



Iraq

The following climate factsheet summarizes available information on the climate of Iraq, climate change and impacts of these changes on humanitarian activities in country. Each of the factsheets were written as a compilation of information from peer-reviewed academic papers, government publications, and INGO documentation.

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 through the winter months while maximum temperatures in the south can exceed 45°C regularly through the summer months.

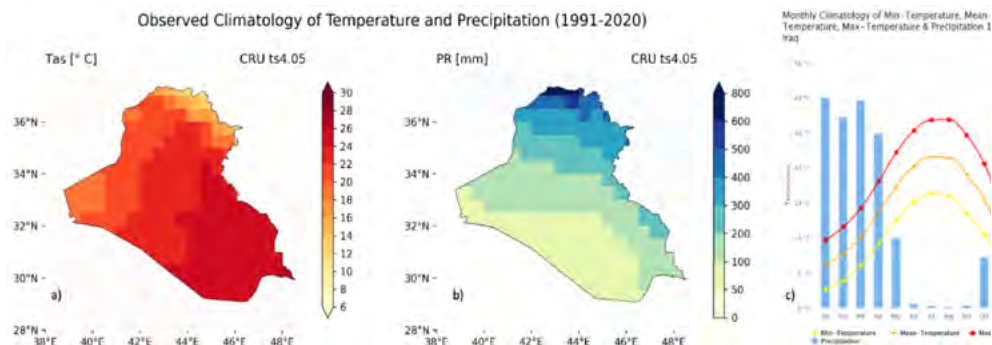
Average rainfall: Rainfall across Iraq ranges from as low as 100mm per year in the south, to as high as 1000mm per year in specific locations in the high mountains in the north.

Main driver of climate variability: ENSO and NAO

Short overview

Iraq is located within a Mediterranean climate regime characterized by boreal winter rainfall and hot dry summers. The climate variation across the country are influenced by latitude and high mountains in the north. The high mountain areas towards the north are

Figure 1. Observed Climatology of mean Temperature (a), annual mean total precipitation (b) and monthly climatology (c) over 1991-2020. (Adapted from World Bank, 2022)



characterized by higher rainfall (between 400mm and 1000mm per year) and relatively cooler temperatures with snow in some areas during winter. Towards the south, 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 El Nino Southern Oscillation (ENSO) as well as other drivers such as the North Atlantic Oscillation (NAO). Warm ENSO (El Nino) events are sometimes associated with wetter rainfall seasons in Iraq. The negative phase of the NAO is sometimes 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. Ranked 13 out of 191 countries by the 2022 Inform Risk Index (DRMKC, 2022), Iraq is one of the very high hazard risk countries in the world. Environmentally the key climate related risks are related to flooding and droughts.

Climate Change in Iraq

Historical climate change

Projected climate change

Temperature

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| <ul style="list-style-type: none"> ▪ The mean annual temperature over Iraq has increased at a rate of around 0.3°C per decade since the 1950s and 0.5°C per decade since the 1970s. Iraq has warmed more than 2°C since the 1950s. The frequency and intensity of hot extremes have increased and cold extremes have decreased. | <ul style="list-style-type: none"> ▪ Mean temperature over the region are projected to rise by between 1° C and 4°C for a high greenhouse gas concentration scenario (SSP5-85) and between 1° C and 3°C for low greenhouse gas concentration scenario (SSP2-4.5) by the 2050s. ▪ Maximum and minimum temperature will increase, and heat waves 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 increase significantly during the spring and autumn in the south of the country. |
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Precipitation

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| <ul style="list-style-type: none"> ▪ Overall rainfall trends are weak across the country with no clear signal of change though natural variability is high which may mask underlying slow changes. ▪ There is no clear signal of increases in extreme rainfall over Iraq except for some weak signals in the south of the country. ▪ Increases in drought indices have been identified particularly where the role of temperature in evaporation are included. | <ul style="list-style-type: none"> ▪ Mid-century estimates (2040-2060) of annual precipitation changes over Iraq under a low emission scenario (SSP2-4.5) are small ranging from around 8% drier to 15% wetter. Under a high emissions scenario (SSP5-8.5) similar changes are projected. ▪ The frequency and intensity of heavy precipitation events are projected to increase slightly under all scenarios with potential resultant increases in flash flooding. ▪ While projected changes in rainfall are uncertain, increasing water scarcity resulting from increased evaporation driven by increasing temperatures, combined with increased extraction of groundwater are very likely. |
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2. Priorities of the Movement and climate change

2.1 Scale up climate-smart DRR, early action and preparedness: DRR portrait

Observed Hazard	Projected Risk
Drought	
<p>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) foreseeing ‘prolonged exposure to extreme heat, resulting in heat stress, 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 Basrah with drought expected at least once in the next five years (ThinkHazard, n/a).</p>	<ul style="list-style-type: none"> Mean temperature over the region are projected to rise by between 1° C and 4°C for a high greenhouse gas concentration scenario (SSP5-85) and between 1° C and 3°C for low greenhouse gas concentration scenario (SSP2-4.5) by the 2050s. Maximum and minimum temperature will increase, and heat waves 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 increase significantly during the spring and autumn in the south of the country.
Flood	
<p>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 30 cm per hour, greatly affecting the southern parts of Iraq (World Bank, 2021). There is a high risk of flood 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/a).</p>	<p>Increased river fluctuations are expected to intensify flood occurrences. River fluctuations combined with water pollution is likely to increase waterborne diseases, including cholera (World Bank, 2021b).</p>
Dust storm	
<p>In the recent years more frequent and more intense dust storms (shamals and haboobs) 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).</p>	<p>Projected increase of drought length and decrease of precipitation (World Bank, 2021b) might impact soil moisture.</p>

It is essential to note that many of these hazards are interrelated and produced compound risks to the same areas and communities. In addition, risk must be understood as the interplay between hazard risk, exposure, and vulnerability which make certain communities, individuals, and sectors more impacted by the hazards. All project design should consider the risk mentioned above and the compounding risks they represent.

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 has been submitted to the parliament. It includes the creation of a Disaster Reduction Councils 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, 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% 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 deaths and damages (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 water-borne 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 hospitalisation cases due to intestinal infections (Goering, 2020; Yeranian, 2018). With the projected increase in water scarcity, the number of people exposed to water-borne 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 sandstorms 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 the rise in cases of malnutrition through disruption of the food systems (WHO & UNFCCC, 2022). Finally, extreme events such as floods and droughts and the resultant effects of decreasing psychosocial wellbeing and increased mental health challenges are expected (Marzouk *et al.*, 2022).

2.3 Sustainable water: resources management, infrastructure and access

Water, Sanitation and Hygiene

Iraq faces severe water shortages due to several factors including low rainfall rates, rising temperatures, mismanagement, high population growth rates, and urbanisation (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 (Norwegian Refugee Council (NRC), 2021). It is estimated that the water levels in the Tigris and Euphrates rivers have declined by 30% since the 1980s and will further decline by 50% by 2030 (Dockx, 2019). Temperature rise also increases evaporation rates, further reducing the water available (Al-Aloosy, 2021). Accompanying this issue of water depletion comes an 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 from Turkey, provide 98% of the surface water in Iraq (Al-Mossawi, 2014). Thus, 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, Power 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 (Organization of the Petroleum Exporting Countries (OPEC) 2019). The Iraqi portion of Kurdistan notably holds a third of the country’s oil reserves and has been a site of much tension in the past few years (The 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 assets¹ 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 and 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 and Al-Juboori 2016; USAID 2017). By the opposite token, 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 (Food and Agriculture Organization of the United Nations (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% of the country's workforce as well as contributing 5% of the GDP (FAO, 2021). Within the sector, crop farming provides 75% 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 rainfalls and droughts result in significant crop production losses. Several 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 and 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 and Tibbo 2012; Kebede et al. 2018).

Water in Iraqi rivers has declined by 40% 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 mismanagement of water resources, and inefficient irrigation infrastructure aggravates the agricultural water shortage challenges in the country (Guiu & Lennard, 2020; World Bank, 2021).

About 92% 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 causes 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 150 km 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 from late 2013 to 2017 led to the displacement of millions of Iraqis, 1.2 million of whom remain internally displaced 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%) 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% 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 (for example, see 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 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 for migrants and displaced people

Women in particular experience the burden of climate change impacts in Iraq due to pre-existing gender roles and persistence 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 marginalisation. In the 2021 Global Gender Gap Report, for instance, Iraq was ranked 154 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 such as 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 and 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 [National Determined Contribution \(NDC\) \(2021\)](#)

Emission target: Cut GHG emission by 15% 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 sector for adaptation, including water, agriculture, health, and biodiversity. Early warning system on flood and droughts are part of the water management measures announced by the country.

Climate finance

There are currently numerous GCF Readiness activities in the country, but no GCF project yet (GCF, 2022). National societies cannot directly apply 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 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). Factsheet on Climate Finance. <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. <https://www.climatecentre.org/wp-content/uploads/Entry-Points-for-Climate-Finance-Partnerships.pdf>

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