Myanmar

This climate fact sheet summarizes available information on the climate of Myanmar 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 average air surface temperature of Myanmar is 23.8°C and varies from around 18°C in January to 26°C in April. Myanmar has a tropical to sub-tropical climate with three seasons: a hot and dry season, a rainy season and a cool and relatively dry season. The climate in Myanmar is controlled mainly by the distance from the coast and altitude. In the south, around the Ayeyarwady Delta and the coast, temperatures are high and similar throughout the year, while the central zone is drier and experiences greater temperature variation, but temperatures can still exceed 40°C. More mountainous regions are generally cooler (World Bank, 2022).

Average annual rainfall: The average precipitation in Myanmar is around 2,050mm, but varies across the country. Coastal regions receive between 2,500–5,500mm per year. Myanmar's central zone is drier with typically 500–1,000mm per year. The mountainous regions in the north and east experience moderate rainfall in the range of 1,000–2,000mm per year (World Bank, 2021).

Main drivers of climate variability: 1. El Niño–Southern Oscillation (ENSO); 2. topography; 3. monsoon region of Asia; 4. Intertropical Convergence Zone (ITCZ); 5. Indian Ocean Dipole (IOD).
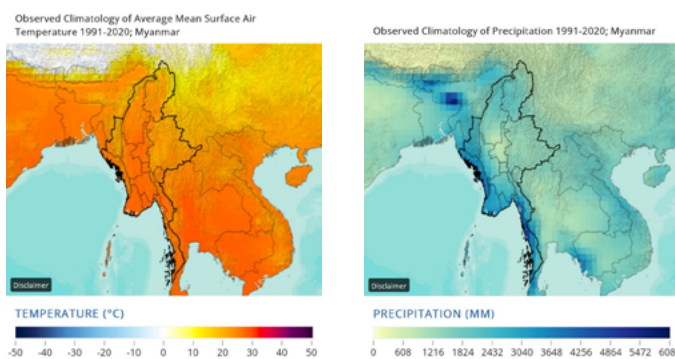

Figure 1: Observed climatology of (left to right) mean temperature and mean total precipitation from 1991 to 2020 (from World Bank Climate Change Knowledge Portal).
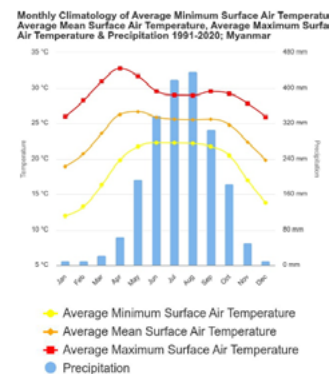
Figure 2: Observed mean monthly climatology from 1991 to 2020 (from World Bank Climate Change Knowledge Portal).

Myanmar is dominated by a tropical/sub-tropical monsoon climate. Topography and distance from the ocean are important factors in shaping Myanmar's climate, with an average temperature of around 28°C on the coast and central regions, dropping to around 20°C in the highlands. Rainfall is higher in the southern and Rakhine coastal regions, with average annual rainfall of 2,200–5,000mm. The central and eastern regions receive the lowest amount of rainfall while the northern hilly region receives relatively high rainfall. Colder temperatures occur from November to February (winter) while higher temperatures occur during March and April. Rainfall is mostly concentrated over the period of May to October (summer monsoon) which is mainly due to the influence of the Southwest Monsoon.

Myanmar faces some of the highest disaster risk levels in the world, ranked 17th out of 191 countries by the 2022 Inform Risk Index (DRMKC, 2022). The country is exposed to various hydrometeorological hazards including floods (riverine, urban and coastal flooding), landslides and heatwaves, as well as high exposure to tropical cyclones and their associated hazards along with droughts.

1.2 Climate change in Myanmar

Historical climate	Projected climate
Temperature	
• The mean annual temperature over Myanmar has increased at a rate of approximately 0.2°C/decade in 1961–2015 (Gutiérrez *et al.*, 2021b). Inland regions have warmed faster than coastal ones (Horton *et al.*, 2017). • 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 1.5–2°C for a high greenhouse gas concentration scenario (SSP5–8.5) and by 1–1.5°C for a low greenhouse gas concentration scenario (SSP2–4.5) (Gutiérrez *et al.*, 2021a). • 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.*, 2021b; Ranasinghe *et al.*, 2021; Seneviratne *et al.*, 2021).
Precipitation	
• While overall trends in mean annual rainfall are unclear, coastal areas have experienced an increase in total rainfall (Horton *et al.*, 2017). • The frequency and magnitude of extreme rainfall events has increased (Horton *et al.*, 2017; Seneviratne *et al.*, 2021).	• Mid-century (2040–2060) estimates of annual precipitation changes over Myanmar under a low emission scenario (SSP2–4.5) and under a high emissions scenario (SSP5–8.5) are projected to increase by around 5–10 per cent. Summer monsoon precipitation will increase during the 21st century, with enhanced interannual variability (Gutiérrez *et al.*, 2021b). • The frequency and intensity of heavy precipitation events are projected to increase with potential impacts of flooding and soil erosion (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

Observed hazard	Projected risk
Droughts	
Drought and extreme heat can affect large parts of the country and are becoming more likely because of climate change. Droughts affect the local community through decreased crop yields and a lack of water for domestic and industrial use. Most droughts in Myanmar occur in the central dry zone, but the southern Ayeyarwady and western Bago regions also experience drought frequently. Projections suggest that droughts are likely to occur in Myanmar every 10-14 months and severe droughts every two to three years (MIMU, 2022).	The World Bank (2022) projects a continuation in the increase of drought events, as rainfall becomes more erratic and unpredictable.
Sea-level rise	
Relative sea level has increased at a higher rate than global mean sea level around Asia over the last three decades (Ranasinghe *et al.*, 2021).	This trend is likely to continue, contributing to increases in the frequency and severity of coastal flooding and erosion in low-lying areas (Ranasinghe *et al.*, 2021).
Floods	
Flooding is a major natural hazard in Myanmar and especially affects communities along the coast and major rivers. The country has six major river basins – Ataran, Ayeyarwady, Bago, Salween, Sittaung and Yangon – which are vulnerable to flooding. Yangon is especially vulnerable to high flood risk as it is located at the confluence of several rivers. Flooding occurs most frequently in between June and October, which corresponds with the rainy season in Myanmar (GFDRR, n.d.).	World Bank (2022) describes an increase in the occurrence of floods and storm surges in the last century (World Bank, 2022). This correlates with rainfall patterns in Myanmar becoming increasingly unpredictable and more intense with multiple reports of record-breaking rainfall. World Bank (2022) also reports that in 1960–2009, shorter rainfall seasons combined with more erratic and intense rainfall caused a number of flood events. This pattern is expected to increase in the coming years.

Climate change poses a severe threat to the country in terms of the impacts of hydrometeorological hazards, which will likely be exacerbated. Flooding and storms are projected to see the most direct increase in frequency and intensity, but with numerous associated indirect effects on biodiversity, ecological systems as well as human livelihoods such as agriculture and fishing (UNDRR, 2020). |

Storms and cyclones

Cyclones typically affect Myanmar in the pre- and post-monsoon seasons of mid-April to mid-May and October to November. The impacts of cyclones on coastal regions can be devastating, causing destruction of property and infrastructure as well as ensuing flooding from storm surges. The coastal regions, such as Ayeyarwady and Rakhine State, face the highest risk of cyclones and their impacts, where events measuring as high as five on the Saffir–Simpson storm intensity scale can be seen (UNDRR, 2020).

The frequency and intensity of cyclones has increased in the last few decades (World Bank, 2022).

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). Before 2000, cyclones made landfall once in three years, this is now a yearly occurrence.

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

The structure of Myanmar's Government is important in understanding the scope and reach of government-based disaster risk reduction (DRR) activities. The Government of Myanmar functions on five separate levels so that the line of authority from the centre to the lower levels of government only reaches regional level. DRR at the local level is the responsibility of a separate entity – the Ministry of Home Affairs. This has resulted in a lot of decentralized DRR work across the country (Srikandini, 2019).

Smith & Chan (2018) argue that although the Myanmar Action Plan for Disaster Risk Reduction (MAPDRR) has made progress towards national projects, it has struggled to implement community-based preparedness and response initiatives (Smith & Chan, 2018). Following a review of the MAPDRR, the analysis showed that the desired outcomes of the plan regarding the community-based initiatives were vague and there remained limited evidence to guide specific interventions.

2.2 Reduce health impacts of climate change

In Myanmar, climate change is expected to increase the risk of vector-borne and waterborne diseases as well as the damage to health infrastructure. This, in turn, is expected to increase potential injury, loss of life and mental health challenges in the country. These risks are particularly high due to a weak health system and the additional burdens brought on by climate change (Ko & Sakai, 2022).

An increase in temperature along with reduced rainfall and drought is highly expected to shorten the breeding cycles of vectors, thereby increasing disease transmission rates and spread to highland areas such as Shan state, where conditions are becoming more favourable and cases have, so far, been minimal (Republic of Myanmar, 2019a). Common vector-borne diseases in Myanmar include dengue fever, Japanese encephalitis and malaria. At the same time, the increased incidence of floods will lead to a surge in water-borne diseases, including cholera, hepatitis A and typhoid, due to the biological contamination of water (Republic of Myanmar, 2019a; USAID, 2017).

Longer heatwaves and more frequent hot days (with a temperature over 35°C) are leading to a significant increase in health complications and heat-related deaths (WWF, 2017). Indirectly, climate change will lead to malnutrition and hunger, especially among children and poor people, due to disruption to food systems (WHO, 2016). Furthermore, social and mental illness resulting from displacement, disasters and other indirect causes such as poor nutrition, discrimination and disease will increase (Lee *et al.*, 2018; Republic of Myanmar, 2019a).

2.3 Ensure sustainable water supplies

Water, Sanitation and Hygiene (WASH)

Myanmar receives abundant precipitation, but climate change-induced erratic rainfall is expected to exacerbate existing challenges related to water access, quality and quantity (Republic of Myanmar, 2019a).

The country is already experiencing droughts, especially in the drier central region of the country, and this is impacting the available water resources (Rajesh, 2018). The projected increase in droughts will increase the demand for groundwater, especially for irrigation requirements (Republic of Myanmar, 2019b). Given the increasing population and lack of public water supply infrastructure, the increase in groundwater use makes it susceptible to seawater intrusion, especially along the coast. Seawater intrusion into coastal groundwater has been identified as the primary cause of deteriorating water quality along Myanmar's coastal regions (Prusty *et al.*, 2018). The resultant groundwater supplies are unsuitable for agriculture and human consumption (Ko *et al.*, 2021)

Climate-driven impacts will exacerbate existing water access inequalities and cause conflict and displacement related to water. Contamination of water sources and inundation of water infrastructure are also expected as the climate changes (USAID, 2017).

Infrastructure and electricity

Critically, the country's infrastructure is unprepared for climate-induced change to the hydrological cycle as most dams and reservoirs were not designed to respond to changes in river flows. It is projected that more water reservoirs in vulnerable areas (notably the Central Dry Zone) will face seasonal and annual water shortages (Republic of Myanmar, 2012b).

Hydropower potential will continue to decrease as extreme rainfall accelerates the sedimentation of rivers and dams, and river flow becomes more unpredictable (Republic of Myanmar 2012a).

2.4. Enable climate-resilient livelihoods and economic security

Sea level rise, high temperatures, increasing frequency and magnitude of floods and cyclones, intense rains and droughts pose a significant threat to livelihoods and economic growth. As much as 85 per cent of rural livelihoods depend on climate-sensitive sectors, and millions of people are highly exposed to climate hazards (Republic of Myanmar, 2019c).

Agriculture is a core sector for livelihoods and economic growth and is the second largest contributor to GDP, employing 61 per cent of the labour force (Republic of Myanmar, 2019c). Seventy per cent of Myanmar's 54 million population live in rural areas and depend on crop farming (mainly rice production), fisheries (predominantly small-scale) and livestock (ACIAR, 2021; Republic of Myanmar, 2019c). Erratic rainfall events, salinization of farms, high-magnitude cyclones and temperature rise will increasingly impact farming by reducing crop yields, causing crop failures and disrupting local production systems with direct consequences for income, food security and livelihoods (Bernado, 2018; Thant *et al.*, 2022; Tun Oo *et al.*, 2020). The impact will be borne mainly by small-scale low-input use farmers (Jensen *et al.*, 2021).

Sea level rise and saltwater intrusion, one of the most pressing consequences of climate change, especially in the Ayeyarwady Delta region, pose a significant threat to livelihood assets, including coastal ecosystems and ecosystem services (Republic of Myanmar, 2019c). Furthermore, in urban centres, the labour market remains highly informal; risks caused by natural hazards and health shocks (including climate-driven changes) are identified as key barriers keeping marginalized populations from accessing income-earning opportunities (World Bank, 2019). Finally, increased temperatures and changing rainfall will drive rural–urban migration, with significant implications for land-use change and deforestation (Republic of Myanmar, 2019c).

With the loss of income-generating opportunities and restricted access to market, displaced populations will become even more susceptible to acute food insecurity and increase their reliance on external assistance.

2.5 Address climate displacement and protection

Current and future displacement challenges

In Myanmar in 2023, cyclone Mocha hit and 995,000 people were internally displaced (IDCM, 2024). Two other significant climate disasters in recent years that affected millions of people are: Cyclone Nargis in 2008 and widespread flooding in 2015 (MIMU 2022). During cyclone Nargis 84,537 people died with 53,836 people reported missing and 19,359 injured. Around 800,000 people were displaced and 2.4 million affected (GFDRR, n.d.).

In February 2021, a military takeover of the government led to protests that were harshly repressed. The protest soon transformed into a widespread armed resistance movement. Consequently, since then to today, displacement has almost tripled, further complicating ongoing conflicts between military and various ethnic non-state armed groups (IDMC, 2023). Myanmar counted over one million internally displaced persons (IDPs) due to conflict and violence in 2022 (IDMC, 2023), around 1,200,000 in 2023 (IDMC, 2024) and 600,000 stateless Rohingya, of whom 148,000 are displaced (UNHCR, 2022). Victims of conflict-based displacement in Myanmar often

face significant systemic discrimination, loss or lack of legal status and restrictions on freedom of movement. This, in turn, limits access to humanitarian aid, healthcare services and livelihood opportunities (IDMC, 2020) and are worrying trends when considering the likelihood of future climate disasters. Most IDPs derive their livelihoods from agriculture and fishing – two highly vulnerable sectors to climate change, which further exacerbates their vulnerability (Tun Oo, 2020).

The compounding effects of conflict and climate disasters will likely increase as climate displacement becomes more widespread. The internal displacement that has occurred in Myanmar for decades due to conflict will likely continue to intersect with more extreme weather events; in 2021, for example, disasters led to over 158,000 displaced people, and monsoon floods hit states in the south-east, north-west, and western part of the country, such as Rakhine State, which are also affected by conflict (IDMC, 2022). Cyclone Mora in 2017 severely damaged IDP camps, including over 21,000 houses and shelters for IDPs and more than 26,000 sanitation facilities in the Rakhine State (ReliefWeb, 2017). The increasing frequency of cyclones and major storms further the likelihood of disaster displacement.

Climate change impacts may limit IDPs' ability to return home. As climate change will impact land productivity, there are rising concerns that loss of land tenures linked to agriculture, logging and mining development projects will exacerbate IDPs' inability to return to their communities of origin (IDMC, 2020). Government-imposed mobility restrictions on IDPs in Rakhine State, for a period of more than five years, have prolonged exposure to recurrent extreme weather events (Tun Oo, 2020).

Rising sea levels and flooding events will further limit agricultural livelihoods and increase rural–urban migration. Approximately 28 million people live in districts at high risk of flood exposure, mainly along the coasts, the Ayeyarwady River and in Kayin State (MIMU, 2022). One study on farm households' adaptation strategies against saltwater intrusion due to sea level rise in the delta region found that rural–urban migration for off-season work is already an important coping strategy for families, indicating that this trend is likely to continue as the impacts of climate change persist (Tun Oo 2018).

Migration law and policies

- Myanmar is not a signatory to the 1951 Refugee Convention and, although it is party to a number of international and regional frameworks regarding refugees and migration, it is not seen as currently upholding them.
- The 2017 Myanmar Action Plan on Disaster Risk Reduction notes the connection between conflict, migration and the environment, while the Myanmar Climate Strategy & Action Plan (2017–2030) aims to support people affected by disasters through inclusion in social protection systems among other commitments (Vigil *et al.*, 2022).
- IDPs and the need for social cohesion are also discussed in the Myanmar Sustainable Development Plan (2018–2030) (*ibid*).

2.6. Policy

Relevant information from the [Nationally Determined Contribution](#) (NDC) (2021)

Emissions reduction target: Myanmar aims to peak its greenhouse gas (GHG) emissions by 2031. Forestry and energy are the main sources of GHG in Myanmar with forestry accounting for up to 80 per cent of the emissions.

Area of focus on adaptation: 1. Resilient, inclusive and sustainable cities and towns where people can live; 2. climate risk management for people's health and wellbeing; 3. climate-smart agriculture, fisheries and livestock for food security and sustainable management of natural resources for healthy ecosystems; 4. education, science and technology for a resilient society, including loss and damage.

Inclusion of DRR: Yes, it includes improving forecasting and warning systems (including Early Warning, Early Action), intervention for disaster preparedness (including the implementation of disaster law) and better health service response.

National designated entity: Environmental Conservation Department, Ministry of Natural Resources and Environmental Conservation

Key stakeholders: Myanmar has been a member of the [NDC Partnership](#) since 2020.

Other national policies on climate

- Risk management and health are consistently integrated in the climate change policies in the country. For example, the [Myanmar Climate Change Strategy](#) (MCCS), and the [Myanmar Climate Change Master Plan](#) (MCCMP) for the 2018–2030 period, include 'climate risk management, people's health and wellbeing' as one of the six priorities areas. The same areas of focus will be reflected in the National Adaptation Plan (NAP) that is currently being developed (Republic of Myanmar, 2021).
- From 2013–2019, the Ministry of Natural Resources and Environmental Conservation was supported by the [Myanmar Climate Change Alliance](#) to mainstream disaster risk reduction and climate into the policy framework in a project financed by the EU (Global Climate Change Alliance Plus Initiative, 2019). A complementary project – [Governance for Resilience and Sustainability project](#) (2018-2022) was led by the United Nations Development Programme (UNDP, n.d.). There are currently two regional [Green Climate Fund (GCF) projects](#) involving Myanmar; both focus on climate finance in mitigation and adpatation (GCF, n.d.).

Climate finance

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. These grants range from 20,000–50,000 US dollars and are intended to support community-level initiatives. The GEF Small Grants Programme sits under the UNDP and has a National Coordinator in each country. Some countries have National Climate Funds, which may be accessible to the National Society. Other funding from bilateral donors, national climate funds, or multilateral climate funds like the Adaptation Fund, CREWS, or GCCA+ could be explored.

National Societies (NS) cannot apply directly for climate finance from the GCF, but they can be an implementing partner for an accredited entity. NS can investigate national GCF projects that are being designed in order to find and work in partnerships.

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

Additional Resources

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Climate Centre. (2022). *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

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