ALGERIA Climate Fact Sheet

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I- GENERAL CLIMATE OVERVIEW

Algeria has two distinct climates: a Mediterranean climate in the North and a desert climate in most of the country (WB CCKP, 2021).

The sub-humid Mediterranean climate on the coast and in the Tell Atlas Mountains is characterized by wet and mild winters and hot and dry summers. Algiers, for example, has afternoon temperatures in July of 28 °C, which drop to about 21 °C at night, while in January daily temperatures range between 15 and 9 °C (Britannica, 2022). The rest of the country is covered by the Sahara Desert, where the seasonal average winter temperature is 15°C to 28°C and 40°C to 45°C during the summer (WB CCKP, 2021).

Total annual precipitation increases along the coast from west to east but diminishes rapidly from the coast southward into the interior. The greatest amount of precipitation occurs in the mountainous regions of the eastern littoral, which are directly exposed to the humid winds that blow inland from the Mediterranean and ranges between 600 mm and 1,000 mm. Precipitation diminishes after crossing the Atlas ranges to the south to less than 100 mm per year (Britannica, 2022).

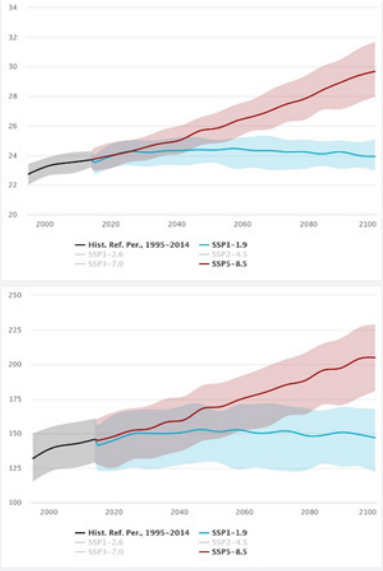


Figure-1: Projected Mean Temperature (up) and Projected Number of Hot Days [Tmax greater than 35 °C] (down) (WB CCKP, 2021)

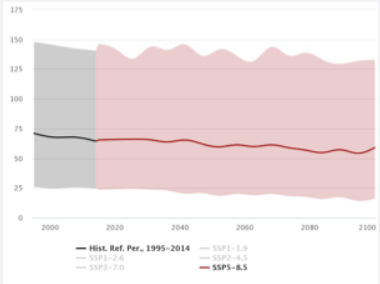


Figure-2 : Projected Precipitation (WB CCKP, 2021)

II- CLIMATE CHANGE TRENDS

The ND-GAIN Country Index summarizes a country's vulnerability[1] to climate change and other global challenges in combination with its readiness[2] to improve resilience. Algeria's ND-GAIN Index rank is 99. It is the 59th most vulnerable country and the 138th most ready country. The low vulnerability score and low readiness score of Algeria places it in the lower-left quadrant of the ND-GAIN Matrix, which means that relative to other countries, its current vulnerabilities are manageable but improvements in readiness will help it better adapt to future challenges (University of Notre Dame, 2023).

1 Vulnerability measures a country's exposure, sensitivity, and ability to adapt to the negative impact of climate change. ND-GAIN measures the overall vulnerability by considering vulnerability in six life-supporting sectors – food, water, health, ecosystem service, human habitat, and infrastructure.

2 Readiness measures a country's ability to leverage investments and convert them to adaptation actions. ND-GAIN measures overall readiness by considering three components – economic readiness, governance readiness and social readiness.

From Past to Present:

- **Temperature:** Annual mean temperatures have risen across Algeria since the 1960's. Inter-annual and decadal variability at the nearest available station show a warming of about 2.7°C per century since the 1900's (WB CCKP, 2021).

- **Precipitation:** Variability in rainfall is high. The seasonal average station, decadal variability and linear trend indicate a reduction of 12.4 mm/month per century since 1960's (WB CCKP, 2021).

Projected:

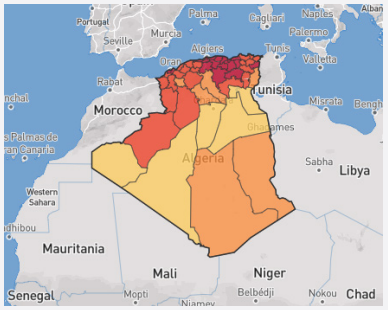
- **Temperature:** While mean temperature for the reference period 1995-2014 was between 22-23 °C, it is expected to increase and reach 25.77 °C by mid-century under a high-emission scenario[3] , and 29.68 °C by the end of the century under a high-emission scenario (figure 1, up). In addition, the number of hot days where maximum temperature (Tmax) is greater than 35 °C is expected to rise from 145 days (2014 reference) to reach 168 days by mid-century and 204 days by end of century under a high-emission scenario (figure 1, down).

- **Precipitation:** While the average precipitation for the reference period 2014 was 65 mm, it is projected to decrease by mid-century under a high-emissions scenario to reach 60.13 mm and by end of century under a high-emissions scenario to reach 59.07 mm (figure 2).

III- CLIMATE CHANGE IMPACTS

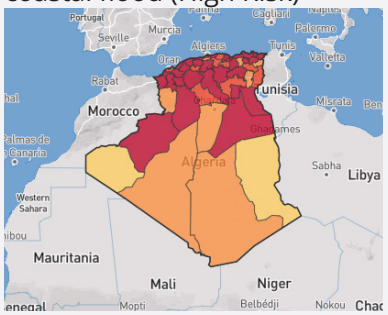
a- Natural Hazards

One of the main impacts of the change in temperature and rainfall patterns is the occurrence of natural hazards. Figure 3 summarizes the risk level of natural hazards in Algeria. It shows that the country has a high risk of river, urban, and coastal floods as well as landslides, extreme

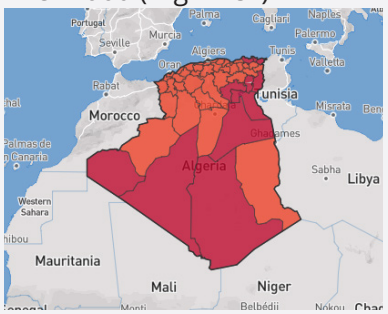


urban flood (High Risk)

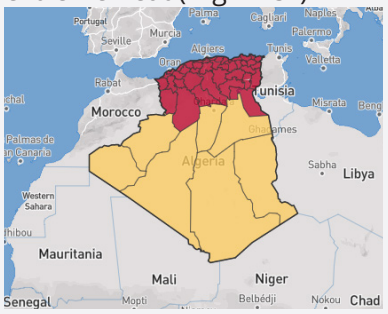
coastal flood (High Risk)



river flood (High Risk)



extreme heat (High Risk)



wildfire (High Risk)

3 SSP5\RCP8.5-The highest baseline emissions scenario in which emissions continue to rise throughout the twenty-first century, depicting a world of rapid and unconstrained growth in economic output and energy use.

heat, wildfire, and water scarcity.

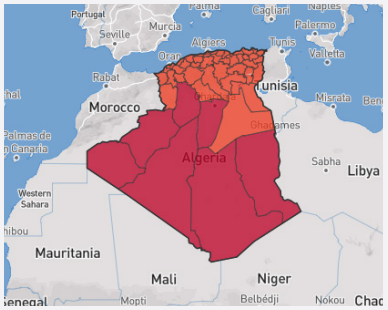
The main climate-related natural hazards that have occurred from 1900 till 2023 in Algeria are seen in table 1:

Table 1: Climate-related Natural Hazards (from 1900 till 2023) (EM-DAT, 2023)

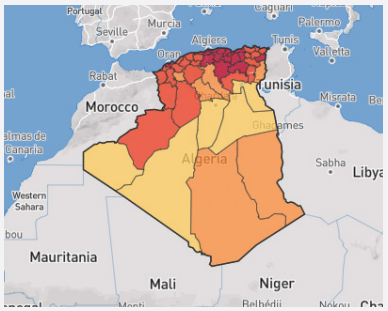
Disaster Type	Occurrence (1900-2023)
Flood	53 (of which 20 recorded riverine floods, 8 recorded flash floods, 1 recorded coastal flood)
Storm	4
Wildfire	4 (of which 3 recorded forest fires)
Extreme temperature	3 (of which 2 recorded cold waves, 1 recorded heat wave)
Drought	1
Landslide	1
	Total deaths: 5 149
	Total damages ('000 US$): 2 500 316

The country ranks 18 of 184 of the most exposed countries to drought, where an estimated 3,763,800 (about 10%) of its population is exposed to droughts. Algeria experienced a record heat wave in June of 2003, with temperatures over 40°C for 20 consecutive days that resulted in an estimated 40 deaths. Such events are projected to increase in a warming climate (WB CCKP, 2021). In addition, a weather station at Ouargla in the Algerian Sahara Desert recorded a temperature of 51.3ºC during the summer of 2018, the highest reliable temperature ever recorded in Africa (McKie, 2018). Recent climate-related natural disasters in the country include the March 2021 flash floods caused by heavy rains that affected north-western Algeria. The floods caused severe damages to properties and infrastructure, and affected more than 500 families (ReliefWeb, 2021). In addition, more than 100 fires raged in north-eastern Algeria during August 2022 affecting 14 governorates (Wilayas): Bejaia, Jijel, Souk Ahras, El Taref, Setif, Skikda, tipaza, tizi-ouzou, Guelma, Batna, Mila, Annaba, Constantine and Bordj Bou Arrerid. These fires resulted in the death of 44 people and caused more than 250 injuries, and the displacement of more than 500 families (2,000 people). The fires also affected the livelihoods of over 6,000 people, including farmers who have lost dozens of hectares, nearly a thousand fruit trees, and more than 400 heads of livestock (ReliefWeb, 2022).

A rise of 7–12 cm in the overall level of the Mediterranean Sea compared to the past decades is projected by 2050 which will lead to the intrusion of



water scarcity (High Risk)



landslide (High Risk)

Figure-3: Climate-Related Natural Hazards Risk Level (ThinkHazard, 2020)

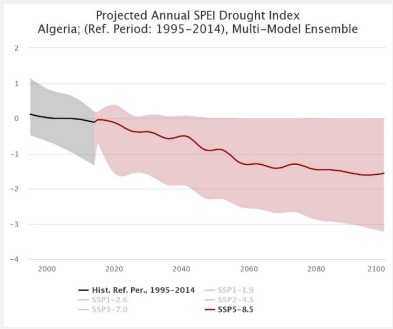


Figure-4: Projected Annual SPEI Drought Index (WB CCKP, 2021)

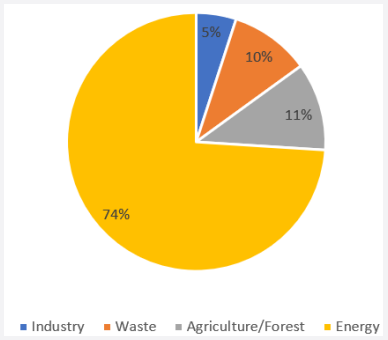


Figure-5: GHG Emissions per Sector (Sahnoune et al., 2013)

marine water into the aquifers, causing a decrease in freshwater storage as well as the deterioration of water and land quality. (ClimaMed, 2017). In addition, coastal areas of Algeria are prone to flooding caused by sea level rise, including the capital city Algiers (where the most severely affected sectors are expected to be the port of Algiers with its piers, the port terraces, the central urban area, the reserve corridor, the Hussein-Dey waterfront, the Sports palace, and the Algiers Opera) (Amoura & Dahmani, 2022).

b- Water

Renewable natural water resources are estimated at approximately 15 billion m3 per year, that is approximately 404 m3 per capita per year, near the threshold of 500 m3 per capita per year, which is widely recognized as the scarcity threshold that indicates developing scarcity and underlying crises (Hamiche et al., 2015). In addition, given Algeria's arid and semi-arid climate, it is important to mention that 85% of the rainfall naturally evaporates with only 15% replenishing the already scarce water surfaces (Fanack Water, 2019), a situation that will aggravate with the projected increase in temperature.

Figure 4 shows the projected annual Standardized Precipitation Evapotranspiration Index (SPEI)[4] in Algeria, which under a high-emissions scenario will score a value of -2.29 by 2050 and will reach -3.22 by the end of the century. These negative values imply a high pressure on water resources that are already scarce. A consequence of water scarcity could be a decline in agricultural productivity especially for crops that need irrigation. Other consequences include inadequate sanitation which can lead to deadly diarrheal diseases and other water-borne illnesses (WWF, 2023).

c- Agriculture and Fisheries

In 2020, agricultural, livestock farming, and fishery activities contributed around 14% to the country's GDP. In addition, the Algerian primary sector employed about 10% of the working population, corresponding to over one million people approximately (Saleh, 2022). The ratio "availability / capita" of agricultural land has declined from 0.75 ha/capita in 1962 to 0.24 ha/capita in 2008. This enormous loss of farmland is not only the result of human population growth and pressures of other sectors (industrial, domestic, etc.) but also the result of climate change. A 10 to 30% decrease in yields of vegetables are estimated to happen by 2030 (ClimaMed, 2017), along with other crops. This reduced agricultural

4 An index which represents the measure of the given water deficit in a specific location, accounting for contributions of temperature-dependent evapotranspiration and providing insight into increasing or decreasing pressure on water resources. Negative values for SPEI represent dry conditions, with values below −2 indicating severe drought conditions, likewise positive values indicate increased wet conditions.

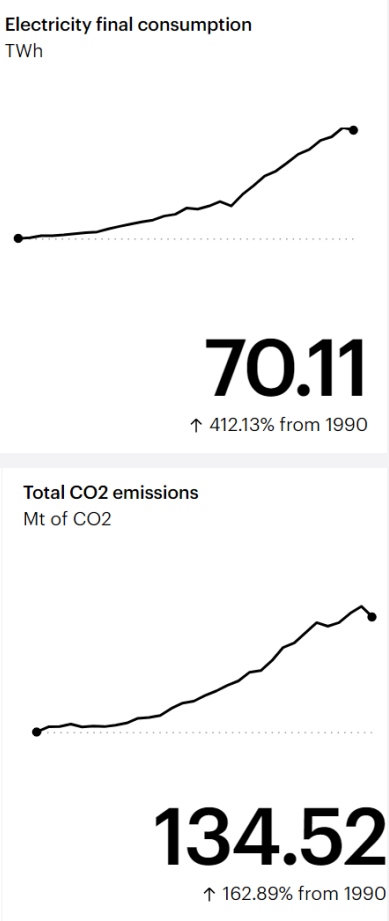


Figure-6: Electricity Final Consumption (up) and Total CO2 Emissions (down) (IEA, 2022)

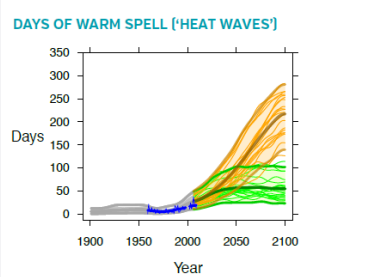


Figure-7: Projected Days of Warm Spell (or "heat waves") (WHO, 2015)

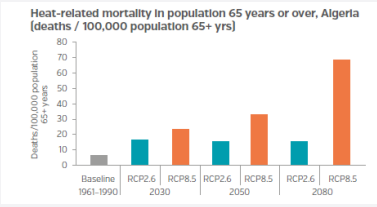


Figure-8: Heat-Related Mortality in Population 65 years or Over (WHO, 2015) ,

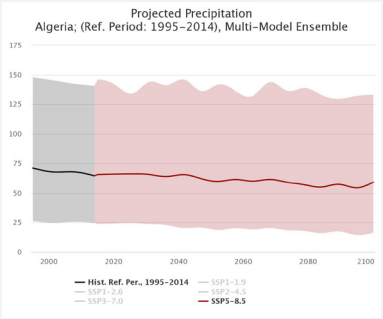


Figure-9: Timeline of Climate Change Actions (taken from ClimaMed, 2017)

productivity will make essential crops unavailable, which can cause food insecurity in the country and increase the chances of imports. In fact, even in years with sufficient domestic production, Algeria heavily relies on imports of cereal grains with wheat being the most prominent. Despite the expected small recovery in the domestic harvest in 2022, wheat import requirements for the 2022/23 marketing year are forecast at 8.1 million tonnes, about 25% above the imports of the previous year and 7% above average. In addition, about 5 million tonnes of maize and 1 million tonnes of barley are expected to be imported. The country imports wheat from France, Canada, Germany, the United States of America, Spain, and Mexico. Although no significant quantities of wheat are imported from Ukraine or Russia, together they supply about 20% of barley imports and less than 10% of maize. Overall, Algeria imports cereals from a variety of origins, making it less vulnerable to disruptions from the Russia-Ukraine conflict (FAO, 2022).

There are 20 major fishing ports along the 1 280 km coastline of Algeria. Aquaculture production is still marginal with the production of 2 200 tonnes in 2013, consisting of 1 560 tonnes of carps grown in freshwater, 350 tonnes of gilthead seabream from brackish water and a very small number of mussels and oysters. Aquaculture development has been identified as a strategic priority by the Government which has recently launched an ambitious development program aiming to create 10000 direct jobs in the sector in the next five years, and up to 50000 indirect ones by 2025, by putting 100000 hectares under cultivation for a target production of 30000 tonnes per year for export and domestic consumption. Climate change will cause changes to be noticed in the productivity of fisheries and fishing areas (ClimaMed, 2017), as it will affect fish and their habitats. Warmer temperatures will influence the abundance, migratory patterns and mortality rates of wild fish stocks and determine what species can be farmed in certain regions. These climatic effects on fish will have negative economic consequences for people dependent on fisheries and aquaculture, especially workers in this sector who will lose their source of income which will directly impact their livelihood (OECD, 2018).

d- Energy

The energy sector in Algeria is the source of highest emissions (about ¾ of the total) (figure 5).

Figure 6 (up) shows that electricity consumption in Algeria increased from 1990 (13.69 TWh) to 2020 (70.11 TWh). This increase in consumption also increased the total CO2 emissions from the energy sector by 162.89% from 1990 to 2020 (figure 6, down).

Figure 6: Electricity Final Consumption (left) and Total CO2 Emissions (right) (IEA, 2022)In addition, and as seen in figure 7, under a high

emissions scenario, the number of days of warm spells[5] is projected to increase from about 10 days in 1990 to about 215 days on average in 2100. Increased temperatures and seasonal changes are likely to increase demand for electricity during hotter summers. This will consequently increase costs for consumers, and projected trends are also expected to increase costs of maintenance and repairing of power and energy infrastructure.

Renewable Energy: As of 2023, Algeria generated only 3% of its electricity from renewable sources (686 MW annually, of which solar (448 MW), hydro (228 MW), and wind (10 MW)). Exporting hydrocarbon resources is an essential pillar of the Algerian economy. For that reason, investing in renewable resources is critical. In fact, it is predicted that unless Algeria adds significant renewable resources to its power generation mix by 2035, it will need to sacrifice hydrocarbon export revenues to supply domestic power demand. Regarding solar power potential, Algeria has some of the world's highest solar irradiance levels with the capacity to generate 1,850 to 2,100 kilowatts per hour and up to 3,500 hours per year in its desert regions. Regarding wind potential, the country has a 1,300-kilometer Mediterranean coastline with wind speeds of more than eight meters per second, in addition to winds coming off the surface of the Sahel in the South. Algeria aims to produce 27% of its electricity from renewable resources by 2035 mostly from solar power. In addition, in 2021, the Algerian government made a new push to develop strategic partnerships in the field of renewable energies with multiple countries, including China, Germany, and the United States to reignite the country's energy transition (International Trade Administration, 2023).

e- Health

In Algeria, under a high emissions scenario heat-related death in the elderly (65+ years) are projected to increase and reach about 69 deaths per 100,000 by 2080 compared to the estimated baseline of about 6 deaths per 100,000 annually between 1961 and 1990 (figure 8).

Climate change, through higher temperatures, land and water scarcity, flooding, drought, and displacement, negatively impacts agricultural production and causes breakdown in food systems. These disproportionally affect those most vulnerable people at risk to hunger and can lead to food insecurity. Vulnerable groups risk further deterioration into food and nutrition crises if exposed to extreme climate events. Without considerable efforts made to improve climate resilience, it has been estimated that the global risk of hunger and malnutrition could increase by up to 20 percent by 2050. In Algeria, the prevalence of stunting in children under age 5 was 11.7% in 2013, the prevalence of underweight children and wasting in children under 5 was

5 Periods characterised by several days of very warm temperatures compared to local or regional averages.

3% and 4.1% respectively in 2013[6] (WHO, 2015)[7][8].

IV- CLIMATE CHANGE RESPONSE: NATIONAL AND INTERNATIONAL

As seen in figure 9, Algeria ratified in April 1993, the United Nations Framework Convention on Climate Change (UNFCCC), and fully subscribed to commitments relating to the stabilizing emissions of GHGs. By adhering to the Kyoto Protocol in 2005, Algeria has shown its determination to participate in the international effort against climate change. With no historical responsibility for climate change, any national effort of mitigation should not be economically restrictive or threatening the right of Algeria to development. Algeria has developed an initial strategy against climate change and developed numerous projects for adaptation and mitigation. The national strategy is based primarily on four areas: institutional strengthening, adaptation to climate change, mitigation of emissions of GHG and human capacity building. Its implementation mainly concerns the sectors of energy, industry, transport, waste, water resources, agriculture, and forests (ClimaMed, 2017). In 2007, Algeria created the National Agency for climate change and inventories of greenhouse gas (GHG) emission are carried out periodically. The National Inter-Ministerial Dialogue on Climate Change was held in Algiers in 2009 following the ratification of the Kyoto Protocol, and with the support of a UNEP/UNDP programme. Algeria submitted its Intended Nationally Determined Contribution (INDC) in September 2015. This INDC was adopted by the Council of Ministers which endorsed it at its meeting on May 24, 2015. On October 13, 2016, Algeria has ratified the Paris Climate Agreement of 2015 (ClimaMed, 2017).

➔ National laws and policies (LSE, 2022):

Law No. 04-20 relative to the Prevention of Major Risks and the Management of Catastrophes in the Framework of Sustainable Development: The Law establishes the legal framework for disaster prevention and disaster risk management in Algeria. This Law is not limited to climate change-related risks, but explicitly includes climatic risks, and climate related areas (notably flooding and forest fires), in

6 Stunting results from chronic undernutrition, whereas wasting results from inadequate nutrition over a shorter period.

7 RCP 8.5 is the highest baseline emissions scenario in which emissions continue to rise throughout the twenty-first century
According to the IPCC, RCP 2.6 requires that carbon dioxide (CO2) emissions start declining by 2020 and go to zero by 2100.

8 According to the IPCC, RCP 2.6 requires that carbon dioxide (CO2) emissions start declining by 2020 and go to zero by 2100.

addition to other non-climate related disasters.

Law No. 04-09 relative to Renewable Energy Promotion in the Framework of Sustainable Development: Builds on the general commitments outlined in Law No. 99-09 relative to the Management of Energy, laying the foundations for a requisite 'national programme to support renewable energy within the context of sustainable development.

Law 99-09 relative to the Management of Energy: Establishes the framework and conditions for the National Programme for the Management of Energy, outlining parameters for: efficient consumption, energy conservation/energy efficiency, the reduction of GHG emissions and general air pollution, the education of both government agencies and the populace regarding energy efficiency, and the development of renewable energy technologies and sources inclusive of solar, geothermal, hydropower, and biomass.

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