



Jordan

The following climate factsheet summarizes available information on the climate of Jordan, 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: Annual average temperature around the country varies between 16°-24°C (Figure 1a)

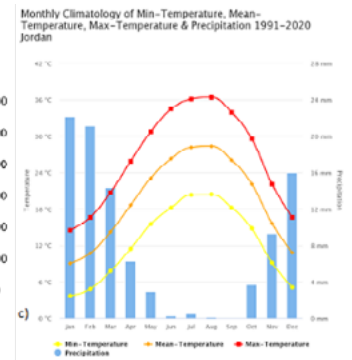
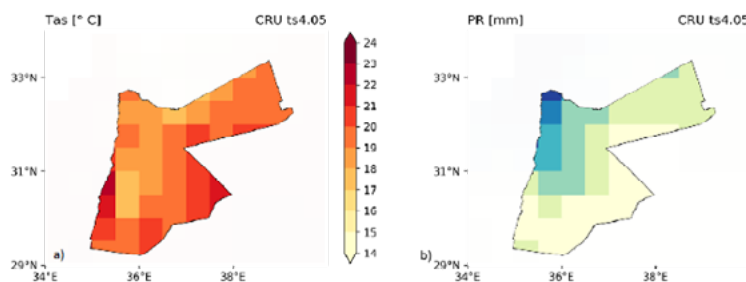
Average annual rainfall: The annual total precipitation varies sharply from one climatic region to another, from less than 50mm at the southern Badia region to a maximum of 600 mm at the Upper Northern Highlands region (figure 1b).

Short overview

Jordan's climate ranges between desert and arid to Mediterranean climate with hot and dry summers and wet and cool winters. The climate variation across the country are influenced by topography. The rainy season extends from around October to May with high amounts of the seasonal rainfall occurring through the months of December to March, reaching a maximum average during the month

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)

Observed Climatology of Temperature and Precipitation (1991-2020)



of January (figure 1c). Jordan has three distinct ecological zones: (i) Jordan valley which forms a narrow strip located below the mean sea level, and has warm winters (19°-22°C) and hot summers (38°-39°C), with average annual rainfall ranging between 100–300 mm; (ii) the Western Highlands where rainfall is relatively high (300–600 mm per year) and temperatures range from 9°–13°C in the winter to 26°–29°C in the summer; and the Badia, an arid and semiarid inland to the east (estimated to cover over 80% of the total area) where the annual rainfall is below 50 mm and temperatures range from 14°–16°C in the winter to 35°–37°C in the summer (GEF, 2014).

The diverse and varied geography of Jordan 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 69 out of 191 countries by the 2022 Inform Risk Index (DRMKC, 2022), Jordan is one of the higher hazard risk countries in the world exposed to droughts, floods, heat waves, cold waves, increasing temperature, increasing aridity.

Climate Change in Jordan

Historical climate change

Temperature

- The mean annual temperature over Jordan have increased at a rate of 0.3 °C/decade since 1961 to 2015 (Gutiérrez *et al.*, 2021a).
- Since the 1950s, hot and cold extremes have become warmer and the number of cold days have decreased, the number of warm days have increased (Dunn *et al.*, 2020).
- There has been an increase in heat waves intensity, frequency and duration (Perkins-Kirkpatrick and Lewis, 2020).

Projected climate change

- Mean temperature over the region are projected to rise until 2050 by at least 3°-4°C for a high greenhouse gas concentration scenario (SSP5-85) and 2°-3°C for low greenhouse gas concentration scenario (SSP2-4.5) (Gutiérrez *et al.*, 2021b).
- 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 rise and with high certainty (Gutiérrez *et al.*, 2021b; Ranasinghe *et al.*, 2021; Seneviratne *et al.*, 2021)

Precipitation

- Annual mean precipitation show high level of spatial variability over Jordan region. During the period 1980-2015 there has been downward trends in mean annual precipitation (GEF, 2014; Gutiérrez *et al.*, 2021b).
- Dry conditions, drought magnitude and frequency has increased in the past over the region (GEF, 2014; Seneviratne *et al.*, 2021).
- Mid-century estimates (2040-2060) of annual precipitation changes over Jordan under a low emission scenario (SSP2-4.5) and under a high emissions scenario (SSP5-8.5) are projected to decrease of around 5-15% (Gutiérrez *et al.*, 2021b).
- With decreases in precipitation and increases in temperature and evaporation, droughts are projected to intensify as a result of climate change over the region. In contrast, when rain storms occur in the wet season they are projected to be more intense as a result of the warmer atmosphere (Gutiérrez *et al.*, 2021b; Ranasinghe *et al.*, 2021; Seneviratne *et al.*, 2021).

2. Priorities of the Movement and climate change

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

| Existing Hydrometeorological Hazard | Projected Risk |
|---|--|
| Floods | |
| <p>Flood risk exists across Jordan and is especially a concern in regard to flash floods which are increasing with rapid urbanisation combined with lack of carrying capacity for drainage systems (World Food Programme [WFP], 2019). Urban sprawl into areas of natural drainage (wadis) is resulting in a particularly acute risk of floods for those populations.</p> | <p>The map developed by the WFP denotes the areas particularly at risk from and susceptible to floods. This was done utilising rainfall data and physio geographical data combined with a hydrological model. The results show the most susceptible areas to floods that will require activities to increase adaptation are located mostly in the Northwest of the country, namely: Ramtha, Bani Kinana, Al Shuna Al Shmalyah, Kora, Al Mazar Al Shamali, Qasabet Ajloun, Kofranja, Qasabet Al Salt, Ayn Al Basha and Al Jame'ah).</p> |
| Droughts | |
| <p>Jordan is one of the most water scarce countries in the world (IWMI, 2022). Annually, the water availability is approximately 100m³ per capita, which falls below the global benchmark of absolute water scarcity of 500m³ per capita. Jordan is currently experiencing drought conditions.</p> | <p>IWMI (2022) estimates that by 2030, 40% of Jordan's groundwater basins are likely to be severely depleted. The WFP drought hazard risk map highlights the most at risk areas, especially in the north-western regions. Climate change is already impacting drought frequency and intensity in Jordan and is projected to continue to be a challenge for the country in the coming years (IWMI, 2022).</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 country's disaster relief operations are highly centralised and managed by the Higher Council of Civil Defence (HCCD). The duties of the HCCD range from response planning at the national level, entering international DRR agreements and also more local levels activities such as volunteer training, and training of civilians. The country plans to establish the National Centre for Security and Crises Management (NCSM) which will work at the national level and be capable of facing the outcomes of environmental dynamics and effectively manage national crises (The Hashemite Kingdom of Jordan, 2019).

Disaster Risk Management Law and Policies

- [The Jordan National Strategy for Disaster Risk Reduction](#) has the mission of creating a coordinated and integrated effort for disaster risk reduction, stakeholder collaboration and innovative use of skills, technologies, and resources.
- [Jordan Vision 2025](#) seeks to improve and secure the welfare of citizens and ensure the continued delivery of services, this includes during and following disasters. The strategy mentions DRR in several contexts.
- [The National Climate Change Policy of the Hashemite Kingdom of Jordan \(2013-2020\)](#) is also an important part of the DRR strategy of Jordan and highlights the many overlaps between climate change adaptation and DRR for the country.

2.2 Reduce health impacts of climate change

Water scarcity (as precipitation declines and temperatures increase) is one of Jordan's most significant health threats (USAID, 2017; WHO & UNFCCC, 2015). Temperature increase poses additional risks such as a rise in vector-borne diseases and the number of people exposed to extreme heatwaves, especially in urban areas (Alwadi & Abdulla, 2022). Finally, flooding e.g., the 2018 flash floods can result in serious physical injuries and death (The Guardian, 2018).

Low water availability could force people to use contaminated water sources or reduce water for hygiene and sanitation, causing water and food borne diseases (Ministry of Environment, 2021). Low-income people and other vulnerable groups could be impacted the most. In addition, frequent flooding could disrupt water and sanitation infrastructure and contaminate water sources (Ministry of Environment, 2021). Water contamination causes food and water-borne diseases. According to the Ministry of Environment (2021), water-scarce Eater regions will be at high risk as water harvesting projects provide breeding grounds for vectors, especially mosquitoes.

Furthermore, higher temperatures, flooding, water scarcity, droughts and displacements affect agricultural production leading to breakdowns in food systems, thereby causing malnutrition (WHO & UNFCCC, 2015). Finally, frequent droughts and higher temperatures could increase pollutants and pathogens in the air, leading to respiratory infections ((Ministry of Environment, 2021; WHO & UNFCCC, 2015).

2.3 Sustainable water: resources management, infrastructure and access

Water, Sanitation and Hygiene

The core climatic risks to water resources in Jordan are decreasing precipitation, increasing temperature leading to high evaporation rates and frequent droughts (Ministry of Environment, 2021). Jordan is the second most water-stressed country globally (UNICEF, n.d.; USAID, 2022). Population growth and the influx of refugees are increasing water demands, with groundwater being used twice as quickly as it can be replenished (USAID, 2022; Whitman, 2019).

Frequent droughts and declining precipitation significantly reduce runoffs (Salameh & Abdallat, 2020). In addition to droughts and low rainfall, higher evapotranspiration rates will reduce surface water resources. It is estimated that Jordan would receive 51-75% less water from the Yarmouk-Jordan River due to droughts (Rajsekhar & Gorelick, 2017). The number and intensity of drier days are expected to increase, which will affect aquifers' recharge, which supplies two-thirds of Jordan's water needs (Whitman, 2019). Furthermore, rising temperatures are expected to increase human and agricultural water demands (Whitman, 2019; Al Qatarnah *et al.*, 2018). Therefore, overuse of groundwater resources may lead to their depletion. Azraq water basin is particularly at high risk of drying up (Hubendick & Gupta, 2021).

Extreme precipitation events and the resultant flooding may also increase due to climate change (UNICEF, n.d.). The risk of flash flooding is high in Jordan, with frequent events causing mortality. The risk stems from the country's topography. In this scenario, floods can lead to the deterioration of water quality by transporting huge quantities of sediments into water bodies (al Qatarnah *et al.*, 2018).

Most of Jordan's water resources are transboundary, requiring careful management. The lower Jordan River Basin in particular – access to it, quantities extracted etc. – is the source of contention, at times resulting in military intervention (Stockholm International Water Institute (SIWI) 2017).

2.4 Enable climate resilient livelihoods and economic security

In Jordan, the most susceptible livelihood sector to frequent droughts, temperature rises, floods, changing rainfall seasons, and declining rainfall is the agricultural sector, which is essential for the livelihoods of most people in rural areas (Ministry of Environment, 2021).

The agricultural sector faces dynamic threats as a result of climate change. Half of those working in the agricultural sector are rural women (Borghuis *et al.*, 2022). Agriculture also contributes 4% of Jordan's GDP but uses more than 50% of the available water resources (Giordano & Rüttinger, 2021). However, industrial and domestic water use are taking priority over agriculture due to the high economic value of industrial and domestic water use (Borghuis *et al.*, 2022). Other risks are related to increasing water scarcity (due to decreasing rainfall, droughts, and increasing demand) as well as declining agricultural productivity due to climate change

Temperature rise, decrease in rainfall, changing rainfall seasons, and frequent droughts and floods will lead to a reduction in rain-fed and irrigated crop productivity (Ministry of Environment, 2021). In addition, field crops such as barley and wheat are highly sensitive to temperature increases and show yield declines of 7-21% for wheat and 18-35% for barley under extreme heat conditions (Ministry of Environment, 2021).

As the water allocated for agriculture is reduced, decreasing precipitation, rising temperatures and extreme droughts due to climate change will increase irrigation water demands (World Bank, 2022). Therefore, the likelihood of crop failures will increase. In addition, rainfall seasons will become more variable and shorter, while rainfall events will be fewer but more intense (Ministry of Environment, 2021; USAID, 2017; World Bank, 2022). Furthermore, droughts will lead to desertification and poor soil quality, affecting productivity (Netherlands Ministry of Foreign Affairs, 2019; USAID, 2017). World Bank (2022) also noted that events of high-pressure systems could lead to very cold conditions during specific parts of the winter period and could cause widespread frost affecting food trees.

Climate change will also affect the incomes of those who depend on livestock. Water shortages and declines in pastures could affect the livestock sector, starting with cattle, followed by goats and sheep (Netherlands Ministry of Foreign Affairs, 2019). Deaths of animals and livestock diseases such as toxoplasmosis and brucellosis, will also increase due to climate change (Ata *et al.*, 2021). Livestock makes up 58% of the agricultural GDP revenue and provides income for over a quarter of a million Jordanians (Netherlands Ministry of Foreign Affairs, 2019). Thus, climate change impacts on agricultural production directly affect farmers and farming communities more broadly.

2.5 Address climate displacement and protection

Current and future displacement challenges

Jordan is a major refugee-hosting country, with over 760,000 refugees registered with UNHCR, mainly from Syria alongside refugees from Iraq, Yemen, Sudan, and Somalia (UNHCR 2022). The refugee population is highly urban, with 83% living outside of camps (*ibid.*). Jordan has only a small number of IDPs, with 138 disaster displacements recorded in 2020 (the last year of available data) due to flooding and storms.

- **Water challenges will likely increase for refugees in both urban areas and refugee camps in Jordan** (UN-Habitat n.d.). As an already vulnerable population, refugees experience the strongest impacts of climate change already, such as poor water quality and rationed amounts of water in the Azraq refugee camp (Bjerkestran 2022).
- **Syrian refugees in Jordan have and are projected to continue to increase pressure on limited water resources in the country** (Arsenault 2017). Tension over water was already present far before the arrival of Syrian refugees, with issues such as drought, transboundary water resource tensions, and water mismanagement all factors in the current water stress (Hussein *et al.* 2020). However, given that the vast majority of Syrian refugees are likely to stay in the country in at least the medium-term, it has been estimated that expected water demand and wastewater generation will nearly double by 2045 if current numbers of Syrians remain (Government of Germany/Government of Jordan 2021).
- **Positive climate change adaptation exists in refugee camps in Jordan, such as the creation of the largest solar power plant ever built in a refugee camp in Za'atari** and hydroponics projects in Azraq and Zaatari camps (UNHCR 2021). Azraq refugee camp is the first in the world to be powered by renewable energy (*ibid.*).
- **Extreme weather events such as flooding, which is a frequent occurrence at Za'atari refugee camp, will likely increase – but effective adaptation has already reduced their impact for refugee populations** (Freij 2016, Oxfam 2019). Although significant flooding in 2013 destroyed many shelters and much infrastructure, the development of sewage and drainage networks has significantly reduced the impact of annual flooding in the camp (ACTED n.d., Freij 2016).

Potential needs for migrants and displaced people

- Displaced women and girls will be disproportionately affected by the impacts of climate change in Jordan, such as water shortages (UNFPA 2022). Already the water network in the country has unequal distribution, with refugees and those in rural communities most marginalised (*ibid.*). Water scarcity is projected to increase domestic and intimate partner violence, with already existing evidence of rising tension around water availability among households in Azraq camp (*ibid.*).

Migration Law and Policies

- [UNHCR-Government of Jordan Memorandum of Understanding \(MoU\)](#), 1998 (partially updated 2014). Although Jordan is not a signatory to the 1951 Refugee Convention, through this MoU main protection commitments are outlined and affirmed.
- [Jordan Compact](#), 2016. This international commitment offers support for Syrians and Jordanians to obtain work permits and decent work.
- [Global Compact for Safe, Orderly and Regular Migration \(GCM\)](#), 2018. The GCM is the current global framework for addressing migration globally.
- [Law of Residency and Foreigners' Affairs](#), 1973. Jordan's Law of Residency and Foreigners' Affairs guides migrant rights and protection in the country, with refugees being subject to Law no. 24 of the document.

Protection

Around the world, people in detention 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). These vulnerabilities, coupled with more frequent and intense disasters due to climate change, may leave prison populations in especially precarious positions to hazards such as extreme heat and floods.

2.6 Policy

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

Emission target: 31% reduction of GHG emissions by 2030 compared to business as usual in Energy, Transport, Waste, Industry and Agriculture and Forestry Sectors.

Area of focus on Adaptation: Water resource management; Agriculture and Food security; Biodiversity and ecosystem; Health; Urban Resilience and Disaster Risk Reduction; Coastal Zone Management; Cultural Heritage and Tourism; Socio-economic impacts

Inclusion of DRR: Yes, DRR is one of the areas of focus. It includes measures on green infrastructure, readiness in urban area, enhancing community resilience, and building efficiency. In addition, early warning systems are a recurrent adaptation measures in the other areas of focus.

National Designed Entity: Ministry of Environment, National Committee on Climate Change

Additional Climate Policy

- [National Climate Change Policy of the Hashemite Kingdom of Jordan 2013-2020](#) (2013). The objective of the policy is 'to build the adaptive capacity of communities and institutions in Jordan, with consideration for gender and addressing the needs of vulnerable groups, to increase the resilience of natural ecosystems and water as well as agricultural resources to climate change, and to optimize mitigation opportunities' **The adaptation sectors are consistent with the NDC, including additional and more detailed measures on DRR.**
- [Jordan's Third National Communication on Climate Change](#) (2014) is expected to be updated later in 2022. It does not feature DRR as one of the adaptation pillar, but it does include 'integrated vulnerability and adaptation assessment of local community' and a pillar on health.

Climate finance

They are two national Green Climate Fund (GCF) projects focusing on adaptation in Jordan; one working on the coral reef protection and 'Building resilience to cope with climate change in Jordan through improving water use efficiency in the agriculture sector' (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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