



Iraq

This climate fact sheet summarizes the available information on the climate of Iraq 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 temperature: The average annual temperature across Iraq is around 22°C, but varies from as low as 8°C in the high mountains to as high as 28°C in the hot and dry southern desert. Minimum temperatures in the north can be below zero in the winter months, while maximum temperatures in the south can exceed 45°C regularly through the summer months.

Average rainfall: Rainfall across Iraq ranges from as low as 100mm per year in the south, to as high as 1,000mm per year in specific locations in the high mountains in the north.

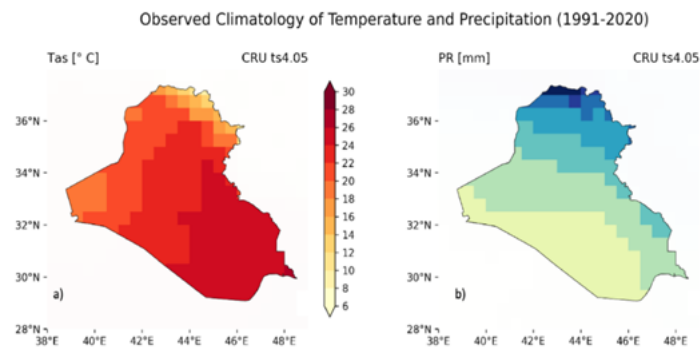


Figure 1. Observed climatology of mean temperature (a), annual mean total precipitation (b) and monthly climatology over 1991-2020. (Adapted from World Bank Climate Change Knowledge Portal, 2021b).

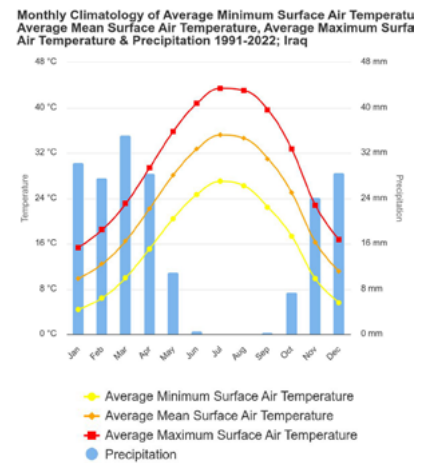


Figure 2: Average monthly climatology over 1991-2020. (Adapted from World Bank Climate Change Knowledge Portal, 2021b)

Short overview

Iraq has a Mediterranean climate, characterized by boreal winter rainfall and hot, dry summers. The climate variation across the country is influenced by latitude and the high mountains in the north. These high mountain areas are characterized by higher rainfall (400–1,000mm per year) and comparatively cooler temperatures with snow in some areas during winter. Towards the south of Iraq, warm desert conditions dominate with higher temperatures and much lower rainfall (less than 25mm per year in some areas). The rainfall season is generally from October/November through to April/May. The year-to-year climate variability across Iraq is influenced by the El Niño–Southern Oscillation (ENSO) as well as other drivers such as the North Atlantic Oscillation (NAO). Warm ENSO (El Niño) events are sometimes associated with wetter rainfall seasons in Iraq. The negative phase of the NAO is similarly associated with higher rainfall in parts of Iraq.

The diverse and varied geography of Iraq 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. Iraq is a high-risk country for humanitarian crises and disasters, ranked 13th out of 191 countries by the 2022 Inform Risk Index (DRMKC, 2022). The key climate-related risks in Iraq relate to flooding and droughts.

Climate change in Iraq

Historical climate change

Temperature

- The mean annual temperature over Iraq has increased at a rate of around 0.7°C per century since the 1950s (USAID, 2017). The frequency and intensity of hot extremes have increased, and cold extremes have decreased. The temperature in Iraq is increasing two to seven times faster than global temperature rise (Salman *et al.*, 2017).

Projected climate change

- By the end of the century, the maximum annual temperature in Iraq is expected to rise between 0.48 and 2.5°C, depending on emission scenarios. Minimum temperature is expected to rise by 0.22°C under a low emissions scenario (RCP2.6) and by 1.76°C under a high emissions scenario (RCP8.5) (Hassan & Nile, 2020).
- More frequent heatwaves are expected, along with fewer frost days (USAID, 2017).

Precipitation

- There are variable changes in rainfall across the country.
- In the north-east, annual rainfall has increased at a rate of 2.4mm/month per century.
- In the south-east, annual rainfall has decreased at a rate of 0.8mm/month per century.
- In the west, annual rainfall has decreased at a rate of 5.93mm/month per century (USAID, 2017).
- Precipitation projections for Iraq are uncertain, with some models estimating a decrease in precipitation across the country, ranging from a decrease of one per cent to a decrease of 68 per cent by 2100, depending on emission scenarios and regions of the country (Al-Mukhtar & Qasim, 2019). In contrast, other models predict increases in precipitation in the western and central regions of Iraq and have attributed the increase to extreme rainfall events that may occur unevenly during the rainy season (Hassan *et al.*, 2023).

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	
Rainfall rates have steeply declined in the recent years, leading to longer drought periods with increased impacts on food security (World Bank, 2021b). There is a high risk of extreme heat in most of the country (except for Dahuk, which has a medium risk) with 'prolonged exposure to extreme heat, resulting in heat stress, which is expected to occur at least once in the next five years.' There is also a high risk of water scarcity in Anbar, Muthanna and Basra, with drought expected at least once in the next five years (ThinkHazard!, n.d.).	Decreased precipitation rates might lead to longer and more severe droughts, with negative impacts on agriculture and livestock, and affecting rural-urban migration (World Bank, 2021b).
Floods	
The annual fluctuation of the Tigris (February to June) and the Euphrates Rivers (March to July) are the main drivers of floods. The Tigris River can rise over 30cm per hour, greatly affecting the southern parts of Iraq (World Bank, 2021b). There is a high risk of flooding in most regions (with lesser risk in the Dahuk, Erbil and Sulaymaniyah). A high risk of flood indicates that 'potentially damaging and life-threatening river floods are expected to occur at least once in the next 10 years' (ThinkHazard!, n.d.).	Increased river fluctuations are expected to intensify flood occurrences. River fluctuations combined with water pollution are likely to increase waterborne diseases, including cholera (World Bank, 2021b).
Dust storms	
In recent years, more frequent and intense dust storms (<i>shamals</i> and <i>haboobs</i>) have been observed due to low soil moisture caused by urbanization, agriculture, droughts and upstream dams on the Tigris and Euphrates Rivers (World Bank, 2021b).	The projected increase in drought length and decrease in precipitation (World Bank, 2021b) might impact soil moisture.

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 legal framework on risk management focuses on the post-disaster response rather than considering the full cycle of disaster management, despite the creation of the Inter-Ministerial Committee on Disaster Management in 2007. In 2012, the Disaster Risk Reduction and Mitigation Law was submitted to the parliament. It includes the creation of a Disaster Reduction Council and National Disaster Risk Reduction and Management Center. Its implementation is, however, challenged by the lack of budget and limited capacities (Al-Shamsi, 2019).

2.2 Reduce health impacts of climate change

Climate change will affect human health in Iraq by increasing the risk of heat stress due to temperature rises (Dehaghi *et al.*, 2021; WHO & UNFCCC, 2022). The number of people exposed to thermal stress as well as heat and cold stress (due to temperature extremes) will increase in Iraq (Mohammadi *et al.*, 2021). According to WHO & UNFCCC (2022), the projected rise in mean annual temperature by 5.4°C could lead to 70 per cent of all days being 'hot days'. Heat stress causes several heat-related illnesses, including dehydration, rash, cramps, heat stroke, heat exhaustion and death (WHO & UNFCCC, 2022). The urban population, the elderly and those with underlying conditions are at heightened risk.

More frequent and intense floods will directly impact human health in Iraq by increasing the risks of death and damage (USAID, 2017). Increased temperatures and a decrease in rainfall due to climate change will reduce the quality and quantity of water, increasing the risks of waterborne diseases such as cholera (USAID, 2017). In 2018, the Iraq floods killed 21 people and injured over 180 (AFP, 2018). Pollution and shortages of safe drinking water are increasing hospitalization due to intestinal infections (Goering, 2020; Yeranian, 2018). With the projected increase in water scarcity, the number of people exposed to waterborne illnesses will likely increase (WHO & UNFCCC, 2022). Similarly, vector-borne diseases such as leishmaniasis, West Nile fever and dengue will increase as climatic conditions become favourable for vectors due to rising temperatures (Al-Obaidi & Ali, 2021; Paz *et al.*, 2021).

Cases of respiratory infections from more frequent dust and sand storms will increase exponentially (WHO & UNFCCC, 2022; USAID, 2017). Projected increases in dust and sand storms, due to desertification and drought, increase particulate matter in the air and carry harmful substances and pathogens (WHO & UNFCCC, 2022). This will lead to an increase in respiratory diseases. In addition, climate change could affect health by increasing cases of malnutrition through disruption of the food system (WHO & UNFCCC, 2022). Finally, extreme events such as floods and droughts can have a resultant effect of decreasing psychosocial wellbeing and increasing mental health challenges (Marzouk *et al.*, 2022).

2.3 Ensure sustainable water supplies

Water, Sanitation and Hygiene (WASH)

Iraq faces severe water shortages due to several factors including low rainfall rates, rising temperatures, mismanagement, high population growth rates, and urbanization (Ethaib *et al.*, 2022). However, climate change has exacerbated many of these challenges, especially the rise of drought conditions in the country, leading to significant declines in overall water availability (NRC, 2021). It is estimated that the water levels in the Tigris and Euphrates Rivers have declined by 30 per cent since the 1980s and will further decline by 50 per cent by 2030 (Dockx, 2019). Rising temperatures also increase evaporation rates, further reducing the water available (Al-Aloosy, 2021). Accompanying the issue of water depletion is the issue of water quality – droughts and flooding have a negative impact on the potability of water for human consumption, as increased erosion and runoff change the chemical compositions of the already-stressed resource and can make it unfit for human consumption. (Janabi, 2013).

The Tigris and Euphrates Rivers, both originating in Turkey, provide 98 per cent of the surface water in Iraq (Al-Mossawi, 2014). This means that Iraq's water availability and quality are also affected by environmental and management challenges outside its borders. Notably, extensive dam development in the upstream countries, particularly Turkey, exacerbates water scarcity in Iraq (Al-Aloosy, 2021). Moreover, high pollution rates and mismanagement of the limited water resources worsen the water crisis (Al-Aloosy, 2021; Guiu & Lennard, 2020).

Other climatic risks to Iraq's water resources include saltwater intrusion into groundwater resources and desertification that reduces water availability (WHO & UNFCCC, 2022; USAID, 2017). In southern Iraq, there are increasing risks of saltwater intrusion into the groundwater aquifer and the Shatt al-Arab River. These are mainly driven by the over-extraction of groundwater, declines in the river water levels and the rise of the Persian Gulf water levels (Abdulameer *et al.*, 2018; Ahmed & Al-Zawar, 2020).

Lastly, the projected increase in flash flood events will threaten water and sanitation services. For example, in 2018, severe rainfall and subsequent flooding interrupted water supplies and damaged toilets and showers (Kafembe, 2019).

Infrastructure and electricity

Decades of conflict and instability have left the country with little reliable electricity supply and grid connection, which constantly threatens the power supply and infrastructure in the country. Additionally, climate change and economic trends are putting increased pressure on what is currently in place. Indeed, the country's main energy source is petroleum, which is a particularly valuable export that represented a revenue of 80,027 million US dollars in 2019 (OPEC, 2019). The Iraqi portion of Kurdistan notably holds one-third of the country's oil reserves and has been a site of much tension in the past few years (New York Times, 2018). This reliance on fossil fuels makes the country, and the region at large, vulnerable to fluctuations in oil prices and global market trends, which can lead to stranded assets in a global context where reliance on fossil fuel is declining.

The country's next largest source of energy comes from its seven hydroelectric power stations that supply 9.22 per cent of the country's electricity (Pilesjo & Al-Juboori, 2016). However, with the climatic changes described above, declines in river water levels are decreasing this potential. Iraq's largest dam, the Mosul Dam, has an installed capacity of 750 megawatts (MW), but projections show that climate change will decrease its generation power by 5–10 per cent by 2050 (Pilesjo & Al-Juboori 2016; USAID 2017). On the other hand, increased severe precipitation events and flash flooding also threaten the country's energy infrastructure, particularly in the southern region of the country where the collapse of levees along the Tigris occurs regularly (FAO, 2016).

Two-thirds of Iraq's population lives in cities of which the capital, Baghdad, is the largest – the ancient city now has an estimated population over 7 million people (World Population Review, 2020). Baghdad experiences severe flooding – often flash floods – due to extreme precipitation events and inadequate drainage infrastructure (ReliefWeb, 2015). In the 1950s, large flood prevention schemes were built but they are falling into disrepair, caused by limited public finances as well as the Gulf War (1990–1991) and Iraq War (2003–2011), and are no longer adapted to the increasing height of floodwater as experienced in recent years (Britannica, n.d.).

2.4 Enable climate-resilient livelihoods and economic security

Climate change-induced droughts and water shortages are leading to a decline in Iraq's agriculture – the second most important economic sector after oil (Netherlands Ministry of Foreign Affairs, 2019). Iraq's economy is oil-dominated. However, agriculture is also a crucial sector and employs about 20 per cent of the country's workforce as well as contributing 5 per cent of the GDP (FAO, 2021). Within the sector, crop farming provides 75 per cent of income to farmers, while the rest depends on livestock and mixed crop–livestock production systems (FAO, 2021). However, more frequent droughts and water scarcity are leading to significant declines in production and productivity, evidenced by reductions in the sector's contribution to the GDP (Netherlands Ministry of Foreign Affairs, 2019).

Low rainfall and droughts result in significant crop production losses. Farmers experience losses in major crops such as wheat and barley (NRC, 2021). Farmers who depend on rainfed agriculture are the most affected by drought conditions. However, irrigation farmers are also affected by declines in water levels.

In addition, drought is expected to impact animal production through declining water and pasture availability (USAID, 2017; NRC, 2021). Climate change also has an impact on animal health, notably causing increases in vector-borne diseases and parasites in livestock; for instance, bluetongue disease and Rift Valley fever. This is of particular concern in Iraq and the region at large as highlighted by a 2012 report by the FAO (van de Steeg & Tibbo, 2012). In the region, climate change is altering the geographical range of these diseases, allowing their propagation notably through decreased water resources and higher temperatures as well as decreased amounts of available fodder (van de Steeg & Tibbo 2012; Kebede *et al.* 2018).

Water in Iraqi rivers has declined by 40 per cent in recent decades and will continue to decline, leading to agricultural crises and threatening livelihoods (Hassan *et al.*, 2018; Seyuba *et al.*, 2022). In 2021, Iraq experienced one of the worst droughts in history (Mahmoud & Tollast, 2021). The water level in the Tigris River plummeted and impacted irrigation agriculture and food security. A combination of high levels of pollution and the mismanagement of water resources along with inefficient irrigation infrastructure aggravates the agricultural water shortage challenges in the country (Guiu & Lennard, 2020; World Bank, 2021a).

About 92 per cent of the total land area in Iraq is at risk of desertification driven by extensive environmental degradation and climate change-induced droughts (Al-Ansari *et al.*, 2021). In addition, frequent sand and dust storms threaten land productivity (Netherlands Ministry of Foreign Affairs, 2019). Floods are also a significant challenge in Iraq that cause extensive crop damage (Al-Ansari *et al.*, 2020).

The fisheries subsector is also affected by the declining water levels. In the Shatt al-Arab river, the decrease in the freshwater volume has led to saltwater intrusion from the Arabian Gulf 150km upstream from the river mouth (Ahmed & Al-Zawar, 2020). Consequently, there have been mass fish mortalities and declining irrigation water quality with subsequent loss of fishing and agricultural incomes (Ahmed & Al-Zawar, 2020).

2.5 Address climate displacement and protection

Current and future displacement challenges

Widespread conflict in north and central Iraq in 2013–2017 led to the displacement of millions of Iraqis, 1.2 million of whom remain internally displaced persons (IDPs) as of 31 March 2022 (CCCM, 2022). Approximately 103,000 of these IDPs are living in informal sites (*ibid*). As of November 2021, over 18,000 Iraqis remained displaced due to drought, with the majority (73 per cent) based in urban locations (IOM, 2021). Iraq also hosts 250,000 refugees from Syria and 37,000 from neighbouring countries who have escaped conflict (ACAPS, 2022), over 90 per cent of whom live in the Kurdistan Region of Iraq (UNHCR, 2022).

Conflict-induced displacement in Iraq has deep roots in environmental and climate-related dimensions. For instance, visible links between water scarcity, agricultural, drought, migration and conflict are well-documented (Detges *et al.*, 2017).

Environmental degradation and water scarcity over the last decade has limited the agricultural sector, driving rural-to-urban migration (IOM, 2021). One study on migrants and hosts in the city of Basra in southern Iraq found that over half of the migrants cannot afford enough food or basic items and lack a financial safety net; they often settle in impoverished neighbourhoods already struggling with limited economic opportunities and insecure conditions (*ibid*).

Displaced populations face additional risks related to the changing climate and its impacts; notably, internally displaced communities are more likely to be food insecure and more vulnerable to disease outbreaks because of living conditions within IDP camps (UNHCR, 2021).

Potential needs of migrants and displaced people

Women, in particular, experience the burden of climate change impacts in Iraq due to pre-existing gender roles and persistent gender inequality that, among other outcomes, negatively influences their livelihoods options and assets (NUPI/SIPRI, 2022). Displaced women may experience disproportionate insecurity and poverty due to their marginalization. In the 2021 Global Gender Gap Report, for instance, Iraq was ranked 154th out of 156 countries due to women's restricted economic opportunities and civic participation (WEF, 2021)..

Migration law and policies

- [Global Compact on Migration](#) (signatory), 2018. In 2022, Iraq became the first MENA country to submit a Voluntary National Review and policy pledges as part of its commitment to the Global Compact on Migration.
- [Law No. 28 of 2012 Combating Trafficking in Persons](#), 2012. This law aims to reduce human trafficking, to assist victims and to protect witnesses and victims of trafficking.

Protection

Climate change in Iraq may be exacerbating the known drivers of conflict, which in turn will likely increase displacement. The impacts of climate change are also taken advantage of for conflict purposes by non-state armed groups, Al-Shabaab and Islamic State, recruiting largely in agropastoral regions where the pressure of climatic and environmental changes is making livelihoods very difficult to sustain, leaving few options for income generation without migration. These communities will be particularly vulnerable to recruitment by state and non-state armed groups as it is often presented as the only viable economic choice (Schwarzstein, 2017).

Prisoners frequently have heightened vulnerability to natural disasters due to spatial marginalization resulting from prison locations on hazard-prone land and/or isolation from emergency evacuation services; limited to no connections to social networks, which are crucial aspects to hazard resilience; and political marginalization, including lack of policies and services to prevent disaster impacts on imprisoned populations (Gaillard & Navizet, 2012). While specific information is not available for Iraq, these vulnerabilities, coupled with more frequent and intense disasters due to climate change, may leave prison populations particularly vulnerable to climate-related hazards such as extreme heat, extreme cold and floods.

2.6 Policy

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

Emission target: Cut greenhouse gas emissions by 15 per cent by 2030 (Yassin, 2022). Actions are planned in the following sectors: oil, gas, electricity, industry, trade, agriculture, transportation, waste and housing sectors.

Area of focus on adaptation: water, agriculture, biodiversity strategy and integrated drought risk management.

Inclusion of DRR: Yes, with a focus on drought and water management.

National designated entity: Climate Change Centre, Ministry of Environment.

Key stakeholders: Permanent National Committee on Climate Change, UNDP, UNEP, GEF, FAO, UNESCO.

Other national policies on climate

[Iraq's Initial Communication to the UNFCCC](#), (2017). In its communication, Iraq indicates priority sectors for adaptation including water, agriculture, health and biodiversity. Early warning systems on floods and droughts are part of the water management measures announced by the country.

Climate finance

There are currently numerous Green Climate Fund (GCF) readiness activities in the country, but no GCF project yet (GCF, 2022). 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>

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