Climate Centre

Climate fact sheet | 2024

Syria

This climate fact sheet summarizes the available information on the climate of Syria 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 annual average temperature in Syria is 18.1°C on the coastal plain and 15.2°C in the mountains. In most parts of the country, summer temperatures tend to exceed 30°C. During the winter, temperatures are moderate to cold. Temperatures are influenced and moderated by Syria's proximity to the sea as well as its elevation (World Bank, 2021).

Average rainfall: Annual rainfall in Syria ranges between 365–1,365mm/year on the coast, 500–,1820mm/year in the mountains, 50–600mm/year in the steppe, and 20–370mm/year in the desert (USAID, 2017).

Short overview

Syria has a combination of arid and semi-arid environments. The total country area is 185,880km^2, the majority of which is covered by the Syrian desert. Natural forests cover approximately 2 per cent of the landscape, and water covers less than 1 per cent of it (FAO, 2014).

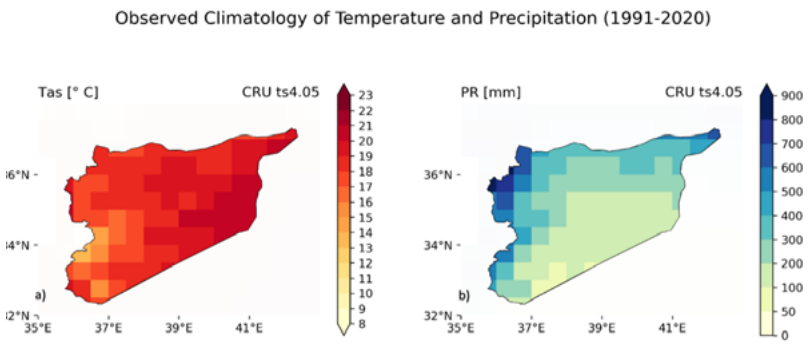

Figure 1. Observed climatology of (left to right) mean temperature and annual mean total precipitation 1991–2020 (Adapted from World Bank, 2021).

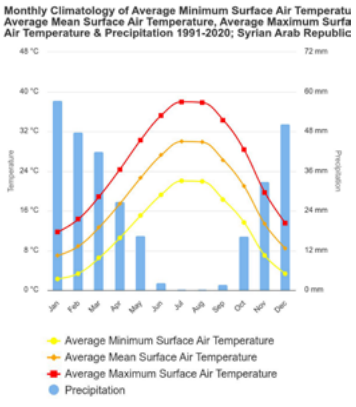

Figure 2: Average monthly climatology 1991–2020 (from World Bank, 2021).

Groundwater is known to take hundreds to thousands of years to replenish in arid and semi-arid environments (*ibid*). Most of the country receives very little rainfall; about 60 per cent of the country averages less than 250mm of rain annually. In the Syrian desert, situated in the central and south-east parts of the country, it is common for annual precipitation levels to fall well below 100mm (USAID, 2017). Nonetheless, some areas near the Mediterranean Sea receive up to 1,000mm of rain per year.

In spring (March to May) and less often in autumn (September to November), Syria is sometimes affected by strong southerly winds that cause massive sandstorms that raise the temperature considerably. These sandstorms damage vegetation and prevent livestock from grazing. Contributions to frequent sandstorms include the degradation of green terrestrial cover, which is caused by overgrazing, desertification, soil erosion and salinization, and unsustainable irrigation practices (Soniak, 2017).

Climate change in Syria

Historical climate change	Projected climate change
Temperature	
▪ Average temperatures have been rising in Syria, with increased mean annual temperature at a rate of 0.8°C per century since the 2050s (USAID, 2017). ▪ The country has experienced heatwaves in the recent past, with temperatures 8–10°C higher than usual (USAID, 2017).	▪ Mean temperatures over the region are projected to rise by between 2–3°C for a high greenhouse gas concentration scenario (SSP5–8.5) and by between 1–2°C for a low greenhouse gas concentration scenario (SSP2–4.5) by the 2050s. ▪ Maximum and minimum temperature will increase, and heatwaves will intensify in duration and peak temperatures for every increase in global warming levels above the pre-industrial values. In line with rising mean annual temperatures, the annual number of very hot days (days with daily maximum temperature above 35°C) is projected to increase significantly during the hot summer months. ▪ Temperature increases are expected to be lower near the Mediterranean coastline due to the moderating effect of the ocean.
Precipitation and water	
▪ There is no clear trend in rainfall over the past 70 years, though there have been dry periods and droughts in the past decades that have caused negative impacts. Increasing temperatures with associated increased water demand and evaporation are likely drivers of increased water scarcity (Selby *et. al.,* 2017).	▪ Several studies suggest that both the frequency and intensity of hydrological and agricultural droughts, especially near the Mediterranean Sea, will increase as global temperatures rise and water demand and evaporation increase. "With much of the infrastructure in ruins and minimal governance because of the civil war, Syria is more vulnerable than ever to future climate-influenced shock." (USAID 2017). ▪ Precipitation has been projected to decrease by 11 per cent over the next three decades, especially in the winter and spring, suggesting that the country will suffer from water shortages in the near future (USAID, 2017; Zeleňáková *et al.*, 2022). ▪ Globally, sea levels are projected to rise by an additional 20–30cms by 2050 and from 50–200cms by 2100, depending on levels of emissions; with at least one study ranging as high as 280cms (Kulp & Strauss, 2019). Therefore, sea level rise poses a significant threat to coastal communities and infrastructure, and increases the risk of saltwater intrusion along the coast of Syria.

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

Existing hazard	Projected risk
Droughts	
Water scarcity is a high risk in the southern part of the country (Daraa, Damascus, Homs, Quneitra, Suweida) meaning that droughts and 'prolonged exposure to extreme heat, resulting in heat stress, is expected to occur at least once in the next five years' and are a medium risk in the rest of the country (Think Hazard!, n.d.). It is estimated that about 10 per cent of the Syrian population is exposed to droughts (World Bank, 2021). The risk of wildfire is also high across the entire country (Think Hazard!, n.d.).	Several studies suggest that both the frequency and intensity of droughts, especially near the Mediterranean Sea, will increase as global temperatures rise, 'with much of the infrastructure in ruins and minimal governance because of the civil war, Syria is more vulnerable than ever to future climate-influenced shock.' (USAID, 2017).
Floods	
Extreme rainfall events (exceeding 50mm/hour) is a risk in Syria (World Bank, 2021). Life-threatening river floods are expected every 10 years in Aleppo, Dayr al-Zawr, Hama and Raqqa.	While a few climate models show a possibility of increased rainfall, most of them show an overall decrease, especially in the winter (World Bank, 2021). Precipitation has been projected to decrease by 11 per cent over the next three decades, especially in the winter, spring and fall/autumn (USAID, 2017).
Heatwaves	
The risk of heatwaves is high in the northern part of the country (Aleppo, Al-Hasakah, Dayr al-Zawr, Hama, Idlib, Latakia, Raqqa and Tartous) as well as in Quneitra as 'prolonged exposure to extreme heat, resulting in heat stress, is expected to occur at least once in the next five years'. The risk is medium in the rest of country (Think Hazard!, n.d.). The risk is particularly present in spring and summer when temperatures can be as high as 10°C above average (World Bank, 2021).	Frequent hot temperature extremes will increase in the next fifty years at a higher rate in Syria than the worldwide average (Think Hazard!, n.d.).
Dust storms	
Dust storms are a regular phenomenon in Syria, with a particularly large storm causing destruction in 2015 that was likely caused by a period of very hot and dry weather (Parolari *et al.*, 2016). These storms can originate from deserts across the region and have different microbes and characteristics (Gat *et al.*, 2017).	Since dust storms happen during times of extreme heat and dryness, it is likely that climate change will exacerbate the conditions that allow large dust storms to form (Parolari *et al.*, 2016).

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.

2.2 Reduce health impacts of climate change

Climate change poses significant challenges to the existing health crisis in Syria. The country's primary healthcare system is 'malfunctional' where two out of five subdistricts do not have primary healthcare facilities and the number of heath workers is insufficient to meet population demands (UNICEF, 2022a).

Drier and hotter temperatures will likely lead to more frequent sand and dust storms, resulting in greater numbers of people being diagnosed with respiratory diseases (World Bank, 2019). In addition, sand and dust storms obscure visibility and disrupt daily life.

Frequent and more intense droughts, higher temperatures and declining rainfall are leading to low agricultural production. Declines in agricultural production disrupt food systems contributing to cases of malnutrition, especially among children (USAID, 2017). In 2022 alone, the number of food-insecure children across the country rose to 4.6 million, with the northern and eastern regions affected the most (WHO, 2022).

Cases of waterborne and water-washed diseases such as scabies and diarrhoea are increasing due to shortages of drinking water and water for sanitation (Devi, 2021). In the event of scarcity, people are forced to consume unsafe water, which increases the risk of illnesses (OCHA, 2021). In particular, the use of poor-quality water leads to severe health risks, such as an increases in diarrhoeal diseases among children (UNICEF, 2022a). Furthermore, temperature rise and increased humidity could facilitate the survival, spread and transmission of disease vectors in Syria. For example, temperature rise effectively increases the geographical range and number of mosquitoes (Negev *et al.*, 2015; Paz *et al.*, 2021). Lastly, extreme heat can increase morbidity and mortality in people (WHO & UNFCCC, 2022). Vulnerable people, such as those above 65 years of age, people with pre-existing health conditions, children and homeless people/those with inadequate housing, are affected most (*ibid*).

2.3 Ensure sustainable water supplies

Water, Sanitation and Hygiene (WASH)

Syria is a water-scarce country. Climate change-induced droughts, temperature rise, rainfall declines and land degradation are further exacerbating water shortages (UNICEF, 2022a). Water shortages cause severe water access, sanitation and hygiene challenges in a country already devastated by conflicts. The war in Syria started in 2011 when an uprising against the Assad family turned into a civil war (CFR, 2023). It has been estimated that in 2011–2021 over 300,000 civilians were killed (UNHR, 2022) and nearly 13 million people, half of the country's population, have been displaced (CFR, 2023). In Syria, 42 per cent of people rely on alternative, often unsafe water sources due to a lack of safely managed water (UNICEF, 2022b). In addition, two-thirds of water treatment plants, one-sixth of wells, half of water pumping stations, and one-third of water towers have been damaged due to the protracted conflict (UNICEF, 2022b). Similarly, one-quarter of sewage treatment plants have been destroyed, and 70 per cent of sewage is discharged untreated (UNICEF, 2022b).

Droughts, low rainfall and high temperatures (driving high evaporation rates), in addition to overuse of water, are causing an unprecedented decrease in surface- and groundwater resources (Mourad & Berndtsson, 2020). In May 2021, water levels in the Euphrates River fell to an all-time low due to the worst drought recorded since 1953, causing severe water shortages in northern and eastern Syria (OCHA, 2021; Sottimano & Samman, 2022). It is estimated that the hot and dry conditions will increase in the Tigris–Euphrates basin as the climate changes, leading to decreased runoffs, high evaporation rates and water shortages (Dezfuli *et al.*, 2022).

Water shortages are driving the over-pumping of groundwater, which increases the risks of saltwater intrusion in coastal aquifers (Allow, 2011). The annual water withdrawal rate, before the damaged caused by the ongoing Syrian war, exceeded the internal renewable water resources by 160 per cent, and 78 per cent of all groundwater was deemed unsustainable (USAID, 2017). Over-abstraction of water in the north-east of the country resulted in the drying up of the Khabur River, increasing the pressure on groundwater resources still further (USAID, 2017).

Infrastructure and electricity

With a coastline on the Mediterranean Sea, there are several potential risks related to sea level rise in Syria. Rising sea levels threaten erosion, critical infrastructure and agricultural areas along the coast. Additionally, saltwater intrusion and contamination can impact groundwater sources in the area, further threatening the region's agricultural productivity (Faour & Fayad, 2008).

Urban planning should take climate change into account when designing spaces and infrastructure. Ensuring that urban dwellers have access to water and wastewater systems by repairing and upgrading infrastructure to be resilient to climatic hazards will help essential services to continue operating. Climate change adaptation needs to include repairing infrastructure such as roads, dams, water-catchment areas and irrigation systems. Increased temperatures affect the durability of construction materials; for example, the asphalt used for roads can buckle during a heatwave if not designed with rising temperatures in mind (Willway *et al.*, 2008).

Furthermore, increased temperature extremes, especially for extended periods, can result in increased morbidity and mortality. This necessitates the promotion of passive cooling strategies in building design and construction (Climate Centre, 2019).

Most of the energy consumed in Syria is from fossil fuels, complemented by a very small amount of hydropower (WorldData, n.d.). Increased temperatures cause an increase in water evaporation, which can have implications for the availability of surface water and the operation of hydropower facilities (Blackshear *et al.*, 2011).

2.4 Enable climate-resilient livelihoods and economic security

In Syria, agriculture is the most susceptible sector to climate change-induced droughts, water shortages, temperature rises and soil degradation (UNICEF, 2022a). Before the Syrian war, agriculture accounted for over 19 per cent of the country's GDP and employed over 50 per cent of the rural population (Schwartzstein & Zwijnenburg, 2022). Two-thirds of the crop farms are rainfed, while the remaining one-third are irrigated (*ibid*).

Low and erratic rainfall, especially in the North and Eastern Syria (NES) regions, affects agricultural production (OCHA, 2021). Research indicates that climate change has already caused decreases in the agricultural production of rice (by 30 per cent), maize (by 47 per cent) and wheat (by 20 per cent) in the Middle East and North Africa (UNFCCC, 2010). In 2021, Syria faced the worst drought in 70 years, and there were significant reductions in water availability for irrigation in the Euphrates River – a major source of agricultural water in NES (Devi, 2021). Consequently, there were significant crop losses, leading to high rates of food insecurity. Estimates suggest that local farmers lost as much as 80 per cent of their crops, and others were forced to sell off their livestock due to water and pasture shortages (Sottimano & Samman, 2022). Small- and medium-scale farmers and pastoralists suffer most under these conditions as their herds die and production declines (Schwartzstein & Zwijnenburg, 2022).

Droughts and water scarcity and the high cost of production combined with loss of control over production land (due to war) have all led to declines in wheat production (Al-Ghazi, 2021). In addition to these challenges, climate change increases the risks of pests and diseases, which lead to further reductions in crop yields (iMMAP, 2022). Finally, hotter and drier conditions increase the risk of pre-harvest wheat crop fires (*ibid*). Future projections show a good chance of rainfall declining below current levels, and groundwater table levels will not only continue to decline but could also become contaminated in some regions. Combined with an additional decrease in water runoff from the mountain snow, rivers will flow at lower levels, leaving even less water available for agriculture (Faour & Fayad, 2014).

2.5 Address climate displacement and protection

Current and future displacement challenges

Syria had an estimated 7.2 million internally displaced persons (IDPs) at the end of 2023, mainly due to conflict and violence – the second highest in the world for that year, after Sudan (IDMC, 2024). In 2023 a series of high magnitude earthquakes, along with flood and winter storms that have also occurred in previous years, left millions of Syrians living in heightened vulnerability. Around 9,300 displacements were triggered by floods and winter storms while earthquakes caused around 678,000 displacements (IDMC, 2024).

- Rainwater flooding poses an increasing and significant risk to IDPs in north-west Syria, where over 1.7 million displaced people live in temporary and informal settlements and IDP camps, with 83 per cent of camp residents living in densely populated areas with insufficient infrastructure (Shelter Cluster, 2021). For example, three-quarters of IDP sites lack rainwater drainage infrastructure, leaving IDPs vulnerable to flooding (*ibid*). In other months, however, these same sites lack fresh drinking water due to drought, illustrating the multivarious effects of climate change and the importance of addressing climate shocks in camps.

- The Syrian refugee mass migration illustrates how sudden displacement can impact environmental conditions in neighbouring countries. Rapid shifts in land and water use, and water management in the Yarmouk–Jordan River watershed – shared by Syria, Jordan and Israel – due to the exodus of Syrians led to temporary additional streamflow to downstream Jordan (Müller *et al.*, 2016). While this was positive, the arrival of Syrian refugees in countries like Jordan and Lebanon exacerbates and will continue to impact dire water availability in the region (Jaafar *et al.*, 2020). In Jordan, it has been estimated that expected water demand and wastewater generation will nearly double by 2045 if current numbers of Syrians remain (ReliefWeb, 2021).

- Analyses on flood risk in the north-west region of Syria illustrates that adequate shelter is crucially needed to withstand and adapt to climate hazards. Research has found that 85 per cent of surveyed locations identified access to adequate shelter as a top priority, in part due to climate hazards (REACH *et al.*, 2021). In total, 5,724 IDP shelters in North Dana, 1,644 IDP shelters in West Dana, and 4,957 IDP shelters in South Dana are exposed to flash flooding, illustrating the high level of need for climate-smart, durable shelter in the region.

- The Syrian conflict and ensuing displacement illustrate the complex interplay between social tensions and climate change in escalating conflict. Main drivers of the Syrian conflict are contested, with some researchers positing drought as a core driver (Kelley *et al.*, 2015), while others point towards the fractured social and political state of the country and find little evidence that either drought or migration contributed to the conflict (Selby *et al.*, 2017). Reduced rainfall combined with increasing temperatures contributed to desertification and the significant loss of agricultural land in eastern Syria, in particular; this, in turn, contributed to 800,000 peoples' loss of livelihood and the die-off of 85 per cent of the country's livestock (DW, 2021).

Potential needs of migrants and displaced people

Many of Syria's IDPs live in camps in tents with poor ventilation and durability, and therefore no protection against climate hazards (REACH *et al.*, 2021). Addressing the infrastructure and shelter needs of IDPs is imperative. Additionally, considering the characteristics of camp populations is key to deciding how displaced people can best be helped in the case of an extreme weather event. For example, children and elderly people are likely less able to travel long distances by foot to access assistance, such as community cooling shelters or flood evacuation shelters. Carefully selecting locations with these types of characteristics in mind is important for enabling as successful a response as possible.

Migration law and policies

Syrian Regional Refugee & Resilience Plan (3RP), 2015. The Syrian Regional Refugee and Resilience Plan is led by humanitarian and development agencies along with the governments of refugee-hosting countries such as Jordan to protect and assist displaced Syrians.

Protection

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 & 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 flooding.

2.6 Policy

Relevant information from the Nationally Determined Contribution (NDC) (2018)

Emission target: There is no specific target, but a wide range of activities in the following sectors: energy; forests, lands and agricultural; transport; industry; solid waste; housing.

Area of focus on adaptation: Water resources management; conservation of biodiversity; combating land degradation and desertification; integrated coastal zone management plans; and development of early warning systems.

Inclusion of DRR: Yes, the coastal management plan and proposed early warning system are an important part of the NDC.

National designated entity: Ministry of Local Administration and Environment.

There is a need for science-informed policy on water supply, water use, irrigation practices and land use. Development and maintenance of interactive, integrated resource policy will be key, along with the promotion of conservation measures and disaster risk management. In Syria, the responsibility for dealing with water resources management lies with a number of ministries, which are all represented under the Council of General Commission for Water Resource Management (FAO, 2008).

Climate finance

There are three Green Climate Fund (GCF) readiness activities in Syria: identifying the country's technological needs to meet its NDC commitments; preparatory activities to support the set-up of a National Designated Authority, including an assessment of Syria's climate profile; and strengthening the WASH sector's capacity to identify and address the impacts of climate change (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 also 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

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