JORDAN Climate Fact Sheet

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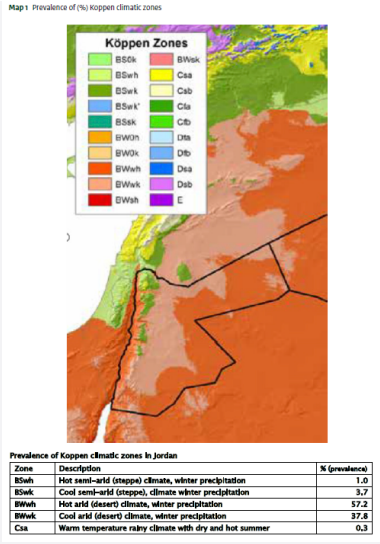
I- GENERAL CLIMATE OVERVIEW

Jordan's climate ranges between a more Mediterranean climate to a desert climate, but the land is generally very arid (orange and beige in figure 1).

Winter temperatures in the southern and northern highlands range between 9-13°C, while the deserts regions range from 19-22°C. In the Jordanian Valley, summer temperatures range between 38-39°C, while in the desert regions, they vary between 26-29°C. About 75% of precipitation falls during the winter. Jordan's climate is influenced by the Dry Sirocco (Khamsin) winds, which can lead to large temperature anomalies, with increases of up to 15°C. The Shamal winds are also an influencing factor, blowing from the north and northeast and causing high daytime temperatures (WB CCKP, 2021).



Prevalence of Koppen climatic zones in Jordan

Zone	Description	% (prevalence)
BSwh	Hot semi-arid (steppe) climate, winter precipitation	1.0
BSwk	Cool semi-arid (steppe), climate winter precipitation	3.7
BWwh	Hot arid (desert) climate, winter precipitation	57.2
BWwk	Cool arid (desert) climate, winter precipitation	37.8
Csa	Warm temperature rainy climate with dry and hot summer	0.3

Figure 1: Jordan's Climatic Zones (Ministry of Foreign Affairs of the Netherlands, 2018)

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. Jordan's ND-GAIN Index rank is 73. It is the 133rd most vulnerable country and the 97th most ready country. The low vulnerability score and high readiness score of Jordan places it in the lower-right quadrant of the ND-GAIN Matrix, which means adaptation challenges still exist, but Jordan is well positioned to adapt (University of Notre Dame, 2023).

From Past to Present:

The average annual mean temperature in Jordan for the year 1901 was 18.25 °C. This number increased to reach 20.36 °C in 2021 (+ 2.11 °C) (figure 2).

Decline in the annual precipitation since 1960s by 5-20% across the country, except in Ras Muneef in the highlands, and Ruwaished in the

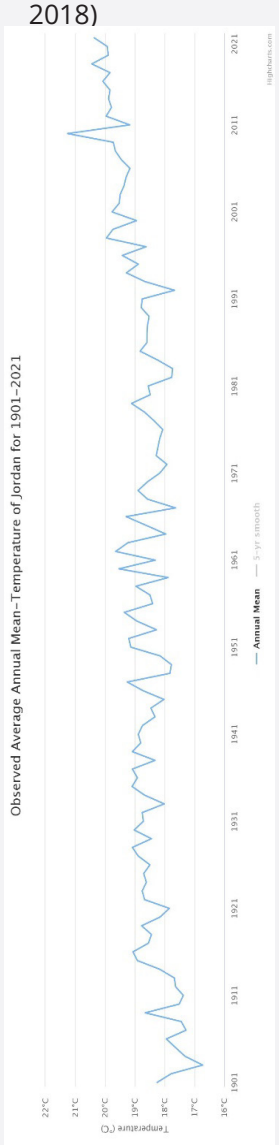


Figure 2: Observed Average Annual Mean Temperature (1901-2021) (WB CCKP, 2021)

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.

Badia, where rainfall has increased by 5-10% (Ministry of Foreign Affairs of the Netherlands, 2018).

Projected:

- **Temperature:** While mean temperature for the reference period 1995-2014 was between 18.94 and 19.81 ºC, it is expected to increase and reach 21.72 ºC by mid-century under a high-emission scenario(3), and 25.35 ºC by the end of the century under a high-emission scenario (figure 3, left). In addition, the number of hot days where the maximum temperature (Tmax) is greater than 35 ºC is expected to rise from 100.46 days (2014 reference) to reach 126.40 days by mid-century and 162.10 days by end of century under a high-emission scenario (figure 3, right).

- **Precipitation:** While the average precipitation for the reference period 2014 was 82.01 mm, it is projected to slightly decrease by mid-century under a high-emissions scenario to reach 79.44 mm and by end of century under a high-emissions scenario to reach 81.25 mm (figure 4).

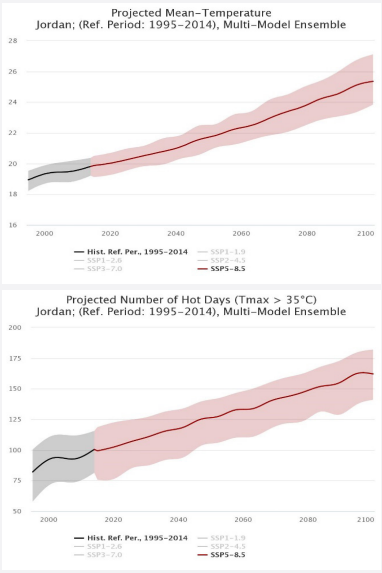


Figure 3: Projected Mean Temperature (Top) and Projected Number of Hot Days [Tmax greater than 35 °C] (Bottom) (WB CCKP, 2021)

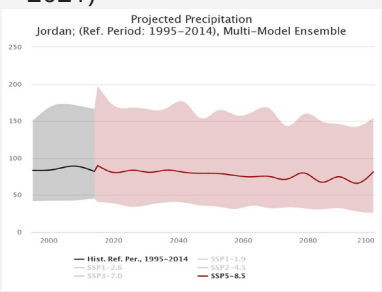


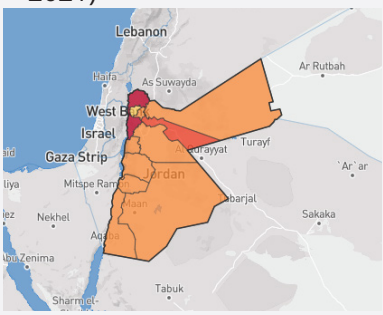
Figure 4: Projected Precipitation (WB CCKP, 2021)

III- CLIMATE CHANGE IMPACTS

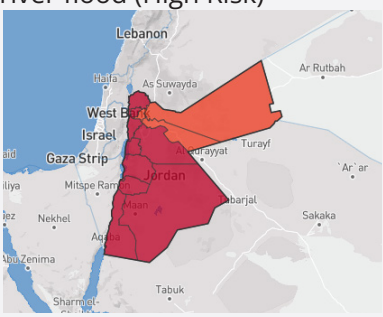
a- Natural Hazards

One of the main impacts of the change in temperature and rainfall patterns is the occurrence of natural hazards. Figure 5 summarizes the risk level of natural hazards in Jordan. It shows that the country has a high risk of river floods as well as landslides, extreme heat, water scarcity and wildfire.

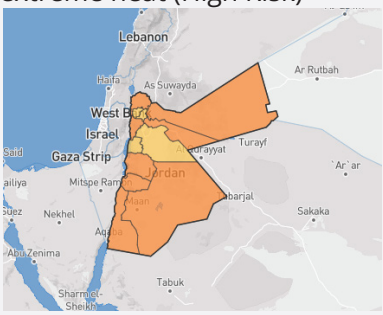
The main climate-related natural hazards that have occurred from 1900 till 2023 in Jordan are seen in table 1:



river flood (High Risk)



extreme heat (High Risk)



urban flood (Low 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.

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

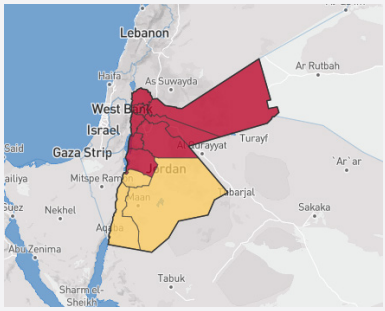
Disaster Type	Occurrence (1900-2023)
Flood	8 (of which 3 recorded flash floods)
Storm	3
Drought	2
Extreme temperature	2 (of which 1 recorded heat wave, 1 recorded cold wave)
	Total deaths: 376
	Total damages ('000 US$): 858 004

A recent example of such disasters includes a flooding event that occurred in December 2022, where over a thousand tourists have been evacuated from Jordan's historical city of Petra as floods engulfed the area (Al-Monitor, 2022).

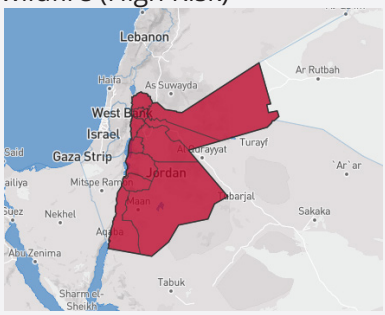
b- Water

Jordan is among the poorest countries in the world based on per capita water availability (Jordan's Third National Communication, 2014). Water availability levels are already at less than 100 m3 per person/year, which is far below the standard water poverty threshold of 500 m3 per capita per year and will continue to decrease further with population growth and climate change (Ministry of Foreign Affairs of the Netherlands, 2018).

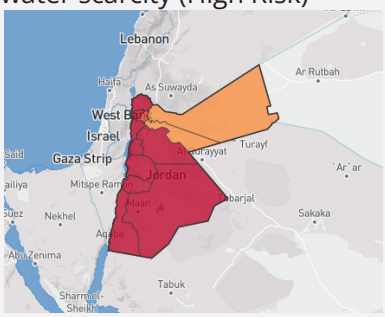
Figure 6 displays the projected annual Standardized Precipitation Evapotranspiration Index (SPEI)(4) in Jordan. The projected maximum annual SPEI drought index under a high-emissions scenario will score a value of -2.63 by 2050 and will reach -3.70 by the end of the century, implying an increasing high pressure on the already scarce water resources. 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).



wildfire (High Risk)



water scarcity (High Risk)



landslide (High Risk)

Figure 5: Climate-Related Natural Hazards Risk Level (ThinkHazard, 2020)

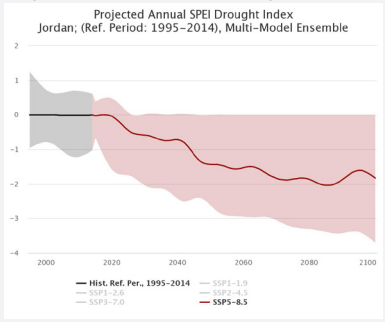


Figure 6: Figure 6: Projected Annual SPEI Drought Index (WB CCKP, 2021)

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.

c- Agriculture

The agriculture sector provides 19% of Jordan's food requirements and employs only 1.8% of the workforce. However, it uses 65% of Jordan's freshwater resources. The prevalence of arid conditions and irregular rainfall distribution are the main limiting factors affecting agricultural production. Only 10% of the land is considered suitable for agricultural production (mainly in the Highlands and the Jordan valley). The projected impact of climate change on agriculture includes crop loss or crop failure because of less rainfall, increased water demand of crops in response to rising temperatures but reduced water available for irrigation, shortened growing season, and desertification and degradation of arable land. The main staple crops in Jordan (wheat and barley) are especially vulnerable to changing climate. In fact, Barley yields in the Yarmouk Basin are projected to decrease by 5-50% by 2050 due to reduced rainfall and higher temperatures. Decline in the production and yields of these crops can affect food security which can lead to malnutrition, especially knowing that Jordan currently imports more than 80% of its domestic food requirements. Most of the rural population depends on agriculture for their livelihoods, therefore, the rural poor are expected to face the most severe consequences of climate change on this sector. (Ministry of Foreign Affairs of the Netherlands, 2018).

d- Energy

Figure 7 (left) shows that electricity consumption in Jordan increased from 1990 (3.33 TWh) to 2020 (18.93 TWh). This increase in consumption also increased the total CO2 emissions from the energy sector by 117.67% from 1990 to 2020 (figure 7, right). It is projected that electricity consumption will keep on increasing especially with the expected increase in the warm spell duration index(5) until the end of the century, under a high emission scenario (figure 8).

Renewable Energy: More than 20% of the electricity grid in Jordan is powered by solar or wind energy, with a target of 31% by 2030. The Jordan National Energy Strategy 2020-2030 focuses on advancing energy security through improving energy efficiency, energy mix diversification, increasing renewable energy share of the entire energy mix, reducing carbon emissions, and bringing down energy costs. The strategy also aims to reduce the reliance on imported oil fuels in producing electricity envisioning that by the end of 2030, 48.5% of the country's electricity generation would come from local energy sources. Jordan has long-term potential for renewable energy as it has an average of 316 sunny days per year, as well as wind speeds ranging between 7 and 8.5 m/s, along with having large desert areas with a low population (International Trade Administration, 2022).

5 An index that depicts periods characterised by several days of very warm temperatures compared to local or regional averages.

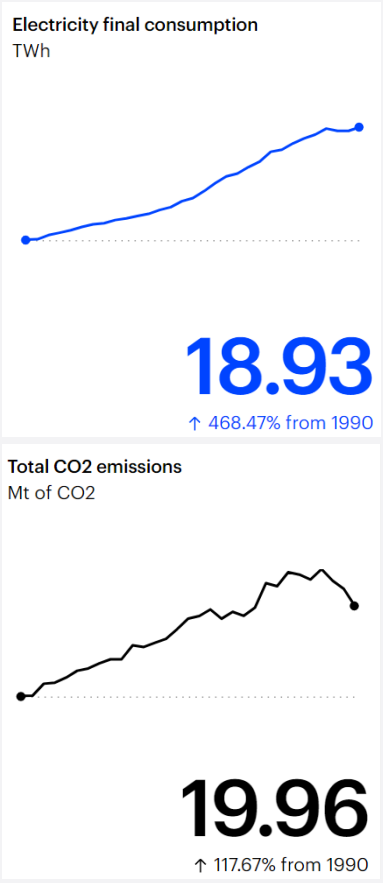


Figure 7: Electricity Final Consumption (top) and Total CO2 Emissions (bottom) (IEA, 2022)

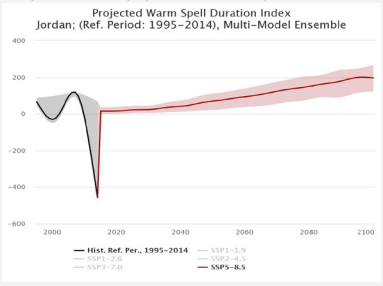


Figure 8: Projected Warm Spell Duration Index (WB CCKP, 2021)

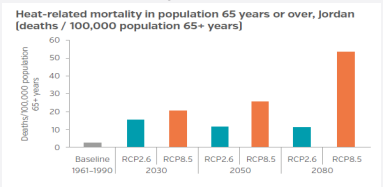


Figure 9: Heat-Related Mortality in Population 65 Years or Over (WHO, 2015)

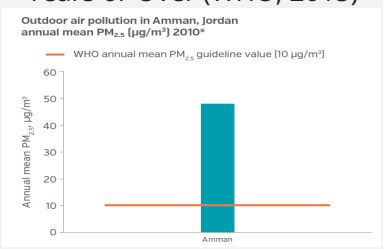


Figure 10: Outdoor Air Pollution in Amman (WHO, 2015)

e- Health

A greater number of people will be at risk of heat-related medical conditions as climate change is expected to increase mean annual temperature and the intensity and frequency of heat waves. The elderly, children, the chronically ill, the socially isolated and at-risk occupational groups are particularly vulnerable to heat-related conditions. Under a high emissions scenario heat-related death in the elderly (65+ years) is projected to increase to about 54 deaths per 100,000 by 2080 compared to the estimated baseline of under 3 deaths per 100,000 annually between 1961 and 1990. A rapid reduction in global emissions could limit heat-related death in the elderly to about 11 deaths per 100,000 in 2080 (figure 9)

Outdoor air pollution can have direct and severe consequences for health. Fine particles which penetrate deep into the respiratory tract increase mortality from respiratory infections, lung cancer and cardiovascular disease. In Amman, in 2010, annual mean PM2.5 levels were above the WHO guideline value of 10 µg/m3 (figure 10). In fact, approximately 600 people die prematurely each year in Jordan because of urban pollution (Ababsa, 2013).

IV- CLIMATE CHANGE RESPONSE: NATIONAL AND INTERATIONAL

➔ **National laws and policies include:**

Environmental Protection Law No. 6 of 2017: this law consisting of 33 articles aims at protecting the environment providing that (i) the Ministry of Environment is the authority responsible for environmental protection; (ii) the Ministry together with the related parties shall develop the policies and prepare the plans and programs, work on forecasting climate change identifying the involved sectors, follow the implementation of international environmental agreements, protect the biodiversity identifying areas that need special attention, protect water sources, issue environmental permits for activities that have a strong impact on the environment, establish the principles governing use and circulation of hazardous substances, gather environmental information and establish a national environmental database, and prepare emergency and disaster management plans. The Law deals also with permits for facilities; harmful substances and rules for their entry, import, storage, circulation, and use; management of hazardous waste; management of liquid and solid waste; and the establishment of an environmental protection Fund (UNEP, n.d.)

The National Climate Change Policy (2013-2020): a key document with subsequent strategies and plans. The objective is to achieve a pro-

active, climate risk-resilient Jordan, to remain with a low carbon but growing economy, with healthy, sustainable, and resilient communities, sustainable water, and agricultural resources, and thriving and productive ecosystems in the path towards sustainable development. The purpose of the Policy is to provide a high level of guidance for the Government of Jordan to implement the climate change objectives of national priority related to adaptation and mitigation of GHG emissions (Ministry of Foreign Affairs of the Netherlands, 2018).

➔ **The different international documents submitted as part of the UNFCCC are seen in table 2:**

Table 2: Timeline of UNFCCC Document Submission (ClimateWatch, 2022)

Date	Document Submitted
1997	First National Communication
2009	Second National Communication
2014	Third National Communication
2015	INDC
2016	First NDC
2021	*Revised first NDC

*Jordan's updated 1st Nationally Determined Contributions (NDC) document enhances its commitment to the international climate change governance system by raising its macroeconomic GHG emission reduction target from 14% in the 1st NDC to 31% in thiscurrent updated NDC, both compared to Business as Usual (BAU) scenario.

V- REFERENCES

Ababsa, M. (2013). Air Pollution IN Atlas of Jordan: History, Territories and Society. Retrieved from http://books.openedition.org/ifpo/5069

Al-Monitor. (2022). Flash floods force evacuations from Jordan's iconic Petra. Retrieved from https://www.al-monitor.com/originals/2022/12/flash-floods-force-evacuations-jordans-iconic-petra

ClimateWatch. (2022). Retrieved from https://www.climatewatchdata.org/countries/JOR

EM-DAT. (2023). Retrieved from https://public.emdat.be/

IEA. (2022). Retrieved from https://www.iea.org/countries/jordan

International Trade Administration. (2022). Retrieved from https://www.trade.gov/country-commercial-guides/jordan-renewable-energy

Jordan's Third National Communication. (2014). Retrieved from https://unfccc.int/resource/docs/natc/jornc3.pdf

Ministry of Foreign Affairs of the Netherlands. (2018). Retrieved from https://www.government.nl/documents/publications/2019/02/05/climate-change-profiles

ThinkHazard. (2020). Retrieved from https://thinkhazard.org/en/report/130-jordan

UNEP. (n.d.). Retrieved from https://leap.unep.org/countries/jo/national-legislation/environmental-protection-law-no-6-2017

University of Notre Dame. (2023). Retrieved from https://gain.nd.edu/our-work/country-index/rankings/

WHO. (2015). Retrieved from https://www.who.int/publications/i/item/health-and-climate-change-country-profile-2015-jordan

World Bank Climate Change Knowledge Portal (WB CCKP). (2021). Retrieved from https://climateknowledgeportal.worldbank.org/country/jordan

WWF. (2023). Water scarcity. Retrieved from https://www.worldwildlife.org/threats/water-scarcity#:~:text=When%20waters%20run%20dry%2C%20people,and%20other%20water%2Dborne%20illnesses