WEATHERING RISK

SYRIA

Climate Impact Profile

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adelphi RESEARCH

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Summary for policymakers

Syria is highly vulnerable to the impacts of climate change, a challenge compounded by protracted conflict and fragile governance. This profile provides an overview of projected climate trends for the near term (2020–39) and medium term (2040–59) under a lower-emissions scenario (SSP1-2.6) and a higher-emissions scenario (SSP3-7.0), together with their impacts on key sectors. Situated in the eastern Mediterranean, Syria's diverse topography ranges from coastal plains and mountain ranges in the west, including the Al Ansariyyah and Anti-Lebanon mountains, across interior plateaus and the agriculturally significant Fertile Crescent along the Euphrates River in the northeast, to the vast arid Badia steppe in the east. Syria's climate is predominantly semi-arid to arid, becoming increasingly continental further inland. However, along the Mediterranean coast conditions are more humid, with a climate characterised by hot, dry summers and cool, wet winters.

Climate Trends

Temperature

Mean annual temperatures are projected to rise across Syria under both SSP1-2.6 and SSP3-7.0 scenarios, with the most extreme heat concentrated in the northeast (Syria's breadbasket) and expanding outward from the Badia. Combined heat risks from hot daytime and warm nighttime temperatures are expected to reach "extreme" and "very high" levels across most of the country, including population centres along the western coast and interior plains, starting in the near term. Under SSP3-7.0, mean temperature is projected to rise nationwide with the highest increase during summer months by a best estimate of 2.46°C (1.77°C to 3.01°C possible) by mid-century. Under SSP1-2.6, summer mean temperature is projected to increase by 1.96°C (1.17°C to 2.43°C possible) across the same timeframe.

Precipitation

Overall mean precipitation is declining across Syria both annually and seasonally. Under SSP3-7.0, annual precipitation is projected to decrease nationally by 5% (-18% to +6% possible) by mid-century, with the greatest seasonal decreases during winter and spring. Western Syria is projected to experience more severe declines in precipitation than eastern Syria under this scenario. Meanwhile, under SSP1-2.6, annual precipitation changes little nationally by mid-century, although projections remain uncertain. Nevertheless, despite substantial model uncertainty, planning for drier winter, spring and autumn conditions in the near to medium term is prudent. At the same time, increases in rainfall intensity across parts of Syria point to a growing risk of extreme wet events.

Floods and Droughts

Syria faces very high drought and considerable flood risks despite drying trends. Riverine flood risk, already high across much of the country, is projected to further increase along watercourses in northwestern Syria. Annual precipitation intensity – which is projected to increase the most along the Mediterranean coast and in the northeast under SSP1-2.6 – contributes to these projections, although model agreement remains low. Drought risk is projected to intensify significantly by mid-century, with central and southern Syria shifting toward severely or extremely dry conditions under SSP3-7.0. Declining snowpack, upstream water diversions and increasing temperature-driven evapotranspiration compound these pressures, with cross-sectoral implications for agriculture, health, energy, infrastructure and transboundary water governance.

Coastal Zone and Sea-level Change

Syria's 183 km Mediterranean coastline, which is home to 11% of the population, faces increasing risks from sea level rise. Under both SSP1-2.6 and SSP3-7.0, sea levels are projected to rise on average by 11 cm above the 1995–2015 baseline by 2030, reaching 23 cm by mid-century and 67 cm by end-of-century under SSP3-7.0. The latter scenario projects inundation of 18 km² of land and damages amounting to SYP 10 billion by end-of-century, primarily due to the impacts of saltwater intrusion on agriculture. The Akkar coastal plain and Jableh are most vulnerable.

Projected Sectoral Impacts

Human Health

Climate-related health risks – including heat stress, vector-borne and water-borne diseases, and air pollution – are projected to worsen over the near and medium term. Rising temperatures will intensify heat-related illnesses and mortality, particularly in the interior plains, Euphrates River Valley and northeast, with disproportionate impacts on vulnerable groups. Warmer nights enhance leishmaniasis transmission, while droughts and flooding exacerbate risks of cholera and other water-borne diseases. As of 2023, two-thirds of the population lacked reliable access to safe drinking water, compounding existing disease burdens and malnutrition risks. Under hotter and drier conditions, more frequent and intense sand and dust storms also stand to raise cases of chronic respiratory illnesses nationwide.

Critical Infrastructure and Economy

Syria's post-conflict economy faces compounding climate risks. Drought episodes alone are projected to cause average GDP losses of up to 0.8% (approximately $320 million per drought year), while rising energy demand for cooling, geological hazards and infrastructure disruption place further strain on an already fragile economy. Vulnerability in the hydropower sector and conflict-damaged networks amplify these pressures. With reconstruction costs estimated at nearly 10 times Syria's GDP for 2024, climate adaptation and economic diversification are urgent priorities for economic recovery.

Food and Agriculture

Rising temperatures, declining precipitation, increasing drought and more than a decade of conflict threaten agricultural livelihoods across Syria. Prior to the Syrian Civil War, agriculture generated one-quarter of exports and sustained 80% of the rural population. However, since 2011, wheat, olive and livestock production have all declined sharply. Reduced upstream snowpack and earlier spring snowmelt will lower Euphrates River flows, a critical source of irrigation water. This is especially concerning given widespread groundwater overextraction and deteriorating water quality. Unpredictable late spring frosts threaten to further reduce fruit, vegetable and cereal crop yields already affected by land degradation and conflict-related pollution.

Human Displacement

Worsening climate-related impacts compound existing displacement pressures, with 7.4 million people internally displaced by the end of the civil war in 2024, more than half of whom were displaced to Aleppo and Idlib. Many internally displaced persons (IDPs) continue to live in inadequate housing and face significant barriers to return. Displacement camps in northwestern Syria have accelerated environmental degradation, heightening future flood, drought and wildfire risks. IDPs face disproportionate exposure to flooding and geological hazards, particularly in greater Damascus and northwestern Syria.

Ecosystems

Syria's ecosystems face mounting risks from rising temperatures, drought and wildfire. The country lies within a global biodiversity hotspot, hosting 173 threatened species across 42 key biodiversity sites, none of which are fully protected. Forests cover only 3% of Syria's territory and are retreating upslope, while desertification, wildfire risk and land degradation expand. Marine and freshwater biodiversity face additional pressures from rising sea surface temperatures, invasive species and conflict-related damage.

Country Overview

Strategically located in the eastern Mediterranean region of the Middle East, the Syrian Arab Republic borders Türkiye to the north, the Mediterranean Sea to the west, Lebanon and Israel to the southwest, Jordan to the south, and Iraq to the east and southeast. Spanning a total land area of 183,630 km^2 between 32°N and 38°N latitude, and 35°E and 43°E longitude, the country is administratively divided into 14 governorates (*muhafazat*) (see **Figure 1**).[1]

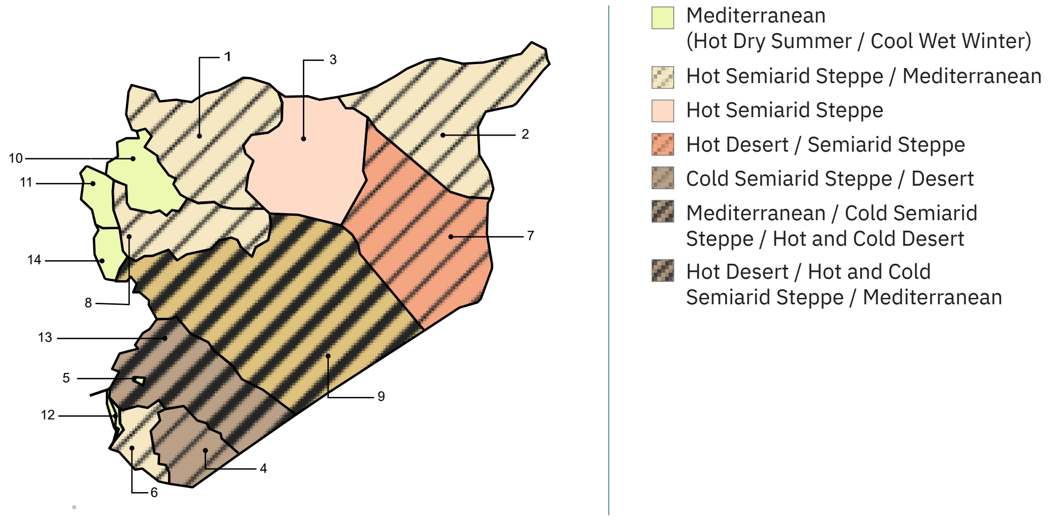


Figure 1. Map of Syria's Governorates with Dominant Topo-Climatic Zones.[I] This profile highlights dominant topographic and climatic zones for each of Syria's 14 governorates. Diagonal lines indicate two major climatic zones, while darkened diagonal lines indicate more than two climatic zones. See the Observed Climate section for further detail on local variations and seasonal temperature.

I Sourced by the author using MapChart and the World Bank's 2019 World Subnational Boundaries data catalogue. Note that the boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Figure 1 and subsequent maps display part of Quneitra as encompassing the 1974 UNDOF demilitarised zone (demarcated with western and eastern borderlines). Since the World Bank's Climate Change Knowledge Portal (CCKP) does not report data for the Golan Heights, an internationally disputed area occupied by Israel, this profile analyses trends using maps and data that exclude the Golan Heights (for reference, see UN Map No. 4204, Rev. 4, Aug 2022 and UN Map No. 3854, Rev. 4, Oct 2023). Key: 1=Aleppo (western interior plateaus and plains); 2=Al Hasakah (northeastern plateaus and plains); 3=Raqqa (northeastern plateaus and plains); 4=As Suwayda (Hawran–Druze plateau and plains); 5=Damascus (Anti-Lebanon foothills); 6=Daraa (Hawran–Druze plateau and plains); 7=Deir ez-Zor (northeastern plateaus and plains / Euphrates River Valley / steppe and desert); 8=Hama (Orontes River Valley / western interior plateaus and plains); 9=Homs (Al Ansariyyah and Anti-Lebanon Mountains / western interior plateaus and plains / central highlands / steppe and desert); 10=Idlib (Orontes River Valley / western interior plateaus and plains); 11=Latakia (coastal plain / Al Ansariyyah Mountains); 12=Quneitra (Anti-Lebanon Mountains / Golan Heights foothills); 13=Rural Damascus (Anti-Lebanon Mountains / central highlands / western interior plateaus and plains / steppe and desert); and 14=Tartous (coastal plain / Al Ansariyyah Mountains). Topographic features in parentheses identify generalised patterns, whereas sections below discuss more localised geographic areas of interest. For further details on topo-climatic regions see NOAA (2023). Köppen-Geiger Climate Subdivisions. U.S. National Oceanic and Atmospheric Administration. 14 April 2023. URL: https://www.noaa.gov/jetstream/global/climate-zones/jetstream-max-addition-k-ppen-geiger-climate-subdivisions; Sayre, R., D. Karagulle, C. Frye, T. Boucher, N.H. Wolff, S. Breyer, D. Wright, et al. (2020). An Assessment of the Representation of Ecosystems in Global Protected Areas Using New Maps of World Climate Regions and World Ecosystems. Global Ecology and Conservation 21: e00860. DOI: https://doi.org/10.1016/j.gecco.2019.e00860, URL: https://storymaps.arcgis.com/stories/61a5d4e9494f46c2b520a984b2398f3b

Geography and Terrain

Syria's terrain is defined by four main topographic zones: the coast, western mountain ranges, interior plateaus and plains, and eastern steppe and desert.[2]

The narrow 180 km-long coastal plain bordering the Mediterranean Sea has an elevation of less than 500 m above sea level and experiences mild, wet winters tempered by the sea. Further inland, two parallel mountain ranges extend from north to south. The Al Ansariyyah Mountains rise to an average elevation of 600–900 m above sea level. Meanwhile, the Anti-Lebanon Mountains (also known as Jabal Al Sharqi), which run along Syria's border with Lebanon, reach average elevations of 1,800–2,100 m above sea level.[3] These mountains feature cooler temperatures and the southern portion of the Anti-Lebanon Mountains contains the country's highest peak, Mount Hermon (2,814 m above sea level).

East of the tallest mountain ranges, most of Syria's population occupies semi-arid interior plains, which benefit from critical water resources, including the Orontes, Barada and Yarmouk rivers.[II] The northeastern plains feature both wetter and drier precipitation zones along the Tigris–Euphrates River Basin, but possess more extensive irrigation networks sustaining considerable agriculture. The remainder of Syria's total land area transitions into steppe and desert plains (known as the Badia), characterised by rock and gravel at average elevations of 300–500 m above sea level, and marked by sizable daily and seasonal temperature swings. The climatic zones associated with each of these major topographic regions are further examined in the Observed Climate section.

Population and Human Development

As of 2024, Syria's population totalled 24.7 million,[4] a figure shaped by more than a decade of conflict. The Syrian Civil War (2011–24) drove more than half of the country's pre-war population from their homes, displacing people across international borders as refugees or within Syria as IDPs. Furthermore, as much as 610,000 conflict-related deaths were recorded, with especially severe social and demographic consequences in northwestern and northeastern Syria, and in the countryside around Damascus (Rural Damascus).[5]

The humanitarian consequences extend beyond displacement and the loss of life. More than one in four Syrians – and nearly one in five children – report permanent injuries or disabilities, many resulting directly from armed conflict, and lack of adequate care and basic services.[6] Syria's Human Development Index (HDI) score has dropped to its lowest level since the 1970s, compounded by extreme rates of undernourishment and gender equality rankings among the lowest globally (see **Table 1**).[III]

Poverty, once only minimal in Syria, has become pervasive. In 2022, 24.8% of the population (i.e., 5.7 million people) lived on less than \$2.15 per capita per day (2017 purchasing power parity), while 67% (i.e., 15.1 million) lived on less than \$3.65 per capita per day. Above-average poverty concentrations are particularly evident in Syria's northwestern and northeastern governorates.[IV]

II In the northwest, the Orontes (or Asi) River flows northward from Lebanon alongside the Syrian cities of Homs and Hama, and forms a rich low-lying valley before entering Türkiye. In the southwest, the Barada River creates an oasis in the foothills of the Anti-Lebanon Mountains that supports Syria's capital and largest city of Damascus. In the south, the Hawran–Druze plateau and plains constitute a dry but fertile region drained by the Yarmouk River, a major tributary of the Jordan River.

III Syria's medium level of human development, as measured by the HDI, is based on factors such as life expectancy, education and gross national income. See UN Development Programme (2025). Human Development Report 2025. New York: UNDP. URL: https://hdr.undp.org/content/human-development-report-2025

IV However, estimates of poverty in Syria vary considerably by source and method, reflecting a lack of consensus. By comparison, using 2021 price-adjusted figures, the World Bank DataBank (2025) reports that 16.5% of the population lived on less than \$3 per day in 2022, while closer to one-third of the population lived on less than \$4 per day. See World Bank (2025). DataBank – World Development Indicators. URL: https://data.worldbank.org/; World Bank (2024). The Welfare of Syrian Households after a Decade of Conflict. Washington DC: World Bank. URL: http://documents.worldbank.org/curated/en/099051624114042163; World Bank (2025). Syria Macro-Fiscal Assessment. Washington DC: World Bank. URL: http://documents.worldbank.org/curated/en/099844070425163533

Economy

Syria's economy has contracted dramatically since 2010, with GDP shrinking by half to approximately $20 billion in 2023,[7] placing it among the smallest economies in the Middle East and North Africa. The country's GDP per capita reflects a low-income economy (see Table 1), although the World Bank projects a modest 1% growth rate for 2025.[8] In 2022, the service, and combined agriculture, forestry and fishing sectors accounted for broadly similar shares of GDP, contributing approximately 45% and 43%, respectively. However, formal employment in agriculture has declined by more than half since the 2000s, as the informal economy has expanded significantly.[V]

Since the Syrian Civil War ended in 2024, the World Bank has estimated the cost of reconstructing damaged buildings and critical infrastructure at roughly $216 billion.[9] Recovery efforts face further obstacles due to a series of additional shocks that occurred during and after the civil war, including the COVID-19 pandemic (2020), severe droughts (2014, 2021 and 2024–25), flooding (2021), wildfires (2025), a major earthquake (2023), and the economic fallout from crises in Lebanon (2019) and Ukraine (2022) – all against a backdrop of international sanctions and currency depreciation.[10] These factors have contributed to Syria's relatively high vulnerability to climate change and limited adaptive capacity, as reflected in its standing on the ND-GAIN Index.[VI]

V Syria's informal economy encompasses aspects of employment (e.g., casual and self-employment, including unreported family-run businesses), as well as trade and transactions (e.g., unreported remittances, foreign currency and gold exchange, and networked Hawala services outside of formal banking). The illegal production and trafficking of the narcotic Captagon comprised the most valuable economic sector during the Syrian Civil War, with an estimated value equivalent to twice the country's reported legal export revenue in 2023. See World Bank (2025). DataBank – World Development Indicators. URL: https://data.worldbank.org/; World Bank (2025). Syria Macro-Fiscal Assessment. Washington DC: World Bank. URL: https://documents.worldbank.org/en/publication/documents-reports/documentdetail/099844407042516353; World Bank (2024). The Welfare of Syrian Households after a Decade of Conflict. Washington DC: World Bank. URL: http://documents.worldbank.org/curated/en/099051624114042163

VI The ND-GAIN Country Index assesses a country's vulnerability to climate change, among other global issues, in combination with its readiness to adapt to impacts. The index measures vulnerability using indicators across six sectors (health, food, ecosystems, habitat, water and infrastructure) and measures readiness using indicators across three areas (social, economic and governance). For Syria, the highest vulnerability scores are associated with agricultural capacity and medical personnel, while the lowest readiness scores relate to political stability, non-violence and tackling corruption. See Notre Dame Global Adaptation Initiative (2023). ND-GAIN Country Index Rankings. University of Notre Dame. URL: https://gain.nd.edu/our-work/country-index/rankings/

HDI	GDP per Capita	% Population Living on < $3.00 per Day	Gini Coefficient	% Population Undernourished (3-Year Avg.)	ND-GAIN Vulnerability Index
162 out of 193 (2023)	**201** out of 214 (2023)	**46** out of 171 (2022)	**11** out of 171 (2022)	**4** out of 167 (2022–24)	**164** out of 187 (2023)
Medium Human Development	$847.40	16.5% *(2021 Purchasing Power Parity)*	26.6 *(0=Most Equal, 100=Most Unequal)*	39%	*High Vulnerability and Low Adaptation Readiness*

Table 1. Representative Fragility Indicator Rankings.[VII]

Conflict and Displacement

The Syrian Civil War began in March 2011, when anti-government demonstrations, inspired by Arab Spring movements elsewhere in the region, gave voice to political and economic grievances that spread nationwide. Government crackdowns on protesters triggered nationwide unrest and mass displacement (see Focus Box 1 and Human Displacement section for a more detailed discussion of drivers).[11] The conflict became increasingly complex, with the proliferation of non-state armed groups, which sought to control territory and intensified international concern following chemical weapons attacks in 2013.

The emergence of the Islamic State of Iraq and the Levant (ISIL/Da'esh) further escalated the conflict. Following its declaration of a caliphate in 2014, ISIL/Da'esh employed scorched earth tactics to seize control of nearly half of Syria's territory by 2015, primarily in the east of the country. Its rapid expansion drew in external actors, with Russia and Iran-backed militias supporting the Assad regime on one side, and the United States and NATO providing military support to the Kurdish-led Syrian Democratic Forces on the other.[12] Meanwhile, the Hay'at Tahrir al-Sham (HTS)-led coalition of Syrian opposition factions gained a dominant foothold in northwest Syria, while Turkish forces and the Turkish-backed Syrian National Army conducted military operations in northern Syria, officially aimed at countering Kurdish-led forces and ISIL/Da'esh. In addition, throughout the conflict, the Israeli military regularly led incursions into Syria, in part to counter Iranian and Hezbollah influence in Syria.

From 2017 onward, political negotiations and sustained counter-ISIL/Da'esh operations largely contained active hostilities in the northwest and northeast for several years, until the HTS-led coalition overthrew the Assad regime in a 12-day offensive in December 2024.[13]

VII Rankings are based on data reported for the most recent available year, and include all countries and territories worldwide. Unless otherwise indicated, data is sourced from the World Bank. Exceptions include the HDI (UNDP), undernourishment estimates (FAO) and vulnerability figures (ND-GAIN). The Population and Human Development subsection above provides more context on the mixed datapoints describing Syria's levels of poverty. See World Bank (2025). DataBank – World Development Indicators. URL: https://data.worldbank.org/; UN Development Programme (2025). Human Development Report 2025. New York: UNDP. URL: https://hdr.undp.org/content/human-development-report-2025; Food and Agriculture Organization of the UN (2024). FAOSTAT Suite of Food Security Indicators. Rome: FAO. URL: https://www.fao.org/faostat/en/#data/FS/visualize; Notre Dame Global Adaptation Initiative (2023). ND-GAIN Country Index Rankings. University of Notre Dame. URL: https://gain.nd.edu/our-work/country-index/rankings/

Governance and Transition

Despite the collapse of President Bashar al-Assad's regime in December 2024, Syria continues to face a range of regional security challenges. Although a five-year transitional period under President Ahmad al-Sharaa was established in 2025, several armed groups that emerged during the civil war continue to operate across the country, with governance remaining fragmented.[VIII] Reflecting these persistent challenges, the Fragile States Index classifies Syria as a "high alert" state, ranking it fourth out of 179 states based on a range of social cohesion, economic, political and cross-cutting indicators.[14]

Following the end of the civil war in 2024, an estimated 16.7 million people require humanitarian assistance, while 7.4 million people remain internally displaced. The northwestern governorate of Idlib, which remained outside of government control for much of the conflict, saw its population roughly double over this period and continues to face acute pressures.[15]

Observed Climate

Temperature Conditions

Temperatures across Syria vary by elevation and distance from the Mediterranean Sea. These two factors, among other contributors, produce a range of temperatures from mild, maritime-influenced conditions along the coast to continental regimes, with pronounced seasonal swings between hot summers and cold winters across the interior plateaus, steppe plains and desert. The **national average annual mean** temperature during the 1991–2020 reference period was 18.75°C, with the **warmest monthly mean** in July (29.95°C) and **coolest monthly mean** in January (7.03°C).[IX]

At the subnational level (see **Figure 1**), annual and monthly temperatures generally decrease with increasing elevation, **with upland elevations more than 1,500 m above sea level contrasting sharply with warmer lowland plains**.[16] **Interior areas with less proximity to the moderating effects of the Mediterranean Sea additionally experience greater seasonal swings between hot summers and cold winters**. All governorates experience hot summers (monthly means > 22°C). Subnationally, the warmest annual mean temperature occurred in the arid interior of Deir ez-Zor (20.44°C), with the hottest July mean of 32.84°C and a maximum temperature of 40.83°C. The lowest subnational annual mean temperature occurred in Damascus in the foothills of the Anti-Lebanon Mountains (14.40°C), with the lowest monthly mean in January of 4.61°C and a minimum temperature of -0.05°C.

Sub-zero winter temperatures characterise higher altitude terrain, and result in lower annual temperatures for inland governorates such as Damascus and Quneitra. Large seasonal temperature swings produce cooler average annual temperatures (< 18°C) in parts of the southern interior (Homs, Rural Damascus and As Suwayda), as illustrated in **Figure 2**. This distinguishes the temperate areas of Syria's western mountains, and (semi-)arid interior plateaus and plains from subtropical areas along the coast, and eastern desert and steppe.

VIII Notably, sectarian violence between mostly Alawite groups in Latakia and Tartous, and transitional government units resulted in hundreds of casualties in March 2025. Meanwhile, violence between Druze and Bedouin combatants in As Suwayda resulted in over 1,000 deaths in July 2025. The latter episode triggered Israeli incursions into Syria, including the capital city of Damascus. See European Union Agency for Asylum (2025). Security Situation in Syria: Recent Events. EUAA. URL: https://www.euaa.europa.eu/country-guidance-syria/security-situation-syria-recent-events

IX For data sources and methodology, see adelphi's Supplemental Information: https://weatheringrisk.org/en/publication/climate-impact-profile-supplementary-information

Precipitation Conditions

Precipitation patterns across Syria are shaped by three principal factors: changes in elevation, distance from the coast, and exposure to tropical, temperate and polar air masses. Together, these result in **regional and seasonal variability, with precipitation generally decreasing from west to east and north to south.** The national **average precipitation** for the 1991–2020 reference period was 294.84 mm annually, although **many governorates contain a blend of areas with different long-term precipitation patterns.**

The highest annual precipitation totals occur along the Mediterranean coast. Latakia, **the wettest region,** measured the most precipitation on average annually (777.83 mm), mainly in winter months. Nevertheless, even this relatively wet region experienced a dry season between May and October with little precipitation, characteristic of a Mediterranean climate and prevailing south-southwesterly winds. At higher altitudes in the western mountains above 1,000 m in elevation, winter precipitation frequently falls as snow, and elevated humidity levels (75%) associated with snow and fog are common.[17]

Further inland, the western and northern interior plains and plateaus measured annual precipitation totals above 300 mm, sufficient to support Syria's most productive rainfed agriculture. These areas encompass both Mediterranean climatic zones, such as Idlib and Quneitra, and mixed semi-arid zones in Aleppo and Hama governorates. **Syria's interior desert regions experienced dry annual totals of less than 200 mm,** with less defined seasonal precipitation peaks in winter. In the country's driest region, Deir ez-Zor observed the least precipitation annually (180.91 mm), with monthly precipitation ranging from less than 5 mm between June and September to 32.25 mm in January. Marginal and semi-arid regions recorded 200–300 mm of precipitation annually, as represented by Raqqa, and experienced greater interannual variability. **Figure 2** presents monthly temperature and precipitation averages over the last 30 years in representative areas, illustrating the range of seasonal temperature extremes and variation in wet season intensity, influenced by westerly polar and tropical air masses.[18]

HOW TO INTERPRET FUTURE CLIMATE SCENARIOS

A scenario describes a trajectory of future conditions based on key assumptions. It serves as an important tool for both climate scientists and social scientists to understand and plan for the effects of complex, unpredictable, human-non-human interactions across various timeframes. The Intergovernmental Panel on Climate Change's (IPCC's) Sixth Assessment Report draws upon a handful of hypothetical future scenarios (Shared Socioeconomic Pathways or SSPs) simulated by a large collection of computer models to gain insight into future societal and climate conditions. These scenarios possess a range of socioeconomic (e.g., population, economic development, technological, and governance) assumptions and associated emissions trajectories. The Climate Impact Profiles prioritise analysis of (1) the SSP3-7.0 scenario, as it explores the effects of high-adaptation challenges under a pessimistic warming scenario and regional conflicts; and (2) the SSP1-2.6 scenario, as it explores the effects of low-adaptation challenges under an optimistic warming scenario and greater international collaboration. Where possible, analysis notes deviations compared to other scenarios in the short and medium-term. Uncertainty in projections is indicated with the symbol throughout the profile. Additional details are specified in the corresponding text. See section on 'How to Interpret Uncertainty in Climate Change Projections' in the Supplementary Methodology for more details on the relationship between model scenarios and probability.

Figure 2a. Latakia
Coastal plain / Al Ansariyyah Mountains
(hot dry summer / cool wet winter)

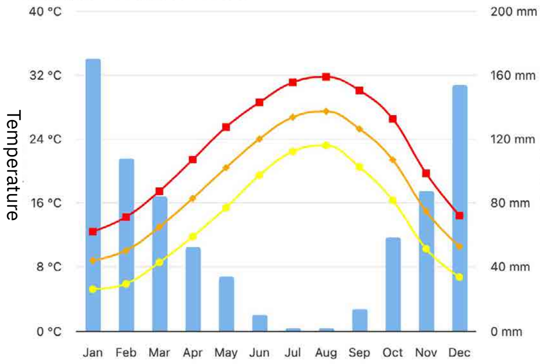


Figure 2b. Deir ez-Zor
Northeastern plateaus and plains / Euphrates River Valley / steppe and desert (hot desert / semi-arid steppe)

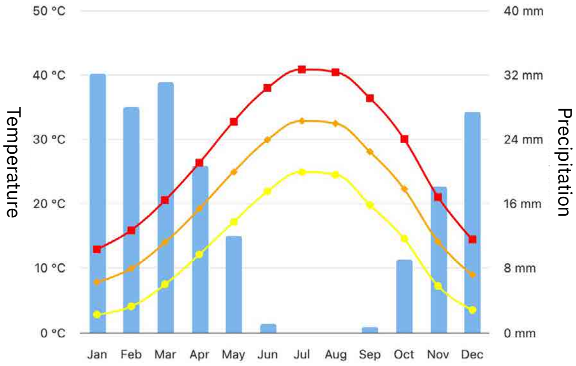
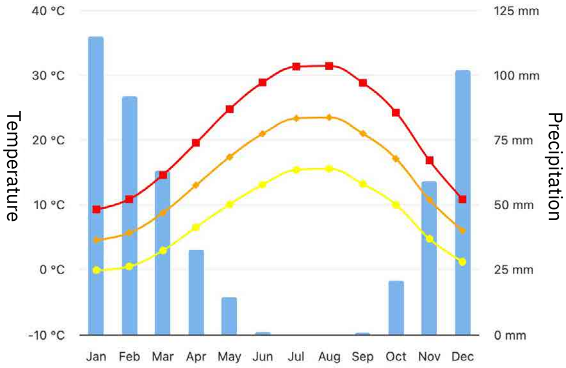


Figure 2c. Damascus
Anti-Lebanon foothills
(hot dry summer / cool wet winter)



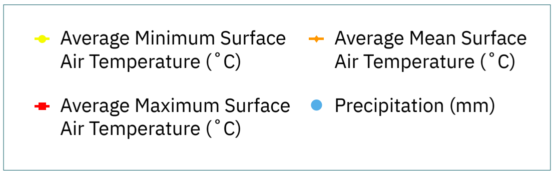


Figure 2. Monthly Temperature and Precipitation Averages (1991–2020) in Latakia (top left, 2a), Deir ez-Zor **(top right, 2b) and Damascus (bottom left, 2c).**[X] Note that each region's climate profile possesses different y-axes for temperature (°C, left) and precipitation (mm, right). Latakia experiences the smallest seasonal temperature range, and highest annual and winter precipitation totals (2a); Deir ez-Zor experiences the widest seasonal temperature range and lowest annual precipitation (2b); and Damascus experiences the coolest winter temperatures and moderate annual rainfall (2c).

X Monthly precipitation charts produced using World Bank (2025). Climate Change Knowledge Portal. URL: https://climateknowledgeportal.worldbank.org/

Temperature and Precipitation Trends

TEMPERATURE TRENDS

Observed temperature records over the last 50 years (1971–2020) indicate significantly warmer regional trends, especially in the heavily populated northwest, and during spring and summer months.[XI] During this period, average temperatures rose by around 0.5°C per decade nationally. Syria's mean temperature increased by 0.51°C, minimum increased by 0.54°C and maximum increased by 0.48°C per decade. The annual average rate of warming in Syria notably exceeded that in many other parts of the world – except for interior and higher-altitude parts of Europe, the Arctic, Central Asia, and other countries in the Middle East and North Africa – over this period.

Mean, minimum and maximum temperatures increased at broadly similar rates with marked seasonal variation, although generally higher in northern Syria.Annual mean temperatures increased the most in Syria's densely populated interior northwest (0.61°C per decade in Idlib). By comparison, regions in the relatively less populated southern interior observed the lowest annual maximum increase per decade of 0.43°C. **The highest mean increases occurred during summer and spring seasons.** Idlib observed the highest mean temperature increase during summer months (0.64°C per decade). **Minimum temperatures increased** even **higher during summer months** in some regions, with the largest increase also in Idlib (0.67°C per decade). However, spring maximum temperatures increased the most in the northwest (0.71°C per decade in Aleppo). Mean temperature increases during the winter varied the most regionally by more than 0.20°C per decade.[XII] **These warmer trends correspond with a significant increase in the number of tropical nights** – defined as nights with minimum temperatures above 20°C – **nationally** (9.62 more tropical nights per decade), alongside a significant decrease in the number of frost days – defined as days with minimum temperatures dropping below 0°C – nationally (2.85 fewer frost days per decade).

PRECIPITATION TRENDS

Annual precipitation records over the last 50 years (1971–2020) reveal a drying trend of -10.09 mm of precipitation per decade nationally, although this trend is not statistically significant. Seasonal and subnational patterns are more pronounced in select areas. Syria's northern governorates experienced the greatest seasonal declines. Precipitation decreased the most annually in Latakia (-19.16 mm per decade) and seasonally during autumn months (-6.52 mm per decade). However, the largest seasonal decrease occurred in Al Hasakah during spring months (-12.10 mm per decade). At the same time, observed precipitation nationally experienced notable interannual variation, including more years that periodically displayed much wetter autumn months and much drier spring months. This combination of long-term drying and increasing variability is projected to have far-reaching impacts across sectors (see Floods and Droughts section for a more detailed discussion).

XI For data sources and methodology, see adelphi's Supplemental Information: https://weatheringrisk.org/en/publication/climate-impact-profile-supplementary-information

XII For example, winter mean temperatures only increased by 0.34ºC per decade in Daraa and As Suwayda (southern interior), but by 0.57ºC per decade in Idlib (northwestern interior).

Projected Climate

The following projections explore the future impacts of the lower-emissions SSP1-2.6 scenario and higher-emissions SSP3-7.0 scenario, with reference to additional climate scenarios where appropriate. Projections are presented for two time horizons, the near term (2020–39) and medium term (2040–59).[XIII]

Best estimates represent the middle percentile value (median) from a range of climate model projections, while the range of possible outcomes shown in parentheses indicate the lower (10th percentile) and upper (90th percentile) bounds of these projections. This range indicates the degree of agreement among different models under each plausible what-if scenario. These probabilities do not represent forecasts nor indicate the likelihood of a particular scenario occurring.

Purple text and icons are used to support appropriate interpretation for decision-makers. For further details regarding climate scenarios, data sources, presentation and uncertainty see adelphi's Supplemental Information.

Temperature

Mean annual and seasonal temperatures across Syria are projected to increase significantly by mid-century, with many regions – especially those with mixed topography – expected to experience a shift toward climate zones currently associated with warmer or drier locations within the country. **There is high model agreement that temperatures will increase. However, the extent of these increases varies across plausible global emission pathways.** **Under SSP3-7.0, national mean temperature is projected to increase** by a best estimate of 1.02°C (0.63°C and 1.48°C possible) in the near term and 1.93°C (1.44°C and 2.55°C possible) in the medium term. **Under SSP1-2.6, mean temperatures increase at slightly higher rates in the near term, but considerably lower rates by mid-century**. Under this scenario, national mean temperature, for example, increases by 1.13°C (0.68°C and 1.50°C possible) in the near term but only by 1.57°C (0.88°C and 2.11°C possible) in the medium term, as illustrated in **Figure 3.**[XIV]

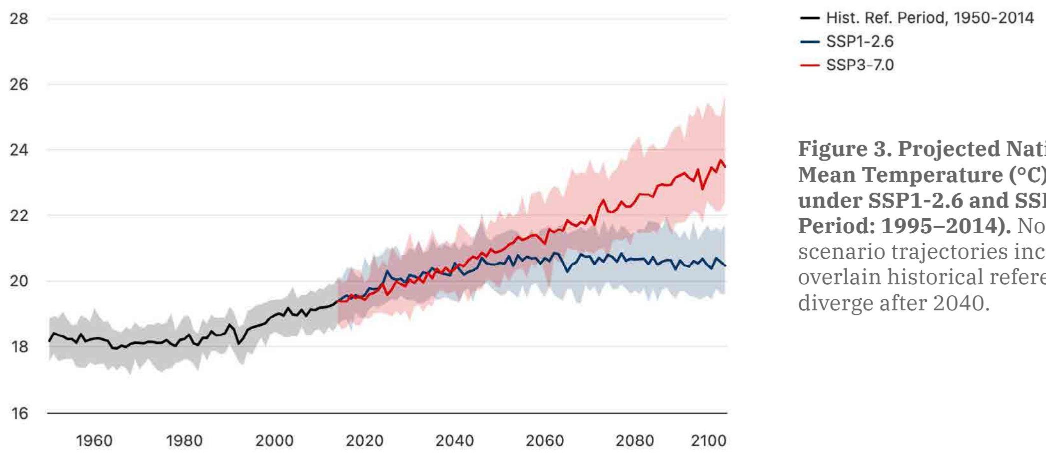


Figure 3. Projected National Average Mean Temperature (°C) for Syria under SSP1-2.6 and SSP3-7.0 (Ref. Period: 1995–2014). Note how both scenario trajectories increase above the overlain historical reference period but diverge after 2040.

XIII In short, the SSP1-2.6 scenario refers to a future global trajectory of up to 2°C warming by end-of-century that presumes low mitigation challenges and low adaptation challenges, realising net-zero CO_2 emissions after mid-century. The SSP3-7.0 scenario represents a future global trajectory with high mitigation and high adaptation challenges (including resurgent nationalism, regional conflict and insecurity), where CO_2 emissions double and warming exceeds 3°C by end-of-century.

XIV Projected maximum and minimum temperature increases generally mirror the rates of mean temperature increases under each scenario.

Mean temperature increases vary by region and season. The eastern interior is projected to warm to a greater extent than the coastal west, while summer months are projected to warm faster than winter months. By mid-century under SSP3-7.0, the highest subnational mean annual temperature increase occurs in Al Hasakah at 2.03°C (1.49°C and 2.74°C possible), with the largest best-estimate increases across the eastern interior. The lowest mean annual increase occurs in Tartous on the coast, increasing by a best estimate of 1.71°C (1.22°C and 2.31°C possible), with relatively similar rates of change along the coast and western mountains.

Under both scenarios, the highest mean increase by mid-century occurs during summer. Nationally, summer mean temperature increases by 2.46°C (1.77°C and 3.01°C possible) under SSP3-7.0 and 1.96°C (1.17°C and 2.43°C possible) under SSP1-2.6, both of which exhibit ranges indicating model disagreement on the magnitude of warming. **The lowest, but still significant, seasonal increases occur during winter months.** For example, winter mean temperature is projected to increase nationally by a best estimate of 1.47°C (0.75°C and 2.42°C possible) under SSP3-7.0.

By mid-century, **most of Syria's regions shift to hotter and drier climate conditions, with little difference between SSP1-2.6 and SSP3-7.0** (as shown in **Figure 4**). Meanwhile, many climate zones across southern Syria – including cold desert and cold semi-arid steppe – are projected to shift to their hotter equivalents, reflecting the **expansion of hotter and more arid conditions from the barren lands of the eastern Badia to marginal surrounding zones**. Notable shifts occur in parts of all southern governorates, while the northward expansion of at least semi-arid zones extends to parts of Idlib, Raqqa and Al Hasakah. Damascus, which does not exceed key annual mean temperature thresholds, becomes drier as well, shifting from a Mediterranean climate to cold steppe (see Floods and Droughts section for further discussion). Only coastal areas and already significantly mixed regions in the northwest experience minimal overall change in climate type.

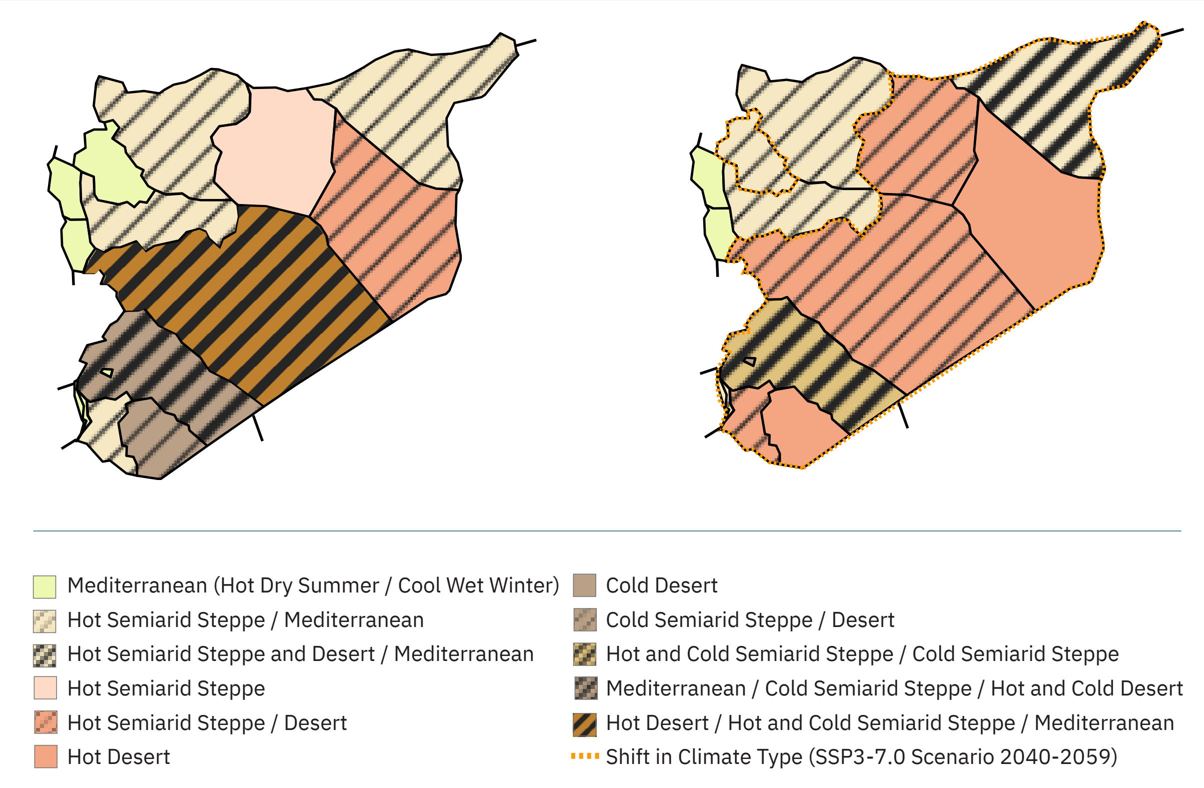


Figure 4. Projected Shifts in Climate Types (right) across Syria's Governorates by the Medium Term under SSP3-7.0, Compared to Baseline Conditions (left).[XV] Note that shifts from baseline map (left) to projected warmer and drier conditions (right) document generalised trends, as many subnational units incorporate multiple topographic and climate zones represented differently depending on the dataset.

XV Sourced by the author using MapChart and the World Bank's 2019 World Subnational Boundaries data catalogue. Key matches that of Figure 1. Note that the boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Since the baseline climatological period used to determine subnational-level Köppen-Geiger climate types differs significantly from the baseline period for the CCKP's climate projections in certain governorates, this analysis determined future subnational shifts based on whether projected mean temperature and precipitation anomalies exceeded key annual or seasonal thresholds when applied to the baseline values (1991–2020 reference period) reflected in Figure 1. For example, shifts from cold to hot desert or semi-arid steppe climates result when mean monthly temperatures exceed 18ºC, corresponding to Köppen-Geiger classifications. Since many governorates possess a mix of more than one climate type and require more detailed data on potential evaporation to determine precipitation-based climatic shifts, this analysis compared annual mean projected precipitation anomalies with FAO criteria to define Syria's agroecological zones. Precipitation and moisture criteria vary by publication date and the FAO's own categories possess overlapping ranges. However, by identifying whether average governorate values fall within non-overlapping category ranges, shifts from baseline could be determined. The modified criteria used are as follows: Zone 1a: > 600 mm annually; Zone 1b: 350–600 mm annually; Zone 2: 300–350 mm annually; Zone 3: 250–300 mm annually; Zone 4: 200–250 mm annually; and Zone 5: < 200 mm annually. Baseline spatial maps (1961–2009) reference Breisinger et al.'s (2011) study because of their detailed focus on measuring Palmer Drought Severity Index (drought defined by water balance) across zones, and climate projections for agricultural crops per agroecological zone (see Food and Agriculture section for more detail). The analysis then corroborated spatial shifts with relevant findings from existing literature, including historical land use shifts (Houmsi et al. 2019) and future regional climate shifts under comparable projections (Zittis et al. 2022). See Breisinger, C., T. Zhu, P. Al-Riffai, G.C. Nelson, R.D. Robertson, J. Funes, and D. Verner (2011). Global and Local Economic Impacts of Climate Change in Syria and Options for Adaptation. IFPRI Discussion Paper 01091. Washington DC: International Food Policy Research Center. URL: https://cgspace.cgiar.org/server/api/core/bitstreams/b5863299-8e47-4c0a-8e43-53d7fc6a651f/content; Houmsi, M.R., M.S. Shiru, M.S. Nashwan, K. Ahmed, G.F. Ziarh, S. Shahid, E.S. Chung, and S. Kim (2019). Spatial Shift of Aridity and Its Impact on Land Use of Syria. Sustainability 11(24): 7047. DOI: https://doi.org/10.3390/su11247047; Zittis, G., M. Almazroui, P. Alpert, P. Ciais, W. Cramer, Y. Dahdal, M. Fnais, D. Francis, P. Hadjinicolaou, F. Howari, A. Jrrar, et al. (2022). Climate Change and Weather Extremes in the Eastern Mediterranean and Middle East. *Reviews of Geophysics* 60(3): e2021RG000762. DOI: https://doi.org/10.1029/2021RG000762

Figure 5 maps the combined heat risk by governorate, integrating the effects of hot daytime temperatures and warm nighttime temperatures. Under **both SSP3-7.0 and SSP1-2.6 scenarios, the greatest combined heat risks – with serious health implications** (see Human Health section) – occur throughout most of the country**, except for the coastal and southern governorates, starting in the near term. Although the projected number of hot days and warm nights annually increase throughout all of Syria's governorates to some extent, mostly during summer months, models disagree over the magnitude of these increases. The most extreme conditions occur in the northeast and expand outward from the Badia by mid-century.**[XVI] Under SSP1-2.6, extreme and very high combined heat risks do not extend as far south or to all high-elevation areas by mid-century. By contrast, under SSP3-7.0, extreme combined heat risks extend into eastern Rural Damascus, and very high combined heat risks cover As Suwayda, Daraa and the Al Ansariyyah Mountains.

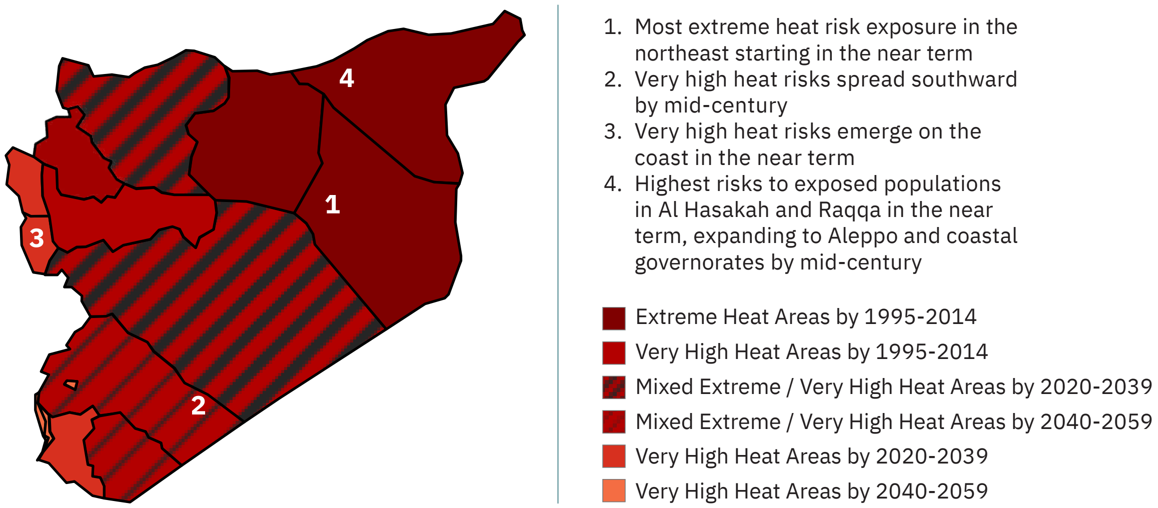


Figure 5. Heat Risk by Governorate under SSP3-7.0 in the Near and Medium Term.[XVII] "Extreme," "very high," "high" and "moderate" risks are assigned when a substantial portion of a governorate is projected to exceed the following heat thresholds in order of moderate, high, very high and extreme risk levels: daily maximum temperatures of 30°C, 35°C, 40°C and 45°C; and nighttime minimum temperatures of 20°C, 23°C, 26°C and 29°C. Combined heat risk patterns remain broadly similar under the SSP1-2.6 scenario for both time periods.

While more mountainous regions do not experience the same intensity of heat risks as in lower-elevation plains, they do experience critical decreases in the number of frost days (minimum temperature < 0°C) during winter months. In Damascus, for example, the best-estimate number of winter frost days decreases by eight days (-14 days and -1 day possible), a similar pattern to that of SSP1-2.6. While decreases in winter frost days in isolation may improve conditions for crop cultivation and energy conservation, late spring frosts continue to become more unpredictable, posing risks to IDPs in substandard shelter, and depressing fruit, vegetable and cereal yields.[19] Under both emissions scenarios, future temperature changes significantly impact all major sectors (see Projected Sectoral Impacts section for further detail).

XVI By mid-century, hot days (maximum temperature > 35°C) increase the most annually under SSP3-7.0 in Idlib by 42 days (30 days and 53 days possible). Hot days with a higher threshold (maximum temperature > 40°C) increase most annually in Deir ez-Zor by a best estimate of 39 days (29 days and 49 days possible), tropical nights (minimum temperature > 20°C) increase most annually in Daraa by a best estimate of 48 nights (33 nights and 63 nights possible) and tropical nights with a higher threshold (minimum temperature > 26°C) increase most annually in Deir ez-Zor by a best estimate of 44 nights (32 nights and 53 nights possible), according to the same scenario and time period.

XVII Sourced by the author using MapChart and the World Bank's 2019 World Subnational Boundaries data catalogue. Note that the boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Precipitation

Projected precipitation changes vary by emissions scenario. Under SSP1-2.6, national precipitation levels change little by mid-century, although uncertainty remains high. Under SSP3-7.0, while absolute precipitation amounts tend to decrease only marginally, percentage changes relative to historical baselines are more pronounced. Models more consistently indicate a trend towards drier rainy seasons under SSP3-7.0, particularly in western Syria.[XVIII] Given the wide range of uncertainty associated with precipitation projections, planning for a range of possible outcomes remains essential. However, spatial and temporal patterns with relatively strong model agreement provide valuable guidance for policymakers and practitioners. In particular, **decision-makers should prepare for potentially drier winter, spring and autumn months in the near to medium term.**

Under SSP3-7.0, average annual precipitation is projected to decrease nationally by 2% (-13% and +11% possible) in the near term and 5% (-18% and +6% possible) in the medium term, **suggesting greater model agreement of drying over time**.[XIX] By mid-century, the largest projected seasonal decreases occur during winter months at 9% (-21% and +6% possible) and spring months at 8% (-29% and +16% possible).[XX] Furthermore, projected reductions in annual precipitation are greater in western Syria than in the east by mid-century. Along the coast around Latakia, precipitation is projected to decrease by 5% (-16% and +7% possible) in the near term and by 11% (-22% and +1% possible) in the medium term.[XXI] By contrast, under SSP1-2.6, changes in average annual precipitation remain uncertain over both the near and medium term.[XXII]

Projected seasonal precipitation changes under SSP3-7.0 (see **Figures 6a-b**) illustrate different regional trends that, in combination with projected temperature changes, may exacerbate **drought conditions and pose significant challenges to all sectors nationally** (see Floods and Droughts section). In Latakia (see **Figure 6a**), SSP3-7.0 projects the greatest seasonal percentage decrease during autumn months in the near term at 9% (-32% and +10%) and the largest absolute decrease during winter months in the medium term at 26 mm (-98 mm and +28 mm possible). Although seasonal model uncertainty generally decreases over time, the range of possible outcomes remains substantial.

A different seasonal pattern emerges in As Suwayda (see **Figure 6b**). Under SSP3-7.0, the largest percentage decreases occur during spring months in the near term at 11% (-29% and +24% possible) and during winter months in the medium term at 13% (-25% and +2% possible).[XXIII] **Overall, depending on the projection and region, Syria experiences decreasing mean**

XVIII This section primarily focuses on precipitation percentage changes compared to historical baselines, as this metric underscores shifts in Syria's already dry and drought-prone climate. Succeeding footnotes indicate volumes of absolute (mm) precipitation corresponding with each percentage change projection. Projected precipitation trends under SSP1-2.6 remain more uncertain than SSP3-7.0. However, the *magnitudes* of change for both mid-century precipitation projections remain uncertain for a host of reasons, including model uncertainty and inherent variability. When interpreting "best estimate" projections, it is important to note the ranges of potential model outcomes in parentheses, which indicate both higher and lower plausible outcomes. See Floods and Droughts section for a complete interpretation of other factors influencing projected drought conditions.

XIX In absolute terms, annual precipitation decreases nationally by 1 mm (-33 mm and +26 mm possible) in the near term and 12 mm (-45 mm and +18 mm possible) in the medium term under SSP3-7.0.

XX In the near term, the largest seasonal precipitation decrease nationally occurs during winter months by a best estimate of 4% (-16% and +8 % possible) and during spring months by 5% (-24% and +26% possible).

XXI In absolute terms, Latakia's annual precipitation declines by 29 mm (-119 mm and +48 mm possible) in the near term and 73 mm (-176 mm and +44 mm possible) in the medium term under SSP3-7.0. Under SSP1-2.6, Latakia's median annual precipitation volumes decline by roughly equivalent amounts at rates similar to the national average in the near and medium term, although with less model agreement over time. Under this scenario, precipitation decreases by a best estimate of 7 mm (-90 mm and +55 mm possible) or 3% (-13% and +1% possible) in the near term, and by 8 mm (-120 mm and +63 mm possible) or 3% (-14% and +6% possible) in the medium term.

XXII SSP1-2.6 projects annual precipitation nationally to increase by a best estimate of 2 mm (-21 mm and +21 mm possible) in the near term and 3 mm (-30 mm and +23 mm possible) in the medium term. Mean precipitation amounts during winter and spring months maintain a wide range of uncertainty in the direction of change.

XXIII As Suwayda's annual precipitation decreases by 1 mm (-29 mm and +19 mm possible) or 4% (-13% and +11% possible) in the near term, and 13 mm (-30 mm and +9 mm possible) or 6% (-20% and +2% possible) in the medium term under SSP3-7.0.

precipitation both annually and seasonally, consistent with more extreme dry events in the future (see discussion of SPEI drought index below). **At the same time, seasonal *increases* in precipitation intensity and frequency (average largest five-day precipitation) indicate the potential for more extreme wet events, at least regionally** (see Floods and Droughts section for a more detailed discussion of these trends).

Figure 6a. Latakia

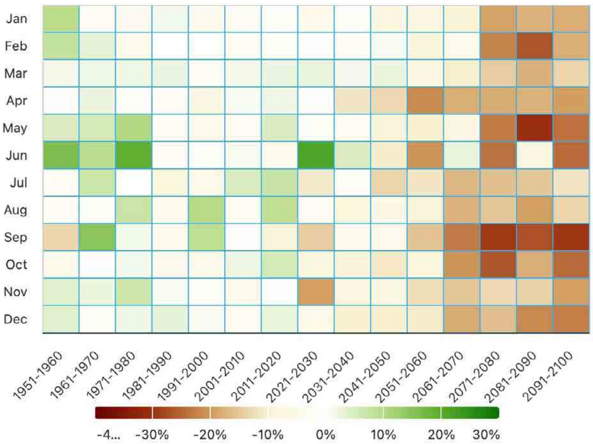


Figure 6b. As Suwayda

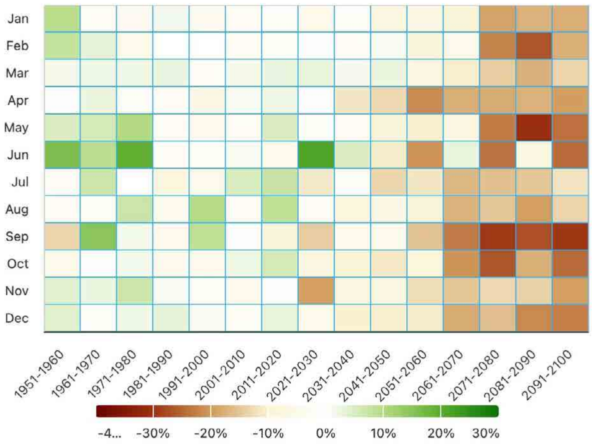


Figure 6. Projected Percentage Change in Precipitation to 2100 (Ref. Period 1995–2014) under SSP3-7.0 in Latakia (6a, left) and As Suwayda (6b, right). Median precipitation percentage decreases are more consistently projected during autumn months in Latakia in the near term, and during spring and winter months in As Suwayda in the medium term. In the long term, drying trends extend across all seasons in both regions. Note that the percentage-change scales differ between plots, with a wider range for Latakia.

Floods and Droughts

Syria faces very high drought risk, driven by higher mean and extreme temperatures, lower overall stream flows, increased water demand, and changes in precipitation patterns, among other variables. At the same time, the country faces considerable flood risks due to various climatic and localised non-climatic factors.[XXIV]

Flood risk is influenced by multiple variables, including increases in the frequency and duration of precipitation, more intense short-duration precipitation, and increases in run-off due to temperature-related changes (e.g., a shift away from slow-melting solid precipitation). Local hydrological and land use patterns, such as paved surfaces and limited vegetation cover in urban areas, further amplify run-off and flood exposure. In addition to flash floods triggered by intense rainfall, riverine flooding caused by overflowing channels also affect many of Syria's watersheds.

XXIV See Projected Precipitation section for levels of uncertainty in purple associated with linked indicators for meteorological floods and droughts.

Because these watersheds extend across international boundaries, and support irrigation, energy and domestic water supply, the impacts can cascade across sectors (see Food and Agriculture, and Critical Infrastructure and Economy sections).[XXV]

Particularly under the SSP1-2.6 scenario, certain areas are projected to experience **best-estimate increases in precipitation intensity** (as measured by average largest precipitation accumulation over a five-day period) **by mid-century. However, localised increases in annual and seasonal intensity generally possess high model uncertainty regarding both the direction and magnitude of change.** The highest increases in precipitation intensity, annually and seasonally, occur in Latakia on the Mediterranean coast. Near-term projections are relatively similar under both scenarios, although SSP1-2.6 projects a greater increase of 11 mm (-40 mm and +60 mm possible) by mid-century.[XXVI] Seasonal increases in Latakia during spring months roughly match annual projected increases. However, during winter months, the greatest increase of 9 mm (-47 mm and +38 mm possible) occurs in Al Hasakah. Likewise, the projected change in the frequency of average largest five-day precipitation events by mid-century increases notably only in certain regions (northeastern Syria) under both scenarios. In the governorate of Homs, which encompasses much of the eastern Badia, the frequency of such events at 100-year intervals increases most by a best estimate of 1.52 times (0.38 times and 3.24 times possible) by 2035–64 (centred on 2050) under SSP1-2.6.[XXVII]

Overall, these projections indicate that precipitation intensity elevate flood risks across various parts of Syria during different seasons in the near and medium term, although without high model agreement. Similarly, **the frequency of such events is projected to increase most in the northeast under both scenarios, although again without high model agreement. Combined with the role of non-meteorological contributors to flood risks (described in more detail below), these projections suggest that decision-makers should prepare for both recurrent flooding and increasingly severe droughts over the near and medium term.**

Figure 7 presents **baseline and projected riverine flood exposure risk** under relevant Middle-of-the-Road (SSP2-4.5) and high (SSP3-8.5) emissions scenarios.[XXVIII] Extremely high riverine flood risk, defined as more than 1% of the population affected annually on average, is concentrated along many watercourses originating in the Badia watershed (Homs). Areas where riverine flood risks rank high (0.006–1% of the population affected annually on average) include the Euphrates River downstream of Lake al Asad and the Lower Khabour tributary (Raqqa, Deir ez-Zor and Al Hasakah), as well as nearly all watersheds in western Syria. **Projections for 100-year riverine flood events under both scenarios by mid-century suggest potential increases in certain areas already facing high existing risk. However, in other high-risk areas, projected changes do not increase with high model agreement.**

XXV Syria's major river basins include: the Euphrates River and its major tributary the Khabour River in the northeast (Aleppo, Raqqa, Deir ez-Zor, Al Hasakah); Orontes River in the west (Rural Damascus, Homs, Hama, Idlib, Aleppo); Coast or Al Sahel (Latakia, Tartous); Yarmouk and Upper Jordan rivers in the south (As Suwayda, Daraa, Quneitra); and, finally, the Barada and Awaj rivers (Damascus, Rural Damascus), Quweiq River (Aleppo, Idlib, Hama), and the Badia (Hama, Homs, Rural Damascus, As Suwayda), all of which comprise interior basins with no outlet to the sea. The Tigris River forms a short border with Syria in the northeast, but joins the Euphrates River downstream and, therefore, does not play the outsized role that the Euphrates River does in Syria. Transboundary river systems include the Kebir River (Coast watershed), which borders Lebanon (Akkar); the Orontes River watershed, which originates in Lebanon (Baalbek-Hermel) and extends into Türkiye (Hatay, Gaziantep, Kilis); the Yarmouk River watershed, which flows into Jordan (Irbid) and Israel (Northern; the disputed Golan Heights, which also includes the Upper Jordan River watershed, which flows into Lake Tiberias (also known as Lake Galilee); the Tigris–Euphrates River watershed, which flows downstream from Türkiye (Sirnak; Sanliurfa, Gaziantep), includes the Khabour River sub-basin (Mardin, Sanliurfa) and continues downstream to Iraq (Nineveh, Dohuk; Al Anbar). See Food and Agriculture Organization of the UN (2008). AQUASTAT Country Profile: Syrian Arab Republic. Rome: FAO. URL: https://www.fao.org/aquastat/en/countries-and-basins/country-profiles/country/SYR

XXVI In Latakia, SSP1-2.6 projects an annual increase of 13 mm (-34 mm and +47 mm possible) in the near term. By comparison, SSP3-7.0 projects an annual increase of 9 mm (-35 mm and +60 mm possible) in the near term, but remains uncertain by mid-century with a best-estimate increase of 1 mm (-74 mm and +27 mm possible). For the latter scenario and time period, Quneitra receives the largest projected increase of 7 mm (-29 mm and +40 mm possible).

XXVII Under SSP1-2.6, the frequency of such events at 50-year intervals increases by 1.43 times (0.42 times and 2.77 times possible) in Homs by mid-century. In comparison, under SSP3-7.0, the frequency of average largest five-day precipitation events at 50-year intervals increases by 1.30 times (0.36 times and 2.95 times possible) in Deir ez-Zor and at 100-year intervals by 1.38 times (0.31 times and 3.58 times possible) by mid-century.

XXVIII For further details regarding climate scenarios, data sources and presentation, see adelphi's Supplemental Methodology: https://weatheringrisk.org/en/publication/climate-impact-profile-supplementary-information

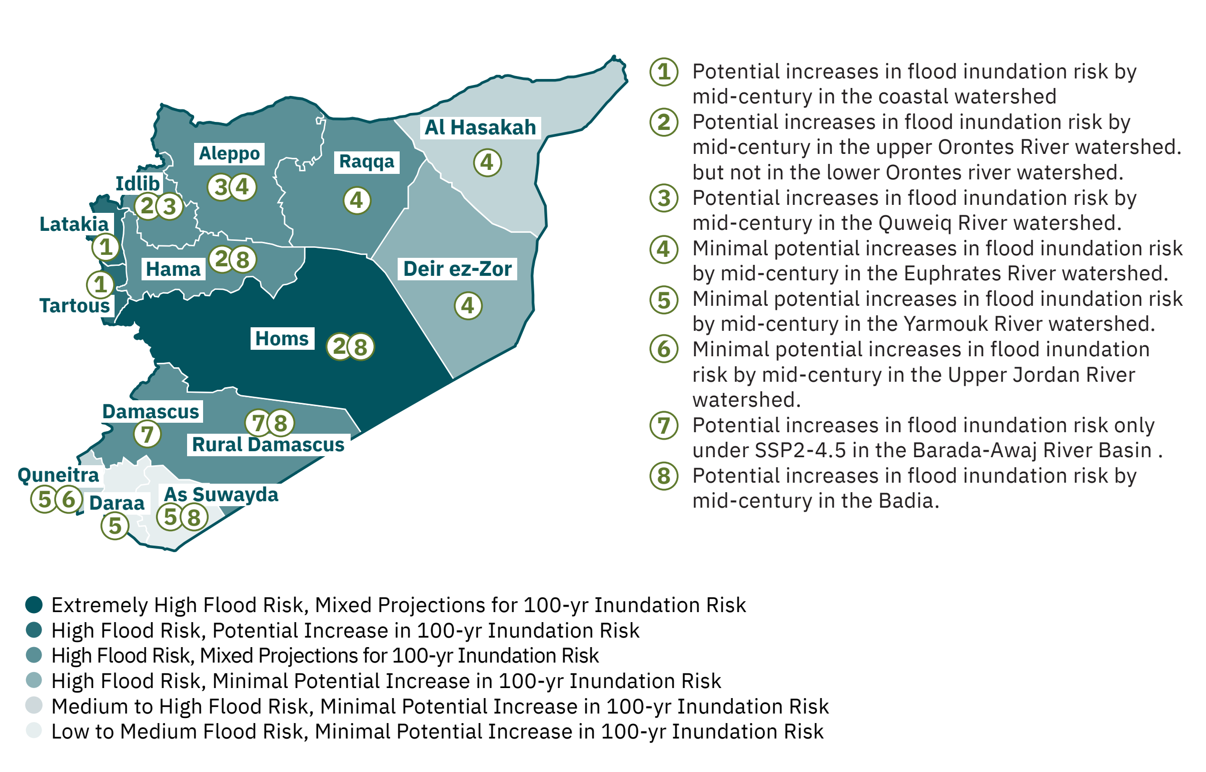


Figure 7. Projected Riverine Flood Risk under Middle-of-the-Road (SSP2-4.5) and High (SSP3-8.5) Emissions Scenarios by Mid-Century.[XXIX] Mixed projection results refer to either opposite trends per scenario or different river systems in the same governorate.

Potentially damaging and life-threatening urban floods pose a high risk across much of northern Syria, with events expected to occur at least once in the next 10 years, **threatening settlements and critical infrastructure.**[20] For example, flooding in Aleppo and Idlib in 2021 displaced more than 80,000 people, many of whom had already been uprooted by the civil war.[21] Flooding can also **damage crops and exacerbate the impacts of seismic events**, affecting a large proportion of the country's population (see Food and Agriculture, and Critical Infrastructure and Economy sections). Under a Middle-of-the-Road scenario, the annual share of GDP affected by riverine flooding is projected to decrease from $810 million in 2010 to $520 million (0.08% of forecasted GDP) by mid-century.[XXX] However, **despite projected reductions or generally uncertain changes in precipitation intensity and river flows under both Middle-of-the-Road and high-emissions scenarios** (see discussion below), **flooding driven by other contributing factors remains an understudied risk.** For example, moderate precipitation following prolonged drought conditions can restrict the moisture-retaining capacity of soil, triggering more severe flooding. This may be further amplified by other risk factors, including high exposure in displacement camps located on marginal land and inadequate protective infrastructure.[22]

At the same time, higher mean and extreme temperatures across Syria (see Figure 4 and 5), **combined with significant decreases in seasonal precipitation, raise the risk of widespread droughts across all major watersheds under both SSP1-2.6 and SSP3-7.0.** Over the last several

XXIX Sourced by the author using MapChart and the World Bank's 2019 World Subnational Boundaries data catalogue. Note that the boundaries and names shown, and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Legend of river basins: 1=Coast; 2=Orontes; 3=Quweiq; 4=Euphrates; 5=Yarmouk; 6=Upper Jordan; 7=Barada–Awaj; 8=Badia. The Aqueduct 4.0 Model uses SSP3-8.5 as a "pessimistic" future scenario and SSP2-4.5 as an "optimistic" future scenario. Potential increase in inundation risk indicates that at least one model in the ensemble projects an increase, although most regions lack strong model agreement on increased inundation risk for 100-year riverine floods. Data sourced from World Resources Institute (2023). Aqueduct 4.0 Floods. WRI. URL: https://www.wri.org/aqueduct/tools

XXX The Aqueduct 4.0 Model uses SSP3-8.5 as a "pessimistic" future scenario and SSP2-4.5 as an "optimistic" future scenario. Under a pessimistic scenario, annual GDP affected by riverine flooding amounts to $370 million by mid-century (0.07% of total forecast GDP). See World Resources Institute (2023). Aqueduct 4.0 Floods. WRI. URL: https://www.wri.org/aqueduct/tools decades, increasing mean and seasonal temperatures contributed to higher rates of melting in the headwaters of cross-boundary watersheds, mostly in Lebanon and Türkiye, which supply the critical agricultural and energy sectors.[23] The Euphrates River, arguably the most influential river system, extends 2,330 km in total and flows from Türkiye through northern Syria for 680 km, carrying an annual flow volume of 26.9 billion m^3 and sustaining the agriculturally productive lands of the Fertile Crescent.[XXXI] Snowmelt and run-off in Türkiye leads to the Euphrates River's highest seasonal flow between March and May, and fluctuates according to interannual patterns associated with the North Atlantic Oscillation.[XXXII] However, upstream water diversions, discussed in greater detail below, exacerbate water stress when combined with climatic variability. Under projected temperature increases, reduced snowpack and associated earlier spring snowmelt are projected to lower average river flows, particularly when combined with lower average precipitation.[XXXIII]

The designation of drought conditions depends on both the type of drought (see Focus Box 1) and method of measurement. The Standardized Precipitation Evapotranspiration Index (SPEI) accounts for the role of temperature-driven evapotranspiration, recognising that increased temperature-driven evaporation produces a drying effect with similar efficiency as precipitation declines and effectively decreases surface water resources.[24] The SPEI records an **increasing frequency, severity and duration of drought events across Syria over the last 50 years,** characterised by reduced wet season precipitation and an average event duration of nearly four years.[25] Northeastern Syria experienced the highest frequency of droughts, but the south and northwest experienced higher frequencies of extreme droughts. By comparison, the Palmer Drought Severity Index, which assesses water balance using soil moisture, indicates that droughts occurred in nearly half of the last 50 years, with individual events lasting 4.5 years on average.[26] Almost half of all droughts occurred in agroecological zones 2–4, whereas multiyear droughts occurred more often in Zone 5 (see Figure 4 notes).

Projections using the annual SPEI Drought Index illustrate the greatest shift from baseline conditions (near-normal) in central and southern Syria (Badia) by mid-century under both scenarios (see **Figure 8**). Under SSP1-2.6, Rural Damascus shifts to moderately dry conditions on average in the near term, with an index score of -1.40 (-2.03 and -0.94 possible) and a similar measurement under SSP3-7.0. However, by mid-century, Rural Damascus shifts to severely dry conditions, with an index score of -1.84 (-2.29 and -1.32 possible), under SSP1-2.6 and to extremely dry conditions, with an index score of -2.21 (-2.72 and -1.54 possible), under SSP3-7.0.

XXXI Syria's land area extends across 38% of the Euphrates River catchment area and produces 11% of river flow, compared to upstream Türkiye (62% of catchment area, 89% of river flow). See Food and Agriculture Organization of the UN (2008). AQUASTAT Country Profile: Syrian Arab Republic. Rome: FAO. URL: https://www.fao.org/aquastat/en/countries-and-basins/country-profiles/country/SYR; Food and Agriculture Organization of the UN (2009). AQUASTAT Transboundary River Basins – Euphrates–Tigris River Basin. Rome: FAO. URL: https://www.fao.org/aquastat/en/countries-and-basins/transboundary-river-basins/euphrates-tigris

XXXII During negative phases of the North Atlantic Oscillation phenomena, driven by regional-scale pressure changes, the eastern Mediterranean experiences above average temperatures, and more frequent storms and precipitation. During positive phases, the eastern Mediterranean experiences cooler and drier conditions than average. See Lindsey, R., and L. Dahlman (2009). Climate Variability: North Atlantic Oscillation. NOAA. 30 August 2009. URL: https://www.climate.gov/news-features/understanding-climate/climate-variability-north-atlantic-oscillation; Food and Agriculture Organization of the UN (2009). AQUASTAT Transboundary River Basins – Euphrates–Tigris River Basin. Rome: FAO. URL: https://www.fao.org/aquastat/en/countries-and-basins/transboundary-river-basins/euphrates-tigris; Richardson, K., A. Doherty, R. Osborne, L. Mayhew, K. Lewis, G. Jobbins, C. Fox, H. Griffith, and S. Taraboulsi-McCarthy (2021). Climate Risk Report for the Middle East and North African Region. UK Met Office, ODI and FCDO. URL: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/services/government/mena-climate-risk-report-final.pdf

XXXIII Across the Euphrates River Basin, SSP1-2.6 projects a marginal best estimate increase of 5.36 mm (-29.97 mm and +38.81 mm possible) by mid-century, while SSP3-7.0 projects a best estimate decrease of 9.45 mm (-55.54 mm and +28.27 mm possible) over the same timeframe. Temperature projections maintain high model agreement on the direction of change, although the rate and timing of hydrological impacts from glacier, snow and ice melt differ by scenario. See Richardson, K., A. Doherty, R. Osborne, L. Mayhew, K. Lewis, G. Jobbins, C. Fox, H. Griffith, and S. Taraboulsi-McCarthy (2021). Climate Risk Report for the Middle East and North African Region. UK Met Office, ODI and FCDO. URL: https://www.metoffice.gov.uk/binaries/content/assets/metofficegovuk/pdf/services/government/mena-climate-risk-report-final.pdf

The clear direction of change projected by mid-century, as indicated by the range of uncertainty, underscores the shift to a much drier climate on average than observed. Under SSP3-7.0, severely dry conditions expand beyond Homs, Damascus and As Suwayda to include most other interior governorates. These conditions portend the climate shifts depicted in Figure 4, **with worsening water shortages and hydrological droughts heightening the risk of competition and tensions over water use as flows decline** (see Food and Agriculture, and Critical Infrastructure and Economy sections).[XXXIV]

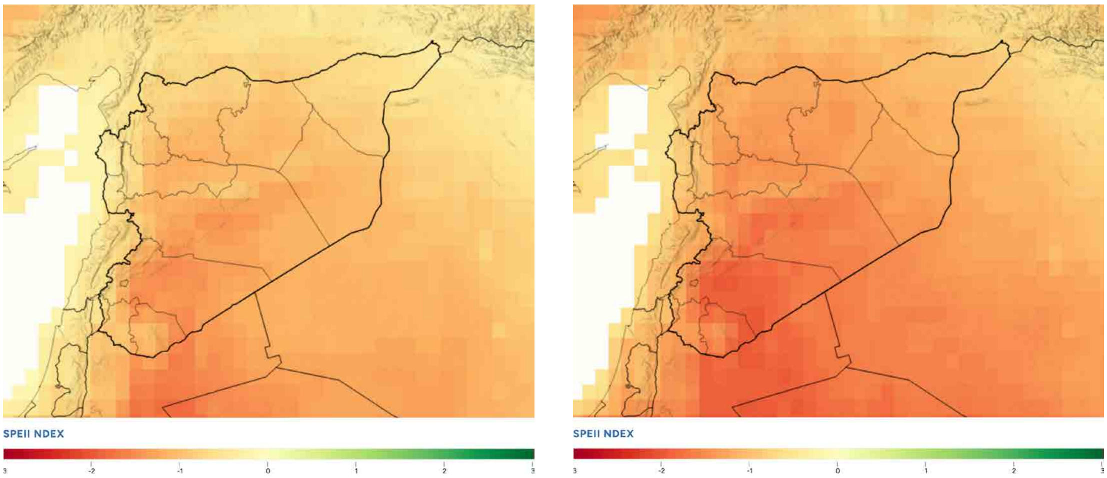


Figure 8. Projected Annual SPEI Drought Index across Syria (Ref. Period 1995–2014) by the Medium Term under SSP1-2.6 (left, a) and SSP3-7.0 (right, b).[XXXV] Note that average drought conditions in central and southern Syria are projected to be moderate under SSP1-2.6 and severe under SSP3-7.0 by mid-century.

XXXIV As an aggregate, the Euphrates River Basin experiences moderate drought conditions on average by mid-century, according to the Annual SPEI Drought Index. SSP3-7.0 projects a score of -1.48 (-2.16 and -0.87 possible) and SSP1-2.6 projects a score of -1.20 (-1.72 and -0.69 possible). By accounting for water demand in measuring water stress per watershed, most of Syria's regions maintain extremely high water stress, except for areas around the Euphrates River and its major tributaries. See World Resources Institute (2023). Aqueduct 4.0 Water Risk Atlas. WRI. URL: https://www.wri.org/aqueduct/tools

XXXV SPEI values between -1 and +1 indicate near-normal conditions, values between -1 and -1.5 indicate moderately dry conditions, while values between +1 and +1.5 indicate moderately wet conditions. Values between -1.5 and -2 indicate severely dry conditions, values between +1.5 and +2 indicate severely wet conditions. Finally, values below -2 indicate extremely dry conditions and above +2 indicate extremely wet conditions.

Focus Box 1: Drought, Conflict and Complex Risks

The relationship between drought and conflict, specifically in the case of the Syrian Civil War, remains an active area of scholarly debate. Differences in findings stem in part from divergent research methods, and insufficient engagement with established literature on migration and displacement.[27] For example, scholars have applied different definitions of drought events, which has affected timeframes (e.g., 2006–11 or 2007–09),[XXXVI] and have disagreed on whether drought should be understood as a proximate trigger of the unrest that led to the civil war or as one contributing factor among many.[XXXVII] Even the chain of events linking economic shock and agricultural collapse to civil unrest in southern Syria remains contested.[XXXVIII] Nevertheless, there is broad agreement that climate impacts do not operate in isolation, but rather interact with political and socioeconomic factors in ways that collectively shape societal vulnerability.[28] The recent droughts across large parts of Syria, among the most severe on record, are a case in point. While not directly triggering violent conflict at scale, they push already fragile livelihoods further to the brink, acting as a potential powder keg in a landscape of recovery, fragmented governance and deep intersectional divisions. In this context, situating climate change within a single causal chain is less analytically useful than assessing how it combines with other factors to increase the fragility of a country's agricultural and governance systems.

adelphi's regional work, drawing on expert interviews and scenario-building workshops, outlines the importance of factors such as economic diversification, effective and inclusive institutions, the strength of the social contract, and interstate relations and strategic interests to understand security risks.[29] For example, observed climate change in Syria (e.g., droughts) interacted with decades of environmentally degrading government policies, limited state disaster-response capabilities and transboundary water diversions upstream.[XXXIX] Together, these factors disrupted economic conditions and livelihoods, strained the social contract, and collectively increased the risk of instability. Today, the Tigris–Euphrates River Basin remains in the midst of an exceptionally severe five-year drought, among the worst on record in the region according to the SPEI Drought Index.[30] Higher temperatures and a 70% reduction in precipitation during this period have already contributed to the loss of 2.7 million tonnes of wheat and sparked a famine affecting 12 million people, prolonging post-war recovery across sectors.[31] Climate change is increasing the likelihood

XXXVI Drought types include meteorological (e.g., temperature and precipitation-driven), hydrological (e.g., water balance), agricultural (e.g., crop water balance) and socioeconomic criteria (e.g., sufficient water for all non-agricultural uses). See Gleick, P.H. (2017). Climate, Water, and Conflict: Commentary on Selby et al. 2017. Political Geography 60: 248–250. DOI: https://doi.org/10.1016/j.polgeo.2017.06.009

XXXVII See Werrell, C.E., F. Femia, and T. Sternberg (2015). Did We See It Coming? State Fragility, Climate Vulnerability, and the Uprisings in Syria and Egypt. *SAIS Review of International Affairs* 35: 29–46. DOI: https://doi.org/10.1353/sais.2015.0002; Kelley, C.P., S. Mohtadi, M.A. Cane, R. Seager, and Y. Kushnir (2015). Climate Change in the Fertile Crescent and Implications of the Recent Syrian Drought. *Proceedings of the National Academy of Sciences* 112: 3241–3246. DOI: https://doi.org/10.1073/pnas.1421533112; Selby, J., O. Dahi, C. Fröhlich, and M. Hulme (2017). Climate Change and the Syrian Civil War Revisited: A Rejoinder. Political Geography 60: 253–255. DOI: https://doi.org/10.1016/j.polgeo.2017.08.001; Gleick, P.H. (2017). Climate, Water, and Conflict: Commentary on Selby et al. 2017. *Political Geography* 60: 248–250. DOI: https://doi.org/10.1016/j.polgeo.2017.06.009

XXXVIII Scholars continue to debate whether migration from rural areas hit hard by crop failures in the northeast to urban centres further south intensified the grievances that led to the uprisings at the start of the conflict in Daraa. See Ide, T. (2018). Climate War in the Middle East? Drought, the Syrian Civil War and the State of Climate-Conflict Research. *Current Climate Change Reports* 4: 347–354. DOI: https://doi.org/10.1007/s40641-018-0115-0; Eklund, L., O.M. Theisen, M. Baumann, A. Forø Tollefsen, T. Kuemmerle, and J. Østergaard Nielsen (2022). Societal Drought Vulnerability and the Syrian Climate-Conflict Nexus are Better Explained by Agriculture than Meteorology. *Communications Earth & Environment* 3(1): 85. DOI: https://doi.org/10.1038/s43247-022-00405-w

XXXIX State policies historically subsidised water-intensive crops and groundwater depletion on marginal agricultural land, maintained a dependency on oil revenues, and pursued economic liberalisation measures that favoured elite interests, while marginalising and violently repressing other groups. For further discussion of structural factors, see De Châtel, F. (2014). The Role of Drought and Climate Change in the Syrian Uprising: Untangling the Triggers of the Revolution. *Middle Eastern Studies* 50: 521–535. DOI: https://doi.org/10.1080/00263206.2013.850076; Selby, J., O. Dahi, C. Fröhlich, and M. Hulme (2017). Climate Change and the Syrian Civil War Revisited: A Rejoinder. Political Geography 60: 253–255. DOI: https://doi.org/10.1016/j.polgeo.2017.08.001; De Juan, A., and A. Bank (2015). The Ba'athist Blackout? Selective Goods Provision and Political Violence in the Syrian Civil War. Journal of Peace Research 52(1): 91–104. DOI: https://doi.org/10.1177/0022343314559437 of extreme droughts in the region, which – combined with the legacies of conflict and instability – threatens to further undermine Syria's human development unless strategic governance reforms address underlying structural vulnerabilities.

Focus Box 2: Governance of the Tigris–Euphrates River Basin

Looking ahead, adelphi concludes that climate impacts in the Tigris–Euphrates River Basin will likely increase political instability and fragility over time amid increasing water stress, rather than stoke an overt conflict between states over transboundary water resources.[32] Longstanding tensions over water resources between Türkiye and Syria – concerning issues such as asymmetric infrastructure development, appropriate cross-border water allocations and conflict-related threats to water security – foreshadow these projected outcomes. Since the 1970s, Türkiye's construction of 22 dams under the Southeastern Anatolia Project in the upper Euphrates River Basin has strained relations with Syria, as periods of reduced river flows have affected Syria's agricultural and energy sectors, centred on three major dams along the Euphrates River.[XL] In 1987, Türkiye informally committed to ensuring a minimum Euphrates River flow of 500 m^3 per second (15.75 billion m^3 per year) into Syria. However, Syria has repeatedly claimed that Türkiye has failed to uphold this commitment.[33] Divergent interpretations of international water law, unilateral actions and persistent inefficiencies in water management continue to fuel disagreements between the two countries. In the midst of mounting political instability in Syria and worsening drought episodes (e.g., in 2021, Euphrates River flows into Syria dwindled to 214 m^3 per second or 6.74 billion m^3 per year)[34], conflict between the Turkish-backed Syrian National Army and Kurdish forces in northeastern Syria disrupted water infrastructure and further reduced Euphrates River flows by 35%.[XLI] Given the history of hydro-political tensions in the Tigris–Euphrates River Basin, projected precipitation reductions underscore the urgent need for integrated water resource management approaches that reduce tensions and strengthen social cohesion among riparian communities and states.[XLII]

XL Combined with increasingly frequent droughts, Euphrates River flows in Syria significantly decreased by 500 m^3 per second between the 1930s and 2010. See Karnieli, A., A. Shtein, N. Panov, N. Weisbrod, and A. Tal (2019). Was Drought Really the Trigger behind the Syrian Civil War in 2011? *Water, 11*(8): 1564. DOI: https://doi.org/10.3390/w11081564; Sottimano, A., and N. Samman (2022). Syria Has a Water Crisis. And It's Not Going Away. Atlantic Council. 24 February 2022. URL: https://www.atlanticcouncil.org/blogs/menasource/syria-has-a-water-crisis-and-its-not-going-away/; Food and Agriculture Organization of the UN (2008). AQUASTAT Country Profile: Syrian Arab Republic. Rome: FAO. URL: https://www.fao.org/aquastat/en/countries-and-basins/country-profiles/country/SYR

XLI For further discussion, see Von Lossow, T. (2016). The Rebirth of Water as a Weapon: IS in Syria and Iraq. *International Spectator* 51.3: 82–99. DOI: https://doi.org/10.1080/03932729.2016.1213063; King, M.D. (2015). The Weaponization of Water in Syria and Iraq. The Washington Quarterly 38(4): 153–169. DOI: https://doi.org/10.1080/0163660X.2015.1125835; Daoudy, M. (2020). Water Weaponization in the Syrian Conflict: Strategies of Domination and Cooperation. *International Affairs* 96(5): 1347–1366. DOI: https://doi.org/10.1093/ia/iiaa131

XLII One dimension warranting further evaluation in relation to water resource management and food security is Syria's reliance on imports of key agricultural products from Türkiye and the implications of "virtual water" trade among riparian neighbours. See Antonelli, M., F. Laio, and S. Tamea (2017). Water Resources, Food Security and the Role of Virtual Water Trade in the MENA Region. In *Environmental Change and Human Security in Africa and the Middle East*. Cham: Springer International Publishing, 199–217; Muratoglu, A. (2020). Assessment of Wheat's Water Footprint and Virtual Water Trade: A Case Study for Turkey. *Ecological processes*, 9(1): 13. DOI: https://doi.org/10.1186/s13717-020-0217-1; Arslan, Ş., H. Arısoy, and Z. Karakayacı (2022). The Situation of Regional Concentration of Tomato Foreign Trade in Turkey. *Turkish Journal of Agriculture-Food Science and Technology*, 10(2): 280-289. DOI: https://doi.org/10.24925/turjaf.v10i2.280-289.4767; Veilleux, J., and S. Dinar (2021). A Global Analysis of Water-related Terrorism, 1970–2016. *Terrorism and Political Violence 33*(6): 1191–1216. DOI: https://doi.org/10.1080/09546553.2019.1599863

Coastal Zone and Sea Level Change

Syria's Mediterranean coastline stretches roughly 183 km and is home to around 11% of the country's population. The region provides critical ecosystem services and opportunities for trade, but faces multiple impacts from sea level rise if left unmitigated.[35] Under both SSP1-2.6 and SSP3-7.0, sea levels are projected to rise above the 1995–2015 baseline by a best estimate of 11 cm across Syria's Exclusive Economic Zone (EEZ) by 2030 (see **Figure 9**).[XLIII] Under SSP3-7.0, **the EEZ faces a best estimate sea level rise of 23 cm by mid-century and 67 cm by end-of-century**.[XLIV] This surpasses the 21 cm and 44 cm best-estimate projections under SSP1-2.6 for the same time periods, respectively, illustrating longer-term scenario uncertainty over the magnitude of future sea level change.[XLV] Under SSP3-7.0, the best-estimate sea level rise by end-of-century is expected to inundate a land area of 18 km^2 and cause SYP 10 billion in damages, largely affecting local agriculture through saltwater intrusion and related processes.[36] **Areas most vulnerable to inundation and erosion include the Akkar coastal plain near Syria's border with Lebanon (Tartous) and the area surrounding Jableh (Latakia).[37]** According to the same coastal vulnerability estimates, the cities of Latakia and Tartous, and their critical infrastructure and economic activities along the coast, remain moderately vulnerable. Conversely, the mountainous and forested interiors of the coastal governorates remain highly susceptible to wildfires. This risk is exacerbated by hotter summers and a greater incidence of rainy-season droughts, which effectively lengthen and intensify the fire season (see Ecosystems section for further discussion). Most studies following the devastating wildfires in the summer of 2025 identify northern Latakia and northeastern Tartous as areas of greatest wildfire risk, owing to a combination of complex topography, dense and highly flammable coniferous forests, and conducive weather conditions, including local wind patterns and variable precipitation.[38]

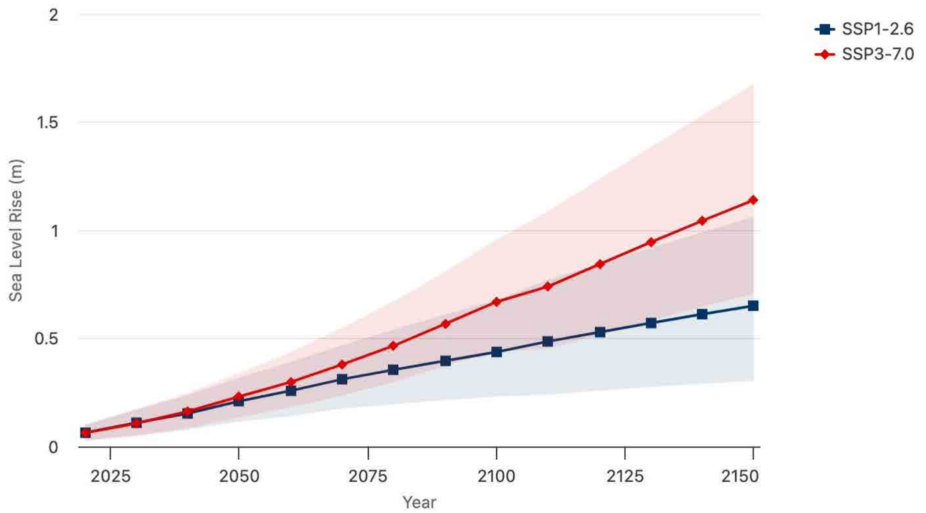


Figure 9. Projected Sea Level Rise in Syria's EEZ above 1995–2015 Baseline.[XLVI] Median years indicated along trendlines and 17th to 83rd percentile probability ranges indicated by colour shadings according to climate scenario. Note that rates of sea level rise diverge toward the end of the century according to the two scenarios.

XLIII Probability range of 5 cm (17th percentile) and 17 cm (83rd percentile). Data from World Bank (2025). Sea Level Change, Projections. Climate Change Knowledge Portal. URL: https://climateknowledgeportal.worldbank.org/country/syrian-arab-republic/sea-level-projections

XLIV Probability range of 14 cm (17th percentile) and 34 cm (83rd percentile) by mid-century, and 44 cm (17th percentile) and 96 cm (83rd percentile) by end-of-century. Ibid.

XLV Probability range of 12 cm (17th percentile) and 32 cm (83rd percentile) by mid-century, and 23 cm (17th percentile) and 68 cm (83rd percentile) by end-of-century under SSP1-2.6. Ibid.

XLVI Visuals from World Bank (2025). Sea Level Change, Projections. Climate Change Knowledge Portal. URL: https://climateknowledgeportal.worldbank.org/country/syrian-arab-republic/sea-level-projections

Projected Sectoral Impacts

The following sections outline projected climate impacts by sector considering the temperature and precipitation indicators described above, alongside interdisciplinary research findings. Sector-specific metrics are further detailed in adelphi's Supplemental Methodology.[XLVII]

Human Health

Climate-related health risks – including heat stress, vector-borne diseases, and food and water-borne diseases – are projected to worsen over the near and medium term with relatively high model agreement. Many of these risks are driven by an expected increase in mean and extreme temperatures.

Hot daytime temperatures (daily maximum > 35°C) **and warm nighttime minimums** (tropical nights > 20°C), which hinder the body's ability to cool and disrupt restful sleep, **increase the most during summer and autumn months in Syria's populous western plains and plateaus**, starting in the near term under both SSP1-2.6 and SSP3-7.0 (see **Figure 5**).[XLVIII] Longer and more extreme heatwaves are projected to raise the risks of heat-related illnesses, including dehydration and heat stroke, as well as heat-related mortality for vulnerable demographic groups.[39]

Temperature-based excess mortality rate (associated with > 84th percentile of daily maximum temperatures during the reference period) is projected to increase across the country, with the greatest increases in the interior plains and plateaus, the Euphrates River Valley, and the steppe and desert of Syria's northeastern governorates.[XLIX] The groups facing **disproportionate heat mortality and morbidity risks include outdoor labourers, such as agricultural and construction workers** (see also Critical Infrastructure and Economy section); **IDPs living in inadequate shelter; elderly people; pregnant women; children; and people with disabilities and pre-existing health conditions.**

Syria faces high and increasing risks of vector-borne diseases, such as leishmaniasis, **and water-borne diseases**, such as cholera, which correlate with warmer temperatures and more extreme precipitation conditions. Leishmaniasis, an infection characterised by skin lesions transmitted by sandflies, persisted endemically for decades in Rural Damascus and Aleppo.[40] The rising number of tropical nights, defined as nights with a minimum temperature above 26°C, can accelerate sandfly development and increase biting activity, elevating the risk of transmission.[41] Under both emissions scenarios, tropical nights at this threshold increase the most during summer months in northeastern Syria by mid-century.[L] Between 2014 and 2015, conflict-driven expansion of sandfly habitats – resulting from land use changes, damaged buildings, unmanaged human waste and mass displacement – contributed to tens of thousands of disease cases in areas not traditionally associated with disease transmission.[42]

Water-borne diseases – including cholera, typhoid, dysentery and other diarrheal diseases – are exacerbated by both drought and flood conditions (see Floods and Droughts section), particularly when populations lack access to water, sanitation and hygiene infrastructure. In Syria, water-borne diseases tend to spike seasonally near the end of summer, with 2.7 million cases estimated in northeastern Syria alone between 2015 and mid-2021, a majority of which affected children under five years of age.[43] Between 2022 and 2023, ingestion of bacteria-contaminated water from the

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XLVII For further details regarding climate scenarios, data sources and presentation, see adelphi's Supplemental Methodology: https://weatheringrisk.org/en/publication/climate-impact-profile-supplementary-information

XLVIII Projected regional temperature increases do not consider additional localised increases due to the urban heat island effect. A study of nearby Israeli cities finds an additional 1–4°C increase in temperature due to more heat-absorbing, moisture-deficient surfaces compared to adjacent rural areas, which could similarly affect Syrian cities such as Damascus. See Itzhak-Ben-Shalom, H., R. Samuels, O. Potchter, and P. Alpert (2016). Recent Trends and Future Predictions until 2060 of Urban Warming in Four Israeli Cities Employing the RegCM Climate Model. *American Journal of Climate Change 5*(4): 464–484. DOI: https://doi.org/10.4236/ajcc.2016.54034

XLIX For example, in Al Hasakah, SSP3-7.0 projects during summer months a mean of 1.09% (0.77% and 1.49% possible) excess heat-related deaths by mid-century. By comparison, SSP1-2.6 projects an average mean of 0.88% (0.61% and 1.15% possible) excess heat-related deaths during summer.

L For example, by mid-century, tropical nights increase the most in Deir ez-Zor by a best estimate of 44 nights (32 nights and 53 nights possible) under SSP3-7.0 and by a best estimate of 34 nights (23 nights and 42 nights possible) under SSP1-2.6.

Euphrates River, where water shortages concentrated pathogens, resulted in more than 600,000 cases of cholera in northern Syria.[44] As of 2023, two-thirds of the population lacked reliable access to safe water as a result of earthquake damage (northwest), attacks on water treatment facilities and poor conditions in internal displacement camps, with water often informally or privately-trucked at high cost.[45] Additional climate-related health risks include malnutrition resulting from drought-related food insecurity and diarrheal disease (see Food and Agriculture section), as well as respiratory illnesses linked to hot, dry sandstorms.[46]

A majority of Syria's population is already exposed to unhealthy levels of air pollution.[LI] Chronic exposure to fine particulate matter increases the risks of respiratory disease, acute infections and lung cancer, while also adversely affecting crops, livestock, ecosystems and economic activity.[47] A range of anthropogenic sources – including industrial and transport emissions, biomass burning, and aerosol by-products associated with armed conflict – contribute to local and seasonal pollution trends.[48] At the same time, sand and dust storms – associated with human and climatic factors, and typically driven by west-northwesterly winds crossing arid, degraded land – increasingly affect Syria's air quality during spring and summer months.[49] **Hotter and drier conditions are projected to increase the frequency and intensity of sand and dust storms**, with the greatest concentration of locally sourced particles originating in the Tigris–Euphrates River Basin, particularly in the northeast and along the Syria–Iraq border.[50] Other significant regional factors that amplify the spread of fine particulate matter include land use changes, unsustainable land management practices, reduced surface water flows due to drought conditions, dam construction and excessive irrigation.[51]

Food and Agriculture

Rising temperatures, high water demand and increasing water shortages are reducing yields and further undermining food security, which has already been severely weakened by more than a decade of conflict. Before the Syrian Civil War, agriculture accounted for roughly one-quarter of exports and provided a source of income for 80% of the rural population.[52] As of 2011, wheat, olives and livestock products comprised the vast majority of agricultural GDP.[53] Between 2001 and 2007, Syria was a net exporter of wheat, producing an average of four million tonnes annually. By 2009, however, the country had become a net importer of wheat, and between 2012 and 2020 average annual wheat production fell to 2.5 million tonnes, largely for domestic consumption.[54] Similarly, Syria's production and export of olives and olive oil declined during the civil war and have yet to recover to pre-war levels, with recurrent heatwaves and droughts contributing to persistently low yields.[55] Livestock production – led by sheep, and followed by goats and cattle – fell nationally between 2011 and 2018 as a result of water scarcity, extreme temperatures, disease and conflict.[56]

Degradation of Syria's water, soil and other natural resources accompany the widespread collapse of agricultural livelihoods that accelerated during the civil war. Wartime sources of pollution deposited long-lasting contaminants into the water and soil sustaining prime farmland, livelihoods and ecosystems across the country. In northeastern Syria between 2014 and 2017, conflicts involving ISIL/Da'esh left unmitigated hazardous waste, damaged oil infrastructure, improvised explosive devices and landmines that continue to disturb agricultural plots.[57] In addition to generating toxic rubble throughout urban centres, the majority of airstrikes on farmland occurred near the heavily contested frontlines of northwestern Syria (Aleppo, Idlib and Hama).[58] Among other factors, **IDPs cannot easily reoccupy arable land due to hundreds of thousands of unexploded ordinances,** which not only endanger the physical and mental health of returnees, but also degrade ecological functions and biodiversity, rendering large areas inaccessible and susceptible to abandonment.[59] Contaminated water sources from the Syrian government's use of chemical weapons, meanwhile, prompt additional causes of concern in the northwest and Rural Damascus, with residues heightening human health risks during flood conditions while straining safe water supplies and otherwise productive cropland.[60] Moreover, such circumstances concentrate increasing human pressures on areas that had escaped the worst effects of pollution.

LI Defined as more than 20 µg of fine particulate matter per m^3, compared to less than 5 µg per m^3 recommended by the World Health Organisation. See World Bank (2026). DataBank – World Development Indicators. URL: https://data.worldbank.org/

Syria's groundwater, an indispensable but diminishing resource for agriculture and domestic use, is the sole source of irrigation for 60% of the country's irrigated land and combines with surface water to irrigate the remaining 40%.[61] However, recent studies estimate that Syria is extracting groundwater **at more than twice the rate of natural recharge,** leaving roughly one-third of the population exposed to high or extremely high levels of groundwater stress.[LII] According to FAO data, 70% of groundwater pumping takes place in the agriculturally productive Al Hasakah, Aleppo and Raqqa governorates.[LIII] As an outcome of Syria's dry climate regime, overextraction and natural resource mismanagement, 43% of groundwater nationwide contains high concentrations of chloride and sulphate salts.[LIV] Deteriorating water quality from salinisation – which affects the majority of groundwater supplies in Deir ez-Zor, Raqqa and Rural Damascus, plus a significant proportion in Al Hasakah – poses an increasing threat to human health and economic wellbeing under projected climate trends.[62]

Soil degradation – typically associated with erosion, compaction, salinisation and declining fertility – is both a key driver and a consequence of broader land degradation.[63] While difficult to assess soil degradation as a discrete factor in land degradation, recent studies estimate that nationwide a total land area of 48,800 km^2 has experienced a reduction in productivity.[LV] Combined with other factors indicative of land degradation, the most afflicted regions extend across most of Al Hasakah and the Euphrates River Valley, as well as many arable interior zones of northwestern and southwestern Syria.[LVI] Not only does **land degradation decrease crop productivity, leading to food insecurity, loss of income and livelihoods, and displacement,** but it also **accelerates adverse feedback effects for livestock and ecosystems, leaving farmland, rangeland and water bodies more susceptible to climate-related extremes** (e.g., floods, droughts, wildfires, and sand and dust storms).[64]

Starting in the near term, increasing temperatures during growing seasons are projected to significantly reduce crop yields and intensify evaporation-driven drying. For example, wheat yields may decline by up to 27% for every 2°C rise in temperature.[65] Heat stress and frost also affect yields of other cereals, as well as blooming fruits and vegetables.[66] As discussed in the Temperature section, the anticipated increases in mean seasonal temperatures and the annual number of hot days maintain high model agreement on the direction but not magnitude of future change, leaving the rate and timing dependent on the scenario. Non-meteorological contributors to drought risk, including water extraction rates and resource competition, further underscore the need to prepare for water shortages, regardless of model uncertainty over seasonal precipitation magnitudes.

LII High water stress characterises areas where groundwater use exceeds the rate of recharge by 10 times or more. See World Bank (2018). Beyond Scarcity: Water Security in the Middle East and North Africa. Washington DC: World Bank. DOI: https://doi.org/10.1596/978-1-4648-1144-9; Food and Agriculture Organization of the UN (2008). AQUASTAT Country Profile: Syrian Arab Republic. Rome: FAO. URL: https://www.fao.org/aquastat/en/countries-and-basins/country-profiles/country/SYR

LIII Additionally, Idlib, Hama and Rural Damascus contain significant areas equipped for groundwater irrigation. In the absence of effective water governance, many households and communities drill wells without formal authorisation or an assessment, potentially contributing to long-term consequences. See Aydın-Kandemir, F. and D. Yıldız (2022). Water Conflicts and the Spatiotemporal Changes in Land Use, Irrigation, and Drought in Northeast Syria with Future Estimations. *International Journal of Water Management and Diplomacy* 1(4): 5–36. DOI: https://izlik.org/JA99XN42UD; Taha, A., C. Watson, and S. Hobi (2025). The Compounded Impact of Climate Change and Armed Conflict on the Agri-Food Sector in Northwest Syria. Violet Syria. DOI: https://doi.org/10.5281/zenodo.17515121

LIV According to Baba et al. (2021). In other words, soil salinity affects more than 40% of Syria's irrigated land. See Baba, A., R.A. Karem, and H. Yazdani (2021). Groundwater Resources and Quality in Syria. *Groundwater for Sustainable Development* 14: 100617. DOI: https://doi.org/10.1016/j.gsd.2021.100617; Hussein, M.A. (2008). Costs of Environmental Degradation: An Analysis of the Middle East and North Africa Region. *Management of Environmental Quality International Journal* 19(3): 305–317. DOI: 10.1108/14777830810866437

LV According to the most recent edition of the World Desertification Atlas. Another estimate suggests that more than 60% of Syria's population lives on degraded land, while a similar proportion of land nationwide experiences severe degradation. See Cherlet, M., C. Hutchinson, J. Reynolds, J. Hill, S. Sommer, and G. von Maltitz (2018). World Atlas of Desertification. Luxembourg: Publication Office of the European Union. DOI:10.2760/06292; Larsen, B. (2011). Cost Assessment of Environmental Degradation in the Middle East and North Africa Region. Working Paper No. 583. Cairo: Economic Research Forum. URL: https://erf.org.eg/app/uploads/2014/08/583.pdf

LVI Other monitored biophysical factors contributing to land degradation include aridity, water stress, climate-vegetation trends, tree loss and wildfires. Assessed socioeconomic factors include population density, population change, change in built-up area, irrigation, livestock density, GNI per capita income level, and low- and high-input agriculture. For more information on methodology, see Cherlet, M., C. Hutchinson, J. Reynolds, J. Hill, S. Sommer, and G. von Maltitz (2018). World Atlas of Desertification. Luxembourg: Publication Office of the European Union. DOI:10.2760/06292

Changing temperature and precipitation patterns pose the greatest risks to food security in intermediate agroecological zones (see Figure 10). Rainfed barley production will likely dip due to higher summer temperatures and crop water demand across shorter growing seasons.[67] These conditions may also reduce yields of summer and cash crops. Although warmer winter temperatures may provide opportunities for expanding crop production in certain locations, higher tropical night minimums lead to declining yields of olives and other varieties of fruit.[68] Higher temperatures and lower precipitation particularly impact women, who must walk further to fetch water and encounter additional legal barriers to access natural resources.[69] Extreme heat and water shortages disproportionately threaten livestock activities among Bedouin communities.[70]

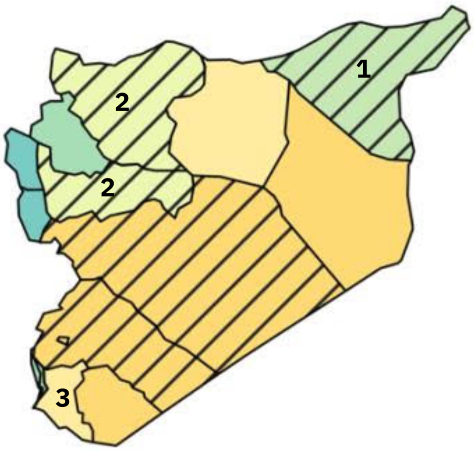

Figure 10. Projected Agroecological Zones (Average by Governorate) under SSP3-7.0 by Mid-Century. See Figure 4 note for data sources and methods regarding agroecological zones.[LVII] Governorates with average projected zones additionally marked as mixed specify areas where more than four agroecological zones span the same subnational unit, indicating particularly high local or regional variation.

Critical Infrastructure and Economy

Syria's post-conflict economic activities and infrastructure networks face increasing risks from climate impacts, such as hotter temperatures, droughts and flooding, and interrelated geological hazards. By mid-century under both SSP1-2.6 and SSP3-7.0, Syria's annual GDP affected by riverine flooding decreases from 0.82% to 0.07–0.08% under the net effects of future precipitation and hydrological reductions.[LVIII] However, drought episodes are associated with average GDP losses of 0–0.8%, equivalent to nearly $320 million per drought year, alongside increases in the national poverty rate of 0.6 percentage points, pushing tens of thousands of additional people below the poverty line.[LIX] Without large-scale economic restructuring, the projected combination of more extreme temperatures,

LVII In Zone 1a, rainfed cereals, fruits and vegetables can be reliably grown every year, whereas in Zone 1b, crops can be grown in at least two out of every three seasons. In Zone 2, grains, fruits and vegetables can be grown in at least two out of every three seasons. In Zone 3, grains and legumes can be grown in at least one or two out of every three seasons. In Zone 4, marginal crops of barley can be grown, along with permanent pasture. In Zone 5, rainfed cultivation is not viable.

LVIII This is projected to result in GDP decreasing from $810 million in 2010 to $370–520 million in 2050. The Aqueduct 4.0 Model uses SSP3-8.5 as a "pessimistic" future scenario. See World Resources Institute (2023). Aqueduct 4.0 Floods. WRI. URL: https://www.wri.org/aqueduct/tools

LIX Drought-related GDP losses depend on the spatial extent, severity and duration of drought events, among other factors. The figure for average GDP loss estimated in U.S. dollars is based on 2007 GDP, the last observed baseline drought year in the cited study. For further details on the effects of declining agricultural yields on GDP, see Food and Agriculture section. Al-Riffai, P., C. Breisinger, D. Verner, and T. Zhu (2012). Droughts in Syria: An Assessment of Impacts and Options for Improving the Resilience of the Poor. *Quarterly Journal of International Agriculture 51*(1): 21–49. DOI: https://doi.org/10.22004/ag.econ.155471 reduced precipitation and altered hydrological flows is likely to make such losses more frequent. These risks must be understood against the broader backdrop of post-conflict recovery. The estimated cost of rebuilding Syria in the wake of more than a decade of conflict is equivalent to nearly 10 times Syria's GDP for 2024,[71] and the vulnerability of major sectors such as agriculture to the impacts of climate change requires updated assessment and diversification measures.

Under both SSP3-7.0 and SSP1-2.6, best-estimate *increases* in the annual number of cooling degree days (mostly due to warmer summer temperatures) outweigh best-estimate *decreases* in the annual number of heating degree days (mostly due to warmer temperatures between November and March).[LX] For example, by mid-century under SSP3-7.0, best-estimate heating degree days in Damascus cumulatively decrease annually by 312°C (-473°C and -202°C possible), while best-estimate cooling degree days cumulatively increase annually by 361°C (280°C and 436°C possible). In Deir ez-Zor, under the same scenario and time period, larger net deficits occur, with heating degree days cumulatively decreasing by 246°C (-379°C and -144°C possible) and best-estimate cooling degree days cumulatively increasing by 493°C (311°C and 643°C possible). **These results suggest that Syria is likely to experience growing climate-related pressures on its energy system in the near and medium term, compounding conflict-related energy disruptions.**[LXI]

Extreme precipitation events increase the risk of geological hazards, affecting critical infrastructure. Syria ranks high regionally based on average annual losses from earthquakes ($101.2 million) and floods ($68.4 million).[72] The World Bank estimates that the 2023 earthquakes alone, which centred on southern Türkiye, caused $5.2 billion in losses and damages in Syria.[73] While the areas of highest average annual loss due to earthquakes include Aleppo ($65 million), Idlib ($48.2 million) and Rural Damascus ($37.1 million), Aleppo and Rural Damascus possess the largest combined earthquake and flood average annual losses.[LXII] Landslide risks, in particular, can worsen as a result of higher combined flood and seismic risks. Currently, landslide risks remain highest along the western mountain ranges, including parts of Latakia, Idlib, Hama, Rural Damascus, Damascus and Quneitra.[74] These governorates remain vulnerable to potential increases in 100-year riverine floods, which pose outsized risks to already weakened settlements and temporary facilities such as internal displacement camps (see Floods and Droughts section for levels of uncertainty in purple associated with meteorological indicators). For example, a heavy precipitation event (including rain-on-snow flooding) following the 7.8 and 7.5 magnitude earthquakes in Türkiye in 2023, which killed nearly 6,000, injured 11,000 and displaced at least 100,000 people, generated a series of landslides.[75]

Higher temperatures and declining precipitation are projected to disrupt water and energy systems, with knock-on effects for food security and livelihoods, particularly when compounded by resource overexploitation and the legacy of conflict. Hydropower facilities along the Euphrates River, which generate 70% of the country's electricity, remain especially vulnerable to hotter and drier summers, driving up peak energy demand.[LXIII] Since agricultural activities such as irrigation pumps and the transport of goods depend on electricity and fuel, households subject to water shortages, economic shocks (e.g., the end of state fuel subsidies in 2008) and conflict-related damages (e.g., to irrigation systems and food storage facilities) face severe income reductions, crop substitution, land abandonment, and migration and displacement.[76]

LX Cooling degree days approximate the energy required to cool a building, counting the number of degrees Celsius that the daily average temperature exceeds 18.3°C over a given period. Heating degree days approximate the energy required to warm a building, counting the number of degrees Celsius that the daily average temperature falls below 18.3°C over a given period. There is high model agreement that temperatures will increase. However, the magnitude of warming varies across different plausible global emissions pathways.

LXI Under SSP1-2.6, significant but smaller net annual deficits occur in both regions by mid-century.

LXII Geological hazards include seismic risks and landslides. See Silva, V., A. Calderon, M. Caruso, C. Costa, J. Dabbeek, M.C. Hoyos, Z. Karimzadeh, L. Martins, N. Paul, A. Rao, M. Simionato, C. Yepes-Estrada, H. Crowley, and K. Jaiswal (2023). Global Earthquake Model (GEM) Seismic Risk Map (version 2023.1). DOI: https://doi.org/10.5281/zenodo.8409623; URL: https://www.globalquakemodel.org/product/global-seismic-risk-map; Dabbeek, J., V. Silva, C. Galasso, and A. Smith (2020). Probabilistic Earthquake and Flood Loss Assessment in the Middle East. *International Journal of Disaster Risk Reduction* 49: 101662. DOI: https://doi.org/10.1016/j.ijdrr.2020.101662

LXIII During the Syrian Civil War, they also remained strategic targets, with disruptions resulting in significant outages in northeastern Syria and greater Damascus. See Sottimano, A., and N. Samman (2022). Syria Has a Water Crisis. And It's Not Going Away. Atlantic Council. 24 February 2022. URL: https://www.atlanticcouncil.org/blogs/menasource/syria-has-a-water-crisis-and-its-not-going-away/

Conflict dynamics, in particular, pose ongoing risks to critical infrastructure under chronic water stress. Before the Syrian Civil War, Syria's population enjoyed near-universal access to water and sanitation.[77] However, by the end of the conflict, urban areas such as Aleppo and Rural Damascus had suffered extensive damage to water and energy infrastructure.[LXIV] As Focus Box 2 discusses, effectively addressing conflict-related threats to water security requires comprehensive governance measures that account for transboundary water dependencies and inequities.

Human Displacement

Climate-related impacts amplify already high levels of conflict-driven internal displacement, leaving many households in need of additional social, economic and psychological support. The Syrian Civil War produced one of the largest displacement crises since the Second World War, displacing six million people within Syria and driving an additional six million people to seek refuge in neighbouring countries, according to the UNHCR.[78] Scholars continue to dispute the extent of displacement in the run-up to the civil war and whether displacement levels occurred due to drought or economic conditions.[LXV] As discussed in Focus Box 1, the 2007–11 drought maintains a complex relationship with displacement. Recent evidence indicates that migrants considered climate stress a factor in their decision to relocate, although the timing of their displacement (land abandonment) aligns more with perceived stresses than scientifically measured drought conditions.[79] At the end of the civil war in 2024, the Internal Displacement Monitoring Centre (IDMC) estimates that conflict and violence had displaced 7.4 million people within Syria, more than half of whom have been displaced to Aleppo and Idlib.[80] The IDMC notes that, even after the fall of the Assad regime, many IDPs continue to occupy inadequate housing, lack basic services and face significant obstacles to returning home (e.g., instability, contamination of land and water resources, and opportunities for employment), which do not necessarily allow for durable solutions. Inequitable access to basic services and reconstruction resources risk reigniting latent factional grievances.

Disaster-induced displacement, primarily caused by flooding or geological hazards, disproportionately affect IDPs living in inadequate housing, with limited access to basic services and few income-generating opportunities.[LXVI] For example, many of the approximately 1,500 displacement camps in northwestern Syria expanded rapidly, producing unmanaged waste, and driving IDPs to clear and degrade surrounding vegetation for shelter and fuelwood, exacerbating flood, drought and wildfire risks.[81] IDPs face elevated and potentially increasing exposure to combined flood and geological hazards in northwestern Syria and greater Damascus. Meanwhile, in the northeast, where riverine flood risk is already high, the frequency of intense precipitation events increases under both scenarios by mid-century (see Floods and Droughts, and Critical Infrastructure and Economy sections).

LXIV Throughout the Syrian Civil War, forces from various sides targeted Aleppo's water and energy infrastructure, disrupting services for three million people. See Mamshai, F.H.A. (2025). Hydro-Insurgency: Weaponization of Water Resources and Infrastructure in Northeast Syria. *World Water Policy* 11(4): 924–938. DOI: https://doi.org/10.1002/wwp2.70024; World Bank (2025). The Syrian Conflict: Physical Damage and Reconstruction Assessment (2011–2024). Washington DC: World Bank. URL: http://documents.worldbank.org/curated/en/099102025095540101

LXV For example, Selby et al. argue that levels of displacement around the start of the Syrian Civil War comprised only 40,000–60,000 households, rather than the 1.5–2 million people estimated by Kelley et al. and others. Furthermore, Selby et al. point out that large population movements occurred years before the outbreak of the civil war and were not explicitly linked to the conflict. Other scholars, such as Frölich, assert that migrants in earlier years of the drought only relocated temporarily or for a short duration. See Selby, J., O. Dahi, C. Fröhlich, and M. Hulme (2017). Climate Change and the Syrian Civil War Revisited: A Rejoinder. *Political Geography* 60: 253–255. DOI: https://doi.org/10.1016/j.polgeo.2017.08.001; Kelley, C.P., S. Mohtadi, M.A. Cane, R. Seager, and Y. Kushnir (2015). Climate Change in the Fertile Crescent and Implications of the Recent Syrian Drought. *Proceedings of the National Academy of Sciences* 112: 3241–3246. DOI: https://doi.org/10.1073/pnas.1421533112; Fröhlich, C.J. (2016). Climate Migrants as Protestors? Dispelling Misconceptions about Global Environmental Change in Pre-revolutionary Syria. *Contemporary Levant 1*: 38–50. https://doi.org/10.1080/20581831.2016.1149355

LXVI The largest event in recent years occurred in 2021, when flooding in Aleppo and Idlib displaced more than 80,000 people. The 2023 earthquake displaced at least 100,000 Syrians, many of whom had already been displaced by conflict. Note that the IDMC was unable to disaggregate displacement data by hazard and conflict for 2024. See Internal Displacement Monitoring Centre (2025). Country Profile: Syrian Arab Republic. IDMC. URL: https://www.internal-displacement.org/countries/syria/; World Bank (2023). Syria Earthquake 2023: Rapid Damage and Needs Assessment. Washington, DC: World Bank. DOI: https://doi.org/10.1596/39610

Ecosystems

Syria's terrestrial and aquatic ecosystems face growing risks from warmer mean and extreme temperatures, droughts, and wildfires. These risks are particularly acute in sensitive landscapes that lack adequate protection.[LXVII] **Syria forms part of the Mediterranean Basin, a global biodiversity hotspot** spanning more than 2 million km² of habitat, of which 50,495 km² lies within the country. The region encompasses two conservation corridors in the eastern Mediterranean, defined as landscapes that sustain ecological connectivity among sites hosting globally threatened species.[82] The Orontes River Valley and Levantine Mountains Corridor in the west, together with the Northern Mesopotamia Corridor in the northeast, encompass the majority of Syria's 42 key biodiversity sites, although none are covered in their entirety by internationally recognised protected status.[LXVIII] In total, 173 threatened species inhabit the snow-capped peaks, forests, steppes and water bodies of these areas. This includes many endangered plants (e.g., Mount Hermon oak and Golan iris), fish (e.g., Drusian spring minnow and Orontes scraper), reptiles (e.g., Euphrates softshell turtle and Lebanon viper), birds (e.g., Saker falcon and Egyptian vulture) and mammals (e.g., Persian fallow deer and mountain gazelle).[83] Such diverse landscapes provide critical ecosystem services and economic benefits, while also offering less tangible cultural services due to their spiritual and religious, inspirational (e.g., folkloric), aesthetic, communal, medicinal, educational, and historical value. The largest concentrations of "critical ecosystems," areas essential for preventing species extinction in landscapes characterised by minimal protection and high rates of land conversion, are located in Syria's northern governorates and face a range of pressures detailed below.[84]

Increasing mean temperatures and declining annual precipitation, consistent with the patterns depicted in Figure 4, are projected to drive upslope shifts in the elevation ranges of forest types and wildlife species currently found at lower elevations **across Syria's western mountain systems**. As species migrate to higher elevations in search of suitable conditions, populations already adapted to cooler, wetter high-altitude environments face increasing habitat fragmentation and declining viability. Forests cover only 3% of Syria's territory, half of which remains naturally occurring, and provides important protection against hazards such as flooding and landslides (see Floods and Droughts section).[LXIX] The largest forested areas are located in the northwest (Latakia and Aleppo) and south (As Suwayda and Daraa), with smaller scattered clusters distributed across wetter agroecological zones in the west.[85] However, dwindling numbers of species in Syria's higher-altitude forests portend ecosystem shifts already observed in Lebanon and Türkiye, where forest vegetation has expanded to elevations up to 200 m higher.[86] Activities such as urban development, intensified agriculture, and encroachment during unstable economic and wartime conditions risk further degrading these landscapes.[87] For example, between 2010 and 2018, farmers, loggers, charcoal collectors and IDPs cleared one-quarter of Syria's forested areas, especially in northwestern Idlib.[88]

As a result, **semi-arid grassland and steppe vegetation along the lower margins of forestland are likely to expand, although this shift is accompanied by heightened risks of desertification and wildfires**. Over recent decades, roughly one-third of forestland has experienced more arid climatic conditions.[89] Under both SSP1-2.6 and SSP3-7.0, the projected expansion of drier and more heat-tolerant vegetation is consistent with the northward spread of more arid climate zones by mid-century (depicted in Figure 4). Degradation threatens most arid and semi-arid land, driven by climatic shifts (e.g., hotter temperatures, and more frequent and severe droughts) and anthropogenic pressures (e.g., inefficient irrigation practices, overgrazing and fuelwood harvesting).[90] Wildfires pose an additional threat – even in ecosystems used to natural fire disturbances, such as Syria's

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LXVII As detailed in earlier sections, temperature-driven projections exhibit greater model agreement than precipitation-driven projections.

LXVIII Ibid. Locations and protected statuses of biodiversity corridors based on the CEPF's recent updated assessment. The Orontes River Valley and Levantine Mountains Corridor spans (from south to north) the Rural Damascus, Homs, Hama, Tartous, Latakia, Idlib and Aleppo governorates. This corridor additionally covers territory in the Golan Heights, but not in the UNDOF zone and undisputed Quneitra. The Northern Mesopotamia Corridor extends (from west to east) across the Aleppo, Raqqa and Al Hasakah governorates. The Mediterranean Basin hotspot covers several other non-contiguous sites in As Suwayda (Djebel el-Druze) and Al Hasakah (Jabal Abdul Aziz, Wadi al-Radd).

LXIX The remaining areas were established through afforestation in marginal agroecological zones. See Syria Ministry of State for Environmental Affairs and UNDP (2008). Initial National Communication to the UNFCCC. Damascus: UNDP. URL: https://unfccc.int/documents/144633 pine woodlands – increasing the risks of soil erosion, landslides and flooding.[91] The duration of the fire season, the total area burned and the prevalence of fire-conducive weather conditions (e.g., low soil moisture, high maximum temperatures during summer months and sustained winds) have all increased over recent decades.[92] During the Syrian Civil War, the lack of effective fire management practices on abandoned land, as well as deliberate and uncontrolled cropland burning to target certain population groups, contributed to the disproportionate concentration of wildfires in northwestern and northeastern Syria.[93] Notably, in July 2025, the combined effects of hot temperatures, historic drought conditions and the legacies of conflict (e.g., the lack of forest management practices, degradation by displaced populations and dangers posed by unexploded ordinances) led to the largest wave of forest fires in Syria's modern history, burning at least 15,000 hectares in Latakia, and severely damaging plant and animal biodiversity.[94] Under a business-as-usual scenario, hotter summer temperatures and drier annual precipitation trends, especially multiyear droughts, more than double the risk of extreme fire weather conditions in vegetated areas of the eastern Mediterranean and Middle East by end-of-century.[95]

Increasing temperatures and decreasing precipitation also endanger Syria's marine and riparian biodiversity. **Mean sea surface temperatures off the Mediterranean coast,** typically 17.01 °C ± 1.22 °C in winter and 27.33 °C ± 1.44 °C in summer, **rose sharply** (0.078 °C ± 0.015 °C per year), particularly during summer months (0.096 °C ± 0.016 °C per year), between 1985 and 2024 compared to other locations in the basin.[96] Marine heatwave frequency, already evident during recent episodes where sea surface temperatures climbed above the average by several degrees Celsius**, increases under all scenarios to various extents by end-of-century, leading to invertebrate die-offs, algal blooms and potentially cascading effects across food chains**.[97] Higher water temperatures also favour invasive species. However, the extent of overfishing and effectiveness of marine conservation drastically impacts the rate of warming from which marine biomass can recover in the eastern Mediterranean.[98] In freshwater riparian areas and inland saltwater catchments, drought, excessive water withdrawals associated with irrigation demand and invasive species continue to threaten endemic fish stocks.[99] For example, water bodies that were once perennial but now flow intermittently or dry completely, such as the Quweiq River watershed, directly affect the survival rates of aquatic species.[100] Due to the Syrian Civil War, the FAO estimates that the fisheries sector sustained $80 million in damages, particularly in Syria's northwestern and northeastern governorates.[101]

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