



Bangladesh

This climate fact sheet summarizes the available information on the climate of Bangladesh 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: 26°C (with seasonal variations of 15–34°C).

Average annual rainfall: 1,000–2,800mm.

Main drivers of climate variability: 1. El Niño–Southern Oscillation (ENSO) (typically every 2–7 years); 2. South Asian Monsoon; 3. Southeast Trade Winds; 4. Indian Ocean Dipole.

1.1 Short overview

Bangladesh has a subtropical monsoon climate. The average temperature is around 26°C, but this varies seasonally between 15–34°C, with colder extremes in the mountainous north and the highest extremes around the capital city, Dhaka. The warmest temperatures tend to accompany the summer monsoon season from April to September. Bangladesh is one of the wettest countries in the world – annual rainfall ranges from 1,000mm in the west to more than 2,800mm in the east and south. Most rainfall is associated with the South Asian Monsoon, which brings warm and moist air from the Indian Ocean (World Bank, 2021). The country has three different climatological seasons: from March to June, characterized by hot and humid weather; from June to October (the monsoon season), characterized by hot and rainy weather; and from October to March, characterized by cooler and drier weather.

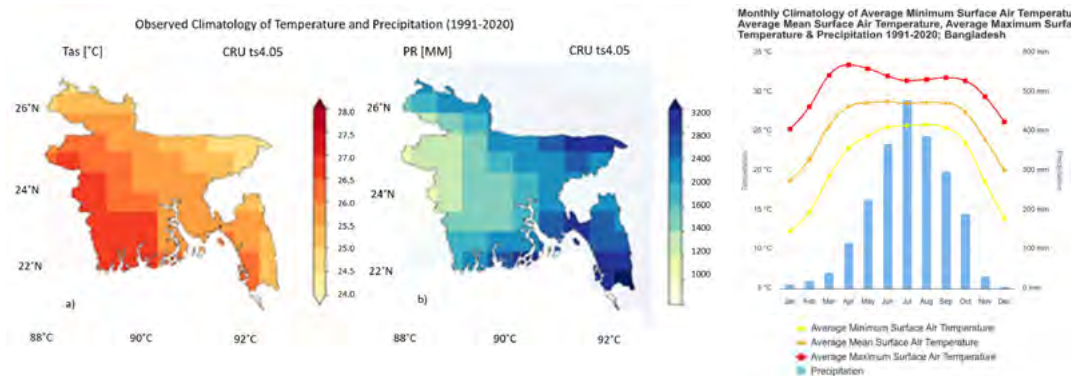


Figure 1: Observed mean temperature (a) and annual mean total precipitation (b) between 1991 and 2020 (Adapted from the Climate Change Knowledge Portal, World Bank)

Figure 2: Average mean, minimum and maximum air temperature and precipitation per month between 1991 and 2020. (Climate Change Knowledge Portal, World Bank)

During El Niño periods, Bangladesh typically experiences drier than normal conditions during June to September; during La Niña periods, wetter than usual conditions typically occur (IRI, 2014).

Bangladesh was ranked 27th out of 191 countries in the 2022 Inform Risk Index (DRMKC, 2022). Bangladesh has extremely high exposure to flooding, tropical cyclones and drought (World Bank, 2021).

1.2 Climate change in Bangladesh

Historical climate

Temperature

Mean annual temperature has increased by 0.1–0.2°C per decade (1961–2015) (Gutiérrez *et al.*, 2021b). Increases happen mostly during monsoon seasons (World Bank, 2021).

The number of ‘hot’ days (above 35°C) increased by 26 days per year from 1960–2003. This warming is also mostly seen in the early monsoon season (McSweeney *et al.*, 2010).

Precipitation

There has been an observed shift in rainfall distribution since 1960 with increases in March to May rainfall and decreases in June to August rains.

Projected climate

Mean temperatures are projected to rise by at least 2–2.5°C (by 2050) for a high greenhouse gas (GHG) concentration scenario (SSP5–8.5) and by 1.5–2°C for low GHG concentration scenario (SSP2–4.5) (Gutiérrez *et al.*, 2021b).

Maximum and minimum temperature will increase, and **heatwaves** will intensify in duration. The annual number of very hot days is projected to rise dramatically and with high certainty (Gutiérrez *et al.*, 2021b).

Heavy rainfall during the wet season is projected to become more intense. 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).

Projected climate change impact on hazards in Bangladesh

- Under a low emissions scenario, the frequency and magnitude of extreme flood events are projected to increase significantly (Paltan, 2018; Mohammed, 2018). Extreme floods that would historically occur at a 1-in-100-year frequency could become 1-in-50 or even 25 year events. Under a 1.5°C scenario, Mohammed *et al.* (2018) estimate the magnitude of an extreme flood event to increase by 27 per cent in the Ganges, 8 per cent in the Brahmaputra and 15 per cent in the Meghna. The figures for a 2°C scenario increase to 29 per cent, 24 per cent and 38 per cent respectively.
- It is estimated that under the high emissions pathway (RCP8.5), by the 2030s 5.3 million people could be affected annually by flooding. This would lead to a decrease of 25 billion US dollars to the country's GDP (World Bank, 2021).
- Relative sea level rise in the Ganges Delta has been projected to occur at a rate of 5–10mm/year (World Bank, 2021). As 6,170 km² of the Ganges Delta lies at less than 2m above sea-level, the region is incredibly vulnerable to the impacts of sea level rise and associated impacts on land, livelihoods and communities. A scenario aiming to limit emissions to 2°C by 2100 (RCP4.5) projects a sea level rise of approximately 0.5m (World Bank, 2021). Without significant adaptation, the number of people affected by coastal flooding in Bangladesh could be 2.5–7.2 million in the years 2070–2100 (UK Met Office, 2014).
- Droughts, combined with the compounding effects of flooding, landslides and soil erosion, pose an increasingly threat to communities across Bangladesh. Ahmed (2021) points out that increasing spontaneous urbanization in the hills of Bangladesh is causing a sharp increase in landslide disaster frequency. Landslides are impacted not only by changing climatic conditions but also by anthropogenic factors such as migration (Ahmed, 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
<p>Flooding</p> <p>Flooding is an annually recurring hazard, especially during the monsoon season (June to September). River flooding is particularly threatening as a large percentage of the landmass sits in the estuary of three major rivers (Brahmaputra, Ganges and Meghna) (Parvin <i>et al.</i>, 2016). During the monsoon and in the pre-monsoon periods, flash flooding poses a threat to communities living downstream of the Maghalaya hills in India and in lowland areas of Bangladesh, especially the districts of Sylhet, Moulvibazar, Habiganj, Netrokona and Kishoreganj (ADB, 2021; Abedin <i>et al.</i>, 2019).</p> <p>Cyclones</p> <p>Cyclones and associated effects such as storm surges can affect most areas of Bangladesh, but pose the highest threat along the coastal regions, particularly in November and May. Tropical cyclones in Bangladesh stand as some of the most devastating disasters in recorded history. Alongside causing the destruction of property and infrastructure with economic repercussions, cyclones also cause heavy precipitation, landslides and strong winds (Rahman & Rahman, 2015; World Bank, 2021). ADB (2021) estimates that 12 of the major cyclones that have impacted Bangladesh since 1965 have led to almost 480,000 people losing their lives (ADB, 2021).</p>	<p>Bangladesh has 230 rivers and tributaries and is characterized by low-laying flat floodplains which coupled with its tropical monsoon climate makes it one of the most flood-vulnerable countries in a warming world. An increase in monsoon precipitation may increase the magnitude, frequency, depth, extent and duration of floods which will cause damage to agriculture, housing and settlements as well as infrastructure and dramatically change the land use patterns in Bangladesh. The impacts of floods on livelihoods have been, and will increasingly become, a major issue. This is especially the case in poor rural areas, where people also depend directly on agriculture and aquaculture (Parvin, 2016).</p> <p>Relative sea level rise in the Ganges Delta has been projected to occur at a rate of 5–10mm/year (World Bank, 2021). As 6,170 km² of the Ganges Delta lies at less than 2m above sea-level, the region is incredibly vulnerable to the impacts of sea level rise and associated impacts on land, livelihoods and communities. A scenario aiming to limit emissions to 2°C by 2100 (RCP4.5) projects a sea level rise of approximately 0.5m (World Bank, 2021). Without significant adaptation, the number of people affected by coastal flooding in Bangladesh could be 2.5–7.2 million in the years 2070–2100 (UK Met Office, 2014).</p> <p>Droughts, combined with the compounding effects of flooding, landslides and soil erosion, increasingly pose a threat to communities across Bangladesh. Ahmed (2021) points out that increasing spontaneous urbanization in the hills of Bangladesh is causing a sharp increase in landslide disaster frequency. Landslides are impacted not only by changing climatic conditions, but also by anthropogenic factors such as migration (Ahmed, 2021).</p>

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 country's vulnerability to hazards is heightened by a high population density, increasing urban population and social vulnerability.

Islam *et al.* (2020) identifies several key challenges to the effective integration of DRR and Climate Change Adaptation (CCA) in Bangladesh. These revolve around funding mechanisms, coordination challenges and competing actors, issues with implementation and mainstreaming of projects and difficulties with information and knowledge sharing (Islam *et al.*, 2020). Furthermore, Uddin *et al.*, (2020) find that communities believe that local governments have failed to uphold good governance principles, corruption is widespread and that a lack of transparency and minimal inclusion of local populations all lead to barriers to the effectiveness of programmes.

2.2 Reduce health impacts of climate change

Climate change in Bangladesh is projected to have direct and indirect impacts: the direct health impacts of climate change in Bangladesh are numerous. These include morbidity and mortality due to droughts, cyclones, floods, heat stress and other extreme events. The indirect impacts are more diffused and include disruption to food systems, psychological effects, water insecurity and the spread of infectious diseases (Helldén *et al.*, 2021; Rahman *et al.*, 2019).

Climate change will affect physical health and cause respiratory illness and damage to lung tissues (due to ground-level ozone) as temperature and humidity rise (Delwer & Hawlader, 2021; Mahmud *et al.*, 2021). Vector-borne diseases, especially dengue fever, will likely increase as climatic conditions become conducive (Mahmud *et al.*, 2021). Heatwaves and temperature affect the elderly and vulnerable populations first and can have widespread and sustained impacts on health and well-being (Ministry of Foreign Affairs of the Netherlands, 2019). These risks are compounded by a lack of access to proper sanitation facilities, a weak health sector and limited healthcare provision available in Bangladesh (Abedin *et al.*, 2019). Moreover, the healthcare system itself is threatened by physical climate impacts, with limited infrastructure and the ability to respond during extreme weather events (Shahid, 2010).

Climate change-induced environmental stressors exacerbate mental health risks. These risks include stress and the amplification of previous traumas, disruption to long-term well-being, and widespread (im)mobility with its associated impacts. Others include displacement and evacuations into unfamiliar and hostile environments (e.g., evacuation to cyclone shelters), child abuse and injury, domestic tensions, child marriages, and loan pressures (Hayward & Ayeb-Karlsson, 2021).

2.3 Ensure sustainable water supplies

Water, Sanitation and Hygiene (WASH)

The major climate change risks to WASH in Bangladesh are saline intrusion, drought, floods (coastal, fluvial and flash floods) and cyclones.

Climate change will compound safe water access, hygiene and sanitation challenges that have been persistent due to environmental degradation, arsenic contamination in groundwater and saltwater intrusion in the coastal regions (Hossain *et al.*, 2022).

Bangladesh already faces a significant water crisis. In 2017, an estimated 22 per cent of the population did not have access to water at home. While just under 90 per cent of Bangladeshis have access to at least some basic services of clean water near their homes, approximately 45 per cent, or 73 million people, use contaminated water (Water Aid, 2021). There is no city with a significant sewer system; only the capital city of Dhaka has a sewer system, which serves just 18 per cent of the city's population (World Bank, 2016).

Saline water intrusion into the ground- and surface water is a major challenge in the coastal regions of Bangladesh due to sea level rise (World Bank, 2021). Drinking salinized water and the accompanying increased sodium intake can have adverse health effects, including a range of significant maternal health risks, notably leading to dangerous levels of hypertension in pregnant women (Khan *et al.*, 2011). In addition, saline and faecal surface water contamination drive people to use more groundwater resources, which increases the risk of arsenic poisoning due to naturally occurring high concentrations of arsenic in deeper levels of groundwater (IRC & Water for People, 2021).

More frequent droughts, due to rising temperatures, threatens pond sand filters and rainwater harvesting in areas where groundwater resources are limited or are contaminated by arsenic or salts (Abedin *et al.*, 2018). Prolonged droughts in the dry seasons are especially increasing in the north-west regions of Bangladesh (ICCCAD & Water Aid Bangladesh, 2021).

Cyclones and post-cyclone water logging negatively impact sanitation infrastructure. Cyclones can induce high waves and flooding which inundate toilet structures, especially pit latrines that serve most of the rural population (IRC & Water for People, 2021). Additionally, cyclones cause damage to water infrastructure, mostly boreholes in coastal regions (IRC & Water for People, 2021).

Bangladesh's water and sanitation sectors have increased coverage over the last several decades; however, hygiene promotion and education along with the quality of water and sanitation facilities still need to be improved (Mahmud & Mbuya, 2016).

Infrastructure and electricity

Bangladesh's capital Dhaka is one of the most densely populated cities in the world at 41,000 people per square kilometre. In Dhaka, 4 million people live in informal settlements (Habitat for Humanity, n.d.) characterized by **inadequate housing and services** along with a range of other high vulnerability indicators. High vulnerability makes these communities particularly at risk of climate-related shocks.

Monsoon-proof buildings are part of Bangladesh's vernacular architecture, and the importance of this knowledge is being reemphasized with recent demographic and environmental changes. Bangladesh has explored innovative ways to provide infrastructure and services within the context of flooding and monsoons, including the use of floating hospitals that expand the reach of medical services to coastal communities impacted by rising sea levels (Sampath, 2017).

Bangladesh's energy consumption was 95,481 GWh in 2021, with 0.55 MWh per capita, compared to 12.87 MWh per capita consumption in the United States. The country produced 0.29 per cent of global emissions (IEA, 2021). According to the World Bank data from 2021, 99 per cent of the population have access to electricity, a huge increase compared to 2010 when only 55 per cent of the population had electricity supply (World Bank, 2021).

Existing and projected increases in the frequency and severity of extreme weather events puts the country's energy sector under heightened risk. The infrastructure is not only at risk of damage from weather events including flooding, high winds and salt intrusion, but climatic and environmental changes shift demand patterns. During heatwaves and droughts, for example, the high temperatures increase the demand for electricity from users, puts pressure on the power infrastructure's cooling systems, and affects wind power potential (Shahid, 2012). Inadequate access to energy for cooling, due to accessibility issues or power outages, can have dire consequences during extreme heat events.

2.4 Enable climate-resilient livelihoods and economic security

Higher temperatures and shifting precipitation patterns will reduce living standards in Bangladesh (Mani et al., 2018). Climatic changes will also directly impact flood protection and labour productivity in urban areas such as Dhaka due to heat stress (World Bank, 2021).

Bangladesh's agriculture sector contributes about 17 per cent of the country's GDP (Rahman, 2017). Yet, the sector is vulnerable to climate impacts, including flooding, storms and cyclones, heatwaves and droughts as well as saline intrusions. The yield of staple crops, for example, rice and wheat, will suffer from temperature increases (Sikder & Xiaoming, 2014; World Bank, 2021). Indirectly, the effect of climate change on the health of smallholder farmers affects production, exacerbating poverty and food insecurity (Talukder et al., 2021).

Saline intrusion leads to losses of major crops by up to 20–40 per cent (Miah *et al.*, 2020). Increasing climatic variability, salinization, more frequent inundation, and temperatures above critical thresholds will decrease major crop production and Bangladesh’s cultivable land by 17 per cent, as 30 per cent of cultivable land is in the coastal area (Ministry of Foreign Affairs of the Netherlands, 2019; Miah *et al.*, 2020).

Climate change risks the livelihoods of people dependent on fisheries and livestock, exacerbating food insecurity, unemployment, poverty and malnutrition. Since the 1990s, rates of undernutrition have declined, but the prevalence remains high with 38.7 per cent of under five-year-olds short for their age and 35 per cent underweight (Mahmud & Mbuya, 2016). Loss of habitat, habitat degradation, ocean acidification and changing reproduction patterns due to climate change poses significant risks to fisheries (Barange *et al.*, 2018). Similarly, the livestock sector is at risk of reductions in grazing lands and increased heat-related mortality and diseases among farm animals.

Bangladesh has experienced steady economic growth (a rate of 5.8 per cent annually) during the last decade, with relatively low inflation and stable domestic debt alongside improvements in nutrition and health outcomes (Mahmud & Mbuya, 2016). However, Bangladesh’s economic stability is vulnerable to climate impacts across many sectors. World Bank research suggests higher temperatures and shifting precipitation patterns will reduce living standards in Bangladesh soon (Mani *et al.*, 2018).

2.5 Address climate displacement and protection

Current and future displacement challenges

At the end of 2020, there were 772,000 people living in displacement in Bangladesh (IDMC, 2021).

Climate-related disasters triggered the most displacement. Cyclone Amphan resulted in 2.5 million displacements, but the majority where pre-emptive evacuations to cyclone shelters. Monsoon floods were the worst in decades, flooding a quarter of the country leading to 1.9 million displacements. In total, disasters caused 4.4 million new displacements with 345,000 people still displaced at the end of 2020 (IDMC, 2021).

Climate displacement is projected to be widespread in Bangladesh, with most climate displacement projected to occur internally rather than across international borders. Approximately one-third of the estimated 17–36 million people displaced internally across South Asia, due to slow-onset climate-induced events, are expected to be in Bangladesh (World Bank, 2021). Key hotspots of out-migration are expected to be around Dhaka city as well as in the northern and eastern regions of the country (Rigaud *et al.*, 2018). The main populations displaced from slow-onset climate change will be those dependent on rainfed crops due to a loss of livelihoods and food security (*ibid.*).

Sea-level rise is projected to displace up to 18 million people irrespective of other hazards – but people are projected to continue to migrate towards coastlines. The scale of displacement due to sea-level rise illustrates the large-scale impacts of climate change on Bangladesh. Research finds that the negative consequences of salinity on crop production due to sea-level rise increases both internal and international migration away from coastlines (Chen & Mueller, 2018). However, it is projected that people will still migrate towards Bangladesh’s coast irrespective of coastal flooding (Bell *et al.*, 2021).

There is a high risk of secondary displacement due to climate hazards. Key areas where the IFRC works – Cox’s Bazar and Bhasan Char – are at high risk of climate hazards, which prompts concerns about future secondary displacement for Rohingya refugees as well as Bangladeshis living in the region. Projections of increased urban and coastal flooding, cyclones and wildfire (ThinkHazard!, 2022) all pose risks for increased displacement in these areas. In June 2019, for example, over 28,000 refugees in Cox’s Bazar in south-eastern Bangladesh were affected by heavy monsoon rains, with over 10,000 people being displaced due to floods and landslides (ReliefWeb, 2019).

Protection

A public health study in Dhaka shows that the children in these communities are substantially more at risk of diarrhoea and asthma than the non-migrant population, leading to lower life-expectancy (Molla *et al.*, 2014).

In addition to internal migration and displacement, climate-induced migration from Bangladesh to India is increasing. This could potentially cause socioeconomic tensions, destabilization of politics, and a range of economic and environmental impacts. The protection of climate-induced migrants and understanding these migration patterns are essential to properly address this cross-border issue (Panda, 2010).

Climate migration, within Bangladesh, has both a socioeconomic and a gender component as climate impacts disproportionately affect individuals of lower economic status and women. In Bangladesh, women are more vulnerable to shocks for socioeconomic reasons, with less resources to adapt, and are more likely to be killed or injured during extreme weather events (Parvin *et al.*, 2013; Cannon, 2002). Globally, disasters exacerbate gender inequality; and, within Bangladesh, where pre-disaster conditions are already poor, and disasters often occur at the same time or in sequence, this effect is magnified (Rahman, 2013).

Potential needs for migrants and displaced people

Livelihoods diversification will be a key adaptation strategy to mitigate migration or to help make it sustainable; some work has focused on providing livelihoods opportunities in secondary towns in Bangladesh to avoid climate migrants moving to informal settlements around Dhaka, which pose concerns of overcrowding and lack of infrastructure (Rana & Ilana, 2021; Alam, 2022).

Migration law and policies

[Presidential Decree No. 331 of 1980](#), 28 May, 1981. This decree adopted the 1951 Refugee Convention as domestic law.

2.6 Policy

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

GHG emissions reduction target: In the unconditional scenario, GHG emissions would be reduced by 6.73 per cent by 2030 and could reach 21.85 per cent with support from the international community.

Area of focus on adaptation: (1) food security, social protection and health; (2) comprehensive disaster management; (3) infrastructure development; (4) research and knowledge management; (5) mitigation and low carbon development; and (6) capacity building and institutional development.

Inclusion of DRR: Yes, DRR is an explicit part of the NDC with a focus on vulnerable populations. It includes the enhancement of information systems and activities related to floods and cyclones.

National designated entity: Department of Environment, Ministry of Environment, Forests and Climate Change.

Key stakeholders: Ministry of Environment, Forests and Climate Change, Ministry of Agriculture, Ministry of Fisheries and Livestock, Ministry of Food.

Other national policies on climate

- [National Adaptation Plan \(NAP\) of Bangladesh \(2023-2050\)](#)
- [National Adaptation Programme of Action \(NAPA\)](#) (2019)
- [Bangladesh Climate Change Strategy and Action Plan \(BCCSAP\)](#), released in 2009, prioritizes food security, social protection and health, disaster management and capacity building as well as institutional development.
- Various policies aim to leverage climate finance, for instance, the Bangladesh Delta Plan 2100, and the Bangladesh Climate Change and Gender Action Plan.

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 around 20,000–50,000 US dollars and are intended to support community-level initiatives. The GEF Small Grants Programme sits under the United Nations Development Programme which 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 cannot apply directly for climate finance from [the GCF](#), but they can be an implementing partner for an accredited entity. National Societies can investigate national GCF projects that are being designed to create partnerships.

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

Additional resources

Climate Centre. (2022). *Factsheet on climatefinance*. Red Cross Red Crescent Climate Centre. <https://www.climatecentre.org/wp-content/uploads/Fact-Sheet-on-Climate-Finance.pdf>

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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