Country-level | Climate fact sheet

Syria

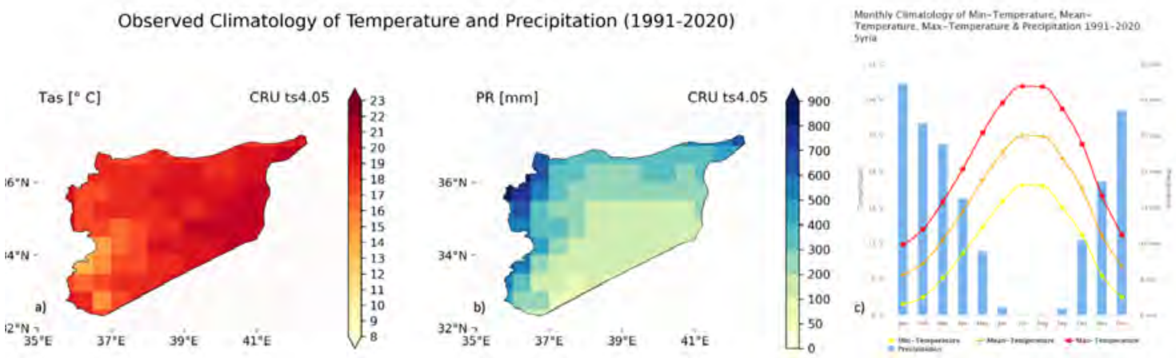
The following climate factsheet summarizes available information on the climate of Syria, climate change and impacts of these changes on humanitarian activities in country. Each of the factsheets were written as a compilation of information from peer-reviewed academic papers, government publications,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

1. Climate overview

Short overview

Syria has a combination of arid and semi-arid environments. The total country area is 185,880 square kilometres (km[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). Groundwater is known to take hundreds to thousands of years to replenish in arid and semi-arid environments (FAO, 2014). Most of the country receives very little rainfall; about 60 per cent of the country averages less than 250 millimeters (mm) 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.

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)



2022

In spring (March–May) and less often in autumn (September–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, and the country is now approximately 2°C hotter today than it was 100 years ago (World Bank Group 2014; International Research Institute for Climate and Society, n.d). • The country has experienced heatwaves in the recent past, with temperatures 8–10°C higher than usual (USAID 2017).	• Mean temperature over the region are projected to rise by between 2° C and 3°C for a high greenhouse gas concentration scenario (SSP5-85) and between 1° C and 2°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 hot summer months. • Temperatre increases are expected to be lower near the Mediteranean 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 ruin and minimal governance because of the civil war, Syria is more vulnerable than ever to future climate-influenced shock" (USAID 2017). • While a few climate models show a possibility of increased rainfall, most of them show an overall decrease, especially in the winter (World Bank Group n.d.) and in the western part of the country. Projected changes over the dry western parts are much less clear. Precipitation has been projected to decrease by 11 per cent over the next three decades, especially in the winter, spring and fall (USAID 2017). • 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 and 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 Movement and climate change

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

Existing Hazard	Projected Risk
Drought	
▪ Water scarcity are a high risk in the southern part of the country (Homs, Damascus, Dara, Suweida, Qunaytirah) 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 a medium risk in the rest of the country (Think Hazard, n/a). It is estimated that about 10% of the Syrian population is exposed to droughts (Worl Bank, 2021). ▪ The risk of wildfire is also high in the entire country (Think Hazard, n/a).	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 ruin and minimal governance because of the civil war, Syria is more vulnerable than ever to future climate-influenced shock' (USAID, 2017).
Flood	
Extreme rainfall events (exceeding 50 mm/hour) is a risk in Syria (World Bank, 2021). Life-threatening flood river are expected every 10 years in Aleppo, Ar-Raqqa, Dayr Az Zor and Hama.	While a few climate models show a possibility of increased rainfall, most of them show an overall decrease, especially in the winter (World Bank Group, 2021). Precipitation has been projected to decrease by 11% over the next three decades, especially in the winter, spring and fall (USAID, 2017).
Heatwaves	
The risk of heatwaves is high in the Northern part of the country (Al Hassakeh, Ar-Raqqa, Dayr Az Zor, Aleppo, Idleb, Hama, Lattakia and Tartous) and in Qunaytirah, with '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/a). The risk is particularly present in spring and summer with temperature that 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/a).
Dust storm	
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 exacerbates the conditions that allow large dust storms to form (Parolari *et al.* 2016).

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.

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 2 out of 5 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 the number of people diagonised 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 water-borne and water-washed diseases such as scabies and diarrhoea are increasing due to shortages of drinking water and water for sanitation (Devi, 2021). In case of scarcity, people are forced to consume unsafe water, which increases the risk of illnesses (OCHA, 2021). Low water levels also threaten the water supply in the country and the use of poor-quality water leads to severe health risks, such as an increases in diarrhoeal diseases among the children (UNICEF, 2022a). Furthermore, temperature rise and increased humidity could facilitate the survival, spread and transmission of disease vectors in Syria (Negev *et al.*, 2015; Paz *et al.*, 2021). Temperature rise effectively increases the geographical range and number of mosquitoes (Negev *et al.*, 2015). Lastly, extreme heat due to higher temperatures can increase morbidity and mortality (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*, 2022).

2.3 Sustainable water: resources management, infrastructure and access

Water, Sanitation and Hygiene

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. In Syria, 42 percent 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 have, and a third of water towers have been damaged due to the protracted conflict (UNICEF, 2022b). Similarly, a quarter of sewage treatment plants have been destroyed, and 70 percent of sewage is discharged untreated (UNICEF, 2022b).

Droughts, low rainfall and high temperatures (driving high evaporation rates), in addition to over use of water, are causing an unprecedented decrease in surface and ground water resources (Mourad & Berndtsson, 2020). In May 2021, twater 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 decrease runoffs, high evaporation rates and water shortages (Dezfuli *et al.*, 2022).

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

Infrastructure, Power and Electricity

With a coastline on the Mediterranean Sea, there are several potential risks related to sea level rise. Rising sea levels threaten erosion, critical coastal infrastructure and agricultural areas. Additionally, saltwater intrusion and contamination can impact groundwater sources in the area, further threatening the region's agricultural productivity (Faour and 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 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 (Singh *et al.* 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 percent of the country's GDP and employed over 50 percent of the rural population (Schwartzstein & Zwijnenburg, 2022). Two-thirds of the crop farms are rainfed, while the remaining one-third are irrigated (Schwartzstein & Zwijnenburg, 2022).

Low and erratic rainfall, especially in 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 (United Nations Framework Convention on Climate Change (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% 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 (iMMAP, 2022). 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 and Fayad, 2014).

2.5 Address climate displacement and protection

Current and future displacement challenges

Syria has an estimated 6.7 million conflict-induced IDPs – the highest in the world in 2021 (IDMC 2022). Many IDPs are also forced to flee again due to disasters such as floods, storms, and drought (*ibid*). Between 2008 and 2021 over 152,092 people were displaced due to disasters, primarily flooding, followed by wildfire and storms (*ibid*). In addition to IDPs, significant numbers of Syrian refugees have returned to the country.

- Rainwater flooding poses an increasing and significant risk to IDPs in northwest Syria, where over 1.7 million displaced people live in temporary and informal settlements and IDP camps, with 83% 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 Yarmou-Jordan river watershed, which is shared by Syria, Jordan, and Israel, due to the exodus of Syrians led to temporary additional stream flow to downstream Jordan (Mueller *et al.* 2016). While this was positive, the arrival of Syrian refugees in countries like Jordan and Lebanon exacerbates and will continue to exacerbate 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 (Government of Germany/Government of Jordan 2021).

- Analyses on flood risk in the Northwest region of Syria illustrates that adequate shelter is crucially needed to withstand and adapt to climate hazards. Research has found that 85% of surveyed locations identified access to adequate shelter as a top priority, in part due to climate hazards (REACH et al 2021). 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% of the country's livestock (DW 2021).

Potential needs for 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 infrastructure and housing needs of IDPs is imperative. Additionally, considering characteristics of camp populations is imperative 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 & Resilience Plan is led by humanitarian and development agencies 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 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 flooding.

2.6 Policy

Relevant information from the National 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, costal management plan and 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 two GCF Readiness Activities in Syria (GCF, 2022). National societies cannot directly apply for climate finance from the GCF, but they can be an implementing partner for an accredited entity. 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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