generally the warmest. Temperatures dip at the end of the rainy season, and June and July are the coolest months of the year. In addition to the Intertropical Convergence Zone (ITCZ), rainfall in Mozambique is influenced by the El Niño–Southern Oscillation (ENSO). ENSO creates irregular periodic variation in the temperature as well as sea surface temperature, thus influencing year-to-year variability and extreme weather events such as droughts, floods and heatwaves. Drier than normal rainfall is generally associated with the El Niño (warm) phase of ENSO, while the La Niña (cold) phase of ENSO is associated with wetter than normal conditions.

The diverse and varied geography of Mozambique means that it is exposed to a broad array of environmental hazards (hydrometeorological as well as geophysical), which are directly impacted and exacerbated by the impacts of climate change across the country. Mozambique is a high-risk country for humanitarian crises and disasters, ranked 9th out of 191 countries by the 2022 Inform Risk Index (DRMKC, 2022).

1.2 Climate change in Mozambique

Historical climate change	Projected climate change
Temperature	
▪ The mean annual temperature over Mozambique has increased at a rate of approximately 0.2°C/ decade in 1961–2015 (Gutiérrez *et al.*, 2021). ▪ The frequency and intensity of hot extremes have increased, and cold extremes have decreased (Seneviratne *et al.*, 2021).	▪ Mean temperatures over the region are projected to rise until 2050 by at least 2–2.5°C for a high greenhouse gas concentration scenario (SSP5–8.5) and 1.5–2°C for a low greenhouse gas concentration scenario (SSP2–4.5) (Gutiérrez *et al.*, 2021). ▪ Maximum and minimum temperatures will increase, and heatwaves will intensify in duration and peak temperatures for every increase in global warming levels above the pre-industrial values. In line with rising mean annual temperatures, the annual number of very hot days (days with daily maximum temperature above 35°C) is projected to rise and with high certainty (Gutiérrez *et al.*, 2021; Ranasinghe *et al.*, 2021; Seneviratne *et al.*, 2021)
Precipitation	
▪ On average, precipitation has declined slightly since the 1960s, an average of 2.5mm per month every decade. However, the number of days with heavy rainfall events has also increased by approximately 25 days a year (World Bank, 2022).	▪ Mid-century (2040–2060) estimates of annual precipitation changes over Mozambique indicate a reduction dominated by natural variability (Gutiérrez *et al.*, 2021). ▪ The frequency and intensity of heavy precipitation events are projected to increase with potential effects of flooding and soil erosion (Seneviratne *et al.*, 2021). ▪ There are projected increases in average tropical cyclone wind speeds, associated heavy precipitation and the proportion of category 4–5 tropical cyclones (Seneviratne *et al.*, 2021). ▪ There is also a projected increase in meteorological droughts (Seneviratne *et al.*, 2021).

2. Priorities of the Red Cross Red Crescent Movement under climate change

2.1 Scale up climate-smart disaster risk reduction (DRR), early action and preparedness

Existing hydrometeorological hazard	Projected risks
Floods	
Along with flooding caused by cyclones and other high precipitation events, Mozambique is also vulnerable to weather that occurs in neighbouring countries which causes flooding downstream in the nine major river systems which drain in Mozambique. In particular, the central and southern regions of the country are more prone to severe floods (Government of Mozambique, 2003). Floods generally occur in the region's rainy season, with peak risk in January and February. For instance, in February and March 2000, the country saw its worst flood period in 50 years, caused by high precipitation through these cross-boundary river catchments – an event which killed over 800 people and displaced 540,000 (World Bank, 2010). In 2000–2015, floods affected over 4.6 million people, caused 1,204 deaths and damaged over one million homes (Government of Mozambique, 2015).	Heavy rainfall during the wet season is projected to be more intense because of the warmer atmosphere. Increases in the intensity and frequency of heavy precipitation is predicted to cause flooding and soil erosion (Gutiérrez *et al.*, 2021a, 2021b; Seneviratne *et al.*, 2021).
Droughts	
Droughts are the country's most frequent disasters, contributing to an estimated 4,000 deaths in 1980–2000 (World Bank, 2022). These are especially common in the centre and south of the country where the return periods of officially declared droughts are 4–10 years in the central region and 7–10 years in the south (World Bank, 2010). In Mozambique, droughts can be long-lasting, regularly spanning 3–4 years (Government of Mozambique, 2003). Floods can compound the impacts of drought years, notably on agricultural production. For instance, in the country's Nationally Determined Contribution (NDC), it is reported that droughts and floods in 2012–2013 caused a yield loss of over 216,745 hectares (ha) (Government of Mozambique, 2015).	Droughts in the central and southern regions will likely increase in frequency and intensity. It is difficult to project any statistically significant changes in rainfall total, however delayed onset and offset dates of the rainy season may be more frequent, particularly in the north (Seneviratne *et al.*, 2021).

Existing hydrometeorological hazard	Projected risks
Cyclones	
The cyclone season in the West Indian Ocean is from November to April. An average of 3–4 tropical cyclones impact Mozambique annually, causing significant impacts to lives, livelihoods and infrastructure. In 2019, Cyclone Dineo destroyed approximately 30,000 ha of crops in Mozambique and displaced over 100,000 people in southern areas (Zambezian, 2017). Most recently, in March and April 2019, Cyclones Idai and Kenneth left over 2.2 million people in need of urgent assistance and killed hundreds more (OCHA, 2019). The impacts of Idai and Kenneth were long-lasting; in its sixth operations update of September 2020, the IFRC calculated that its response to the cyclone had assisted over 407,372 people and recovery efforts were ongoing (IFRC, 2020). The coastline of Mozambique is most frequently exposed to cyclones between October to April, especially in the areas between Pemba (Cabo Delgado) and Angoche (Zambezia) along with the southern areas of Sofala Province and the northern Inhambane Province. The number of tropical cyclones impacting Mozambique has increased since the 1960s (Government of Mozambique, 2015).	There are projected increases in average tropical cyclone wind speeds, associated heavy precipitation and the proportion of category 4–5 tropical cyclones (Seneviratne *et al.*, 2021).

It is important to note that many of these hazards are interrelated and produce compound risks in the same areas and communities. In addition, risk must be understood as the interplay between hazard, exposure and vulnerability which makes certain individuals, communities and sectors more impacted by the hazards. All project design should take such compounding risks into account.

Disaster risk management strategies

Mozambique's National Institute of Disaster Management (INGD) is responsible for coordinating disaster risk management (DRM) activities in the country. The INGD works closely with the National Institute of Meteorology (INAM) and the Directorate for Water Resource Management to provide early warning systems and effective disaster risk responses. DRR has been embedded in national priorities since 2000 and the country has taken a proactive approach to reduce the vulnerabilities of local communities, the economy and infrastructure to extreme events.

Disaster risk management law and policies

- Law 15/2014 Establishing the Framework for Disaster Management, Including Prevention and Mitigation. Serves as the framework for DRR and prepares the country to mitigate and respond to the impacts of climate change.
- The National Strategy for Adaptation and Mitigation of Climate Change (ENAMMC) (2013-2025). Aims to establish guidelines for building resilience to the impacts of climate change, including the reduction of climate risks and promoting the development of a low carbon and green economy.
- The Master Plan for Disaster Risk Reduction (2017-2030). Aims to align the country's DRR work with the Sendai Framework for Disaster Risk Reduction and respond to the provisions of Law No. 15/2014 to establish a legal regime for the management of disasters and climate change in Mozambique.

2.2 Reduce health impacts of climate change

The increased frequency and intensity of cyclones, floods and droughts, temperature rise and changing precipitation patterns increase disease prevalence, injuries and loss of life in Mozambique (Hervey and Blythe, 2013). In addition, floods, cyclones and droughts lead to loss of crop yields, destruction of health infrastructure and contamination of water sources, causing significant health risks (Clim-Health Africa, 2018). Poor adaptive capacity of the health system, widespread poverty and overstretched public services and infrastructure make Mozambique especially vulnerable to health-related impacts caused by climate change (WHO, 2018).

With the rising temperatures, vector-borne diseases – especially malaria – are expected to increase and move south towards previously unsuitable regions. New infectious diseases, such as Rift Valley fever and Zika, are being detected. Climate-sensitive diseases such as malaria, cholera and diarrhoeal disease are likely to increase (Clim-Health Africa, 2018).

Other climatic risks that will affect health and wellbeing include malnutrition and hunger due to declines in crop yields and reduced water quality in the coastal areas due to sea level rise and saltwater intrusion (Manuel *et al.*, 2020). Lastly, climate change impacts also add to existing health burdens. For example, it may be challenging for people living with HIV/AIDS to cope with the additional health and other risks posed by climate change impacts (UNAIDS, 2023).

2.3 Ensure sustainable water supplies

Water, Sanitation and Hygiene (WASH)

Cyclones and floods pose a threat to water infrastructure and water quality as well as secondary impacts to WASH facilities in Mozambique.

Higher temperatures and droughts due to climate change are also expected to increase evaporation rates and cause low groundwater recharge rates. These outcomes will lead to water shortages, especially in the drier southern parts of the country. In addition, droughts lead to reduced water quality; while along coastal areas, saline intrusion will further jeopardize water quality and affect WASH infrastructure with the greatest impacts felt by the poor (CDKN Global, 2017).

Infrastructure and electricity

Climate change-induced weather events will cause damage to power infrastructure as droughts reduce the available surface water and, as a result, the hydropower generation potential in Mozambique. Despite this risk, to fulfil increased demand for electricity, several large and many small hydropower plant projects are planned and they do not include climate risks in feasibility studies (Uamusse *et al.*, 2020).

2.4 Enable climate-resilient livelihoods and economic security

Most communities in Mozambique, especially those in rural areas, depend on natural resources and the environment for their livelihood activities and assets. Over 80 per cent of the population is employed in a primarily rainfed agricultural sector, the majority being subsistence farmers (USAID, 2017; Manuel *et al.*, 2021).

In contexts such as Mozambique, women bear a disproportionate burden of climate change-related livelihood losses as men tend to migrate to other countries and metropolitan areas in search of better jobs (Ribeiro & Chaúque, 2010). In addition, an increased prevalence of tropical cyclones and intense rainfall events, with associated flooding, are expected to cause damage to agricultural infrastructure and crops (Manuel *et al.*, 2021). For example, in the first quarter of 2022, 91,177ha of crops were lost due to Cyclone Gombe, with negative consequences for food security and livelihoods (OCHA, 2022). Droughts and declining reliability of rainfall will also cause productivity declines, especially in the semiarid regions of the country (Hunter *et al.*, 2020).

Consequently, major crops such as maize, soya beans, sorghum and groundnuts will experience yield losses of between 17–25 per cent (Manuel *et al.*, 2020; Ministry of the Foreign Affairs of the Netherlands, 2018). Though more resilient than crops, livestock farming will also be impacted during drought events (Hunter *et al.*, 2020). Moreover, animal parasites and diseases may increase due to climate change (USAID, 2021b).

The forest and fisheries sub-sectors are not spared from climate change impacts. Warming temperatures and droughts affect forest ecosystems through species loss and increasing vulnerability to forest fires (Irish Aid, 2018). Even the highly productive mangrove ecosystems in the coastal areas are threatened by climate hazards and coastal erosion (Charrua *et al.*, 2020). Yet, forestry sustains the livelihoods of about 12 million Mozambicans, providing them with essential goods and services such as timber and medicinal and edible plants (*ibid*). In the fisheries sub-sector, drought-induced water declines in rivers and lakes and temperature increases are expected to cause the greatest impact (von Hardenberg *et al.*, 2022). Here, marine heatwaves are becoming intense and longer in the biodiversity-rich Mozambican channel, negatively affecting people's livelihoods and the economy (Mawren *et al.*, 2022).

Finally, cyclones and floods inundate and destroy vital infrastructure, affecting livelihoods (UN-Habitat). For example, in March 2022, Cyclone Gombe damaged 41,587 houses, 69 health centres, 1,458 classrooms, 2,748 electricity poles and 12 water systems (OCHA, 2022), affecting over 736,000 people, including internally displaced persons and refugees (UNHCR, 2022b).

2.5 Address climate displacement and protection

Current and future displacement challenges

Mozambique is currently experiencing climate-induced migration in the south of the country while concurrently experiencing conflict-induced migration in the northern Cabo Delgado province. For over five years, northem Mozambique has been experiencing attacks by non-state armed groups causing large-scale displacement in a region already impacted by extreme poverty (IOM, 2023). In 2021, 187,000 people were internally displaced due to the conflict, although 50,000 also returned home when security conditions improved (IDMC, 2022). Storms and floods account for most climate-induced displacements, with around 44,000 people displaced due to them in 2021 (*ibid*).

An increase in out-migration from urban coastal areas is projected due to sea level rise and as storms and flooding increase in frequency and severity (Oppenheimer *et al.*, 2019). Mozambique has a 2,470 km-long coastline which is home to 60 per cent of the population and hosts important ecosystems such as coral reefs, mangroves and seagrass. These systems are threatened by rising ocean temperatures, ocean acidification, sea level rise and saltwater intrusion. High coastal erosion is also an issue, 90 per cent of which can be attributed to climate change impacts. It is estimated that 4,850 km^2 of land could be lost to sea level rise by 2040. The total damage to transportation and infrastructure caused by the effects of climate change is estimated at 103 million US dollars per year by the 2040s (USAID, 2018).

People from Mozambique have been migrating due to various factors including war, natural disasters, instability and lack of economic opportunities. While the entire country is suffering from the impacts of climate change such as rising sea levels, soil salinization and natural hazards such as cyclones, the central region is particularly impacted by weather-related disasters such as droughts and heavy rains, putting hundreds of thousands of people at risk of forced migration (IOM, 2023). Similarly, other research found that rural–urban migrants in Beira attribute weather to worsening economic conditions in their places of origin (Anderson and Silva, 2020).

To minimize the need for migration, highly vulnerable cities and ports should be prioritized in adaptation efforts. Research has called for a rights-based approach to participatory adaptation planning in Maputo to support a more inclusive city (Broto *et al.*, 2015).

Government relocation efforts to address people displaced by climate events have had mixed results, with attention paid to a lack of consultation and participation with those relocated (Jacobs & Almeida, 2021).

Both flooding and drought will likely continue to cause displacement and labour migration within and outside of Mozambique. Research found an increase in male out-migration to South Africa and other countries since 2000 due to successive droughts (Ribeiro & Chaúque, 2010). Floods in central Mozambique have increased rural–urban migration and placed additional pressure on informal urban settlements (Stal, 2011).

Potential needs of migrants and displaced people

Qualitative research on rural–urban migrants in Beira, found that the majority prefer in situ adaptation over migration if enough sustainable livelihoods are available (Anderson & Silva, 2020). This suggests a need to focus on sustainable in situ adaptation options, such as strengthening local economies and diversifying livelihoods to support people who choose not to migrate.

2.6 Policy

Relevant information from the Nationally Determined Contribution (2021)

Emission target: A reduction of greenhouse gas emissions by about 40 million tCO_2eq over 2020–2025. This would translate to emissions increase of 11 per cent above 2015 levels and is not compatible with a 1.5°C pathway (Climate Analytics, 2021). The NDC focuses on agro-livestock and sustainable land use, waste management, energy security and sustainability of industries (Ministry of Land and Environment, 2021).

Area of focus on adaptation: Climate risk reduction; water resources; agriculture, fisheries, food security and nutrition; social protection; health; biodiversity; forests; and infrastructure, urban areas, other settlements and tourist and coastal zones.

Inclusion of DRR: Yes, data and measures (strengthening climate risk preparedness, response capacity and early warning, early action system) on climate risk reduction are part of the NDC.

Ministry in charge: Ministry of Land and Environment.

Key stakeholders: The Ministry of Land and Environment has introduced a National Climate Change Conference to be held every two years as a forum open to public participation on climate change issues and measures.

The Initiative for Transparency in Climate Action implemented by UNEP-DTU (UNEP's Copenhagen Climate Centre) supported on the transparency of the climate information integrated in the NDC.

Other national policies on climate

- National Strategy for Mitigation and Adaptation to Climate Change (2013-2025). Aims to 'improve the wellbeing of Mozambicans through the implementation of concrete measures for adaptation and climate risk reduction, mitigation and low-carbon development, aiming at sustainable development'.
- Mozambique has not yet submitted a National Adaptation Plan to the UNFCCC.

Climate finance

A number of climate projects are currently taking place in Mozambique, including: a Green Climate Fund (GCF) project 'Climate-resilient food security for women and men smallholders in Mozambique through integrated risk management' (GCF, 2022); the United Nations Development Programme (UNDP) project 'Scaling up local adaptation and climate-risk informed planning for resilient livelihoods' (UNDP, 2022); and the World Health Organization (WHO) project 'Strengthening the resilience of the Mozambique health system to climate change impacts' (WHO, 2018).

National Societies cannot apply directly for climate finance from the GCF, but they can be an implementing partner for an accredited entity (Climate Centre, 2022a).

National Societies can explore options for accessing climate funds through smaller funds, such as the GEF's Small Grants Programme or the FFEM's Small Scale Initiatives Program. Other funding from bilateral donors, national climate funds, or multilateral climate funds like the Adaptation Fund, CREWS, or GCCA+ could be explored (Climate Centre, 2022a).

Engaging in national climate adaptation planning is vital for accessing climate finance.

Additional resources

Climate Centre. (2022a). *Fact sheet on climate finance.* Red Cross Red Crescent Climate Centre. https://www.climatecentre.org/wp-content/uploads/Fact-Sheet-on-Climate-Finance.pdf

Climate Centre. (2022b). *Entry points for National Societies on climate finance partnerships.* Red Cross Red Crescent Climate Centre. https://www.climatecentre.org/wp-content/uploads/Entry-Points-for-Climate-Finance-Partnerships.pdf

References

Anderson, K.J. & Silva, J.A. (2020). Weather-related influences on rural-to-urban migration: A spectrum of attribution in Beira, Mozambique. *Global Environmental Change*, 65, p.102193. https://doi.org/10.1016/j.gloenvcha.2020.102193.

Broto, V.C., Boyd, E. & Ensor, J. (2015). Participatory urban planning for climate change adaptation in coastal cities: lessons from a pilot experience in Maputo, Mozambique. *Current Opinion in Environmental Sustainability*, 13, pp.11–18. https://doi.org/10.1016/j.cosust.2014.12.005.

Climate Analytics. (2021). *What is Mozambique's pathway to limit global warming to 1.5°C?* https://1p5ndc-pathways.climateanalytics.org/countries/mozambique/ambition-gap/#fn10

Clim-Health Africa. (2018). *Mozambique's Climate, Environment and Health Observatory: The first in Sub-Saharan Africa.* https://climhealthafrica.org/news-mozambique-climate-and-health-observatory/

DRMKC. (2022). *INFORM Index for Risk Management: Mozambique country profile.* Disaster Risk Management Knowledge Centre. https://drmkc.jrc.ec.europa.eu/inform-index/INFORM-Risk/Country-Risk-Profile

GCF. (2022). *Climate-resilient food security for women and men smallholders in Mozambique through integrated risk management*. Green Climate Fund. https://www.greenclimate.fund/project/sap011

Government of Mozambique. (2015). *Intended Nationally Determined Contribution of Mozambique to the United Nations Framework Convention on Climate Change*. https://www4.unfccc.int/sites/submissions/INDC/Published%20Documents/Mozambique/1/MOZ_INDC_Final_Version.pdf

Government of Mozambique. (2003). *Mozambique Initial National Communication Under UN Framework Convention on Climate Change*. https://unfccc.int/sites/default/files/resource/Mozambique%20INC.pdf

Gutiérrez, J.M., Jones, R.G., Narisma, G.T., Alves, L. M., Amjad, M., Gorodetskaya, I.V, Grose, M., Klutse, N.A.B., Krakovska, S., Li, J., Martínez-Castro, D., Mearns, L. O., Mernild, S.H., Ngo-Duc, T., van den Hurk, B., & Yoon, J.-H. (2021). 'Interactive Atlas', in *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, eds. V. Masson-Delmotte, P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, *et al.* (Cambridge University Press). http://interactive-atlas.ipcc.ch/

Hervey A. & Blythe J. (2013). Reducing Climate Change Vulnerability in Mozambique: *From Policy to Practice*. https://researchonline-uat.jcu.edu.au/34795/

IDMC. (2022). *Country profile: Mozambique.* Internal Displacement Monitoring Centre. https://www.internal-displacement.org/countries/mozambique

IFRC. (2020). *Mozambique: Tropical Cyclones Idai and Kenneth – Emergency Appeal n°MDRMZ014 Operation Update n°6.* International Federation of Red Cross and Red Crescent Societies. https://reliefweb.int/report/mozambique/mozambique-tropical-cyclones-idai-and-kennethemergency-appeal-n-mdrmz014-3

IOM. (2023). *Mozambique Crisis Response Plan 2023*. International Organization for Migration: UN Migration. https://crisisresponse.iom.int/response/mozambique-crisis-response-plan-2023

Jacobs, C., & Almeida, B. (2021). 'Government-led resettlement after natural disasters as a durable solution? The case of Cyclone Idai', *Refugee Survey Quarterly*, 40(2), 239–247. https://academic.oup.com/rsq/article/40/2/239/6048241

Manuel, L., Chiziane, O., Mandhlate, G., Hartley F. & Tostao E. (2021) Impact of climate change on the agriculture sector and household welfare in Mozambique: an analysis based on a dynamic computable general equilibrium model. *Climatic Change* 167 (6). https://doi.org/10.1007/s10584-021-03139-4

Manuel L., Tostão E., Vilanculos O., Mandlhate G., & Hartley F. (2020). Economic implications of climate change in Mozambique. *Southern Africa – Towards Inclusive Economic Development*. https://sa-tied-archive.wider.unu.edu/sites/default/files/pdf/SA-TIED-WP-136.pdf

Ministry of Land and Environment. (2021). *Update of the First Nationally Determined Contribution to the United Nations Framework Convention on Climate Change Mozambique Period: 2020-2025.* Ministério da Terra e Ambiente. Republic of Mozambique. https://unfccc.int/sites/default/files/NDC/2022-06/NDC_EN_Final.pdf

OCHA. (2019). *Cyclones Idai and Kenneth.* Office for the Coordination of Humanitarian Affairs. https://www.unocha.org/southern-and-eastern-africa-rosea/cyclones-idai-and-kenneth

OCHA. (2022). *Mozambique:* Tropical Cyclone Gombe Flash Update No.5 (As od 22 March 2022). https://reliefweb.int/report/mozambique/mozambique-tropical-cyclone-gombe-flash-update-no5-22-march-2022

Oppenheimer, M., Glavovic, B.C., Hinkel, J.,. van de Wal, R., Magnan, A.K, Abd-Elgawad, A., Cai, R., Cifuentes-Jara, M., DeConto, R.M., Ghosh, T., Hay, J., Isla, F., Marzeion, B., Meyssignac, B., & Sebesvari, Z. (2019). 'Sea level rise and implications for low-lying islands, coasts and communities' in *IPCC Special Report on the Ocean and Cryosphere in a Changing Climate*, eds H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama & N.M. Weyer. https://www.ipcc.ch/site/assets/uploads/sites/3/2019/11/08_SROCC_Ch04_FINAL.pdf

Ranasinghe, R., Ruane, A.C., Vautard, R., Arnell, N., Coppola, E., Cruz, F.A., Dessai, S., Islam, A.S., Rahimi, M., Ruiz Carrascal, D., Sillmann, J., Sylla, M.B., Tebaldi, C., Wang, W., & Zaaboul, R. (2021). 'Climate change information for regional impact and for risk assessment', *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, eds. V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, *et al.* (Cambridge University Press). https://www.ipcc.ch/report/ar6/wg1/chapter/chapter-12/

Ribeiro, N., & Chaúque, A. (2010). *Gender and climate change: Mozambique case study.* Heinrich Böll Stiftung. https://ees.kuleuven.be/eng/klimos/toolkit/documents/210_mozambique.pdf

Stal, M. (2011). 'Flooding and relocation: The Zambezi River Valley in Mozambique', *International Migration*, vol. 49, pp. 125–145. https://onlinelibrary.wiley.com/doi/10.1111/j.1468-2435.2010.00667.x

Seneviratne, S.I., Zhang, X., Adnan, M., Badi, W., Dereczynski, C., Di Luca, A., Ghosh, S., Iskandar, I., Kossin, J., Lewis, S., Otto, F., Pinto, I., Satoh, M., Vicente-Serrano, S.M., Wehner, M., & Zhou, B. (2021). 'Weather and climate extreme events in a changing climate supplementary material', *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*, eds. V. Masson-Delmotte, P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, *et al.* https://www.ipcc.ch/

Uamusse, M.M., Tussupova, K. & Persson, K.M. (2020). Climate Change Effects on Hydropower in Mozambique. *Applied Sciences*, 10 (14) p. 4842. https://doi.org/10.3390/app10144842

UNAIDS. (2023). *Mozambique.* United Nations Programme on HIV/AIDS https://www.unaids.org/en/keywords/mozambique

UNDP. (2022). *Scaling up local adaptation and climate-risk informed planning for resilient livelihoods.* United Nations Development Programme. https://open.undp.org/projects/00118048

UNHCR. (2022). *UNHCR raises alarm over Mozambique's "invisible" crisis as climate shocks worsen displacement.* United Nations High Commissioner for Refugees. https://www.unhcr.org/uk/news/briefing/2022/5/627a6c404/unhcr-raises-alarm-mozambiques-invisible-crisis-climate-shocks-worsen-displacement.html

USAID. (2018). *Climate Risk Profile: Mozambique.* United States Agency for International Development. https://www.climatelinks.org/sites/default/files/asset/document/2018_USAID-ATLAS-Project_Climate-Risk-Profile-Mozambique.pdf

USAID. (2017). *Agriculture and Food Security: Mozambique.* United States Agency for International Development. https://www.usaid.gov/mozambique/agriculture-and-food-security

WHO. (2018). *Strengthening the resilience of the Mozambique health system to climate change impacts.* World Health Organization. https://www.who.int/news/item/01-01-2018-strengthening-the-resilience-of-the-mozambique-health-system-to-climate-change-impacts

World Bank. (2022). *Mozambique: Current climate.* Climate Change Knowledge Portal. https://climateknowledgeportal.worldbank.org/country/mozambique/climate-data-historical

World Bank. (2010). *Economics of adaptation to climate change:* Mozambique. https://openknowledge.worldbank.org/bitstream/handle/10986/12748/702640v10ESW0P0IC000EACC0Mozambique.pdf?sequence=1&isAllowed=y

Zambezian. (2017). *Cyclone Dineo: At least 55 injured, over 100 000 displaced in Mozambique*. https://zambezian.com/cyclone-dineo-at-least-55-injured-over-100-000-displaced-in-mozambique/