



BAHRAIN Climate Fact Sheet

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I- GENERAL CLIMATE OVERVIEW

Bahrain is an arid country with mild, pleasant winters, and summers that are very hot and humid. Rainfall is negligible from April through the end of October, coinciding with high temperatures. Relative humidity is highest during the winter months of December through February, although other months of the year show only slightly lower levels (WB CCKP, 2021).

II- CLIMATE CHANGE TRENDS

The ND-GAIN Country Index summarizes a country's vulnerability to climate change and other global challenges in combination with its readiness to improve resilience. Bahrain's ND-GAIN Index rank is 65. It is the 75th most vulnerable country and the 56th most ready country. The high vulnerability⁽¹⁾ score and high readiness⁽²⁾ score of Bahrain places it in the upper-right quadrant of the ND-GAIN Matrix, which means that it is on the road to responding effectively to climate change, but the adaptation needs and urgency to act are greater (University of Notre Dame, 2023).

From Past to Present:

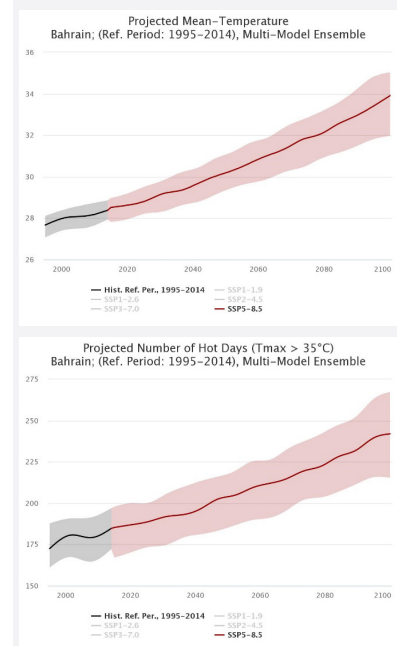
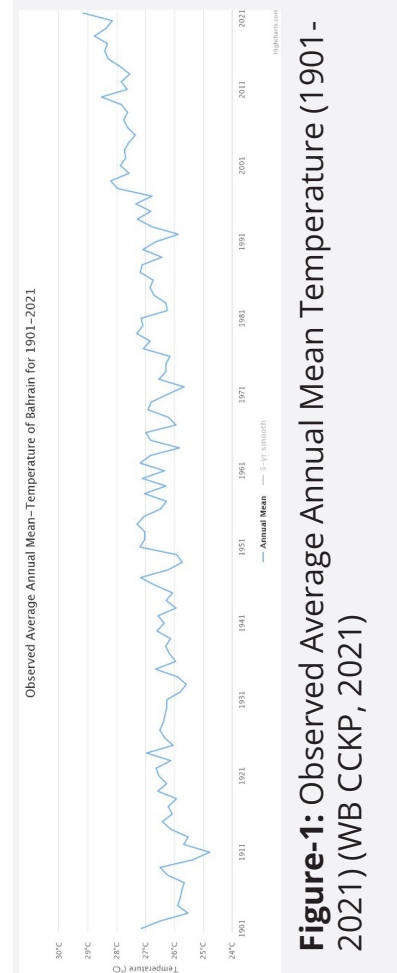
The average annual mean temperature in Bahrain for the year 1901 was 27.14 °C. This number increased to reach 29.15 °C in 2021 (+ 2.01 °C) (figure 1).

Projected:

- **Temperature:** While mean temperature for the reference period 1995-2014

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.



was between 27.67 and 28.38 °C, it is expected to increase and reach 30.19 °C by mid-century under a high-emission scenario⁽³⁾, and 33.91 °C by the end of the century under a high-emission scenario (figure 2, top). In addition, the number of hot days where the maximum temperature (Tmax) is greater than 35 °C is expected to rise from 184.74 days (2014 reference) to reach 203.93 days by mid-century and 241.96 days by end of century under a high-emission scenario (figure 2, bottom).



- **Precipitation:** While the average precipitation for the reference period 2014 was 57.23 mm, it is projected to increase by mid-century under a high-emissions scenario to reach 61.91 mm and by end of century under a high-emissions scenario to reach 99.65 mm (figure 3).

III- CLIMATE CHANGE IMPACTS



a- Natural Hazards

Figure 4 summarizes the risk level of natural hazards in Bahrain. It shows that the country has a high risk of extreme heat, and a medium risk of coastal floods. The country has very low risk of river floods, urban floods, landslides, and wildfires.

Figure 5 shows that under a high-emissions scenario, sea level rise is projected to increase and reach 0.24 m by mid-century and 0.70 m by the end of the century. As with all small island developing states, sea level rise represents an almost existential risk to the coastline of Bahrain. The six major islands on which most of Bahrain's population and infrastructure are located are less than 5 meters above current sea levels. Therefore, the very high population densities will surely be threatened by flooding. Sea level rise will also have an adverse impact on mangrove ecosystems⁽⁴⁾ which will start to degrade and eventually disappear, especially in Tubli Bay. In addition, widespread groundwater salinization due to saltwater intrusion is projected to occur causing a decrease in freshwater storage as well as the deterioration of water and land quality (Bahrain's Third National Communication, 2020).



b- Water

Bahrain is extremely poorly equipped with water resources, having per capita freshwater availability levels that are among the lowest in the world. There are three main sources of water supply in Bahrain: groundwater, desalinated water, and treated wastewater. Over the past

4 Mangroves provide natural protection to nearby populations by preventing erosion and absorbing storm surge impacts during extreme weather events. They also provide habitat for birds, fish, invertebrates, mammals, and plants (The Nature Conservancy, 2020).

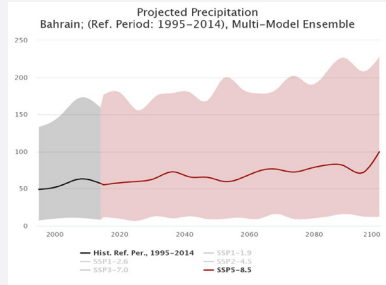
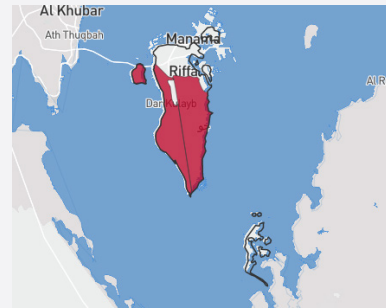
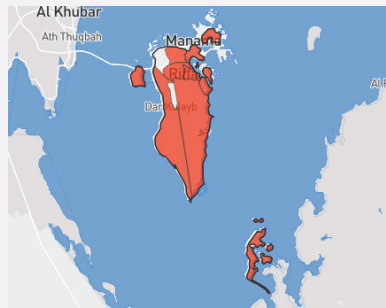


Figure-3: Projected Precipitation (WB CCKP, 2021)



extreme heat (High Risk)



coastal flood (Medium Risk)

Figure-4: Climate-Related Natural Hazards Risk Level (ThinkHazard, 2020)

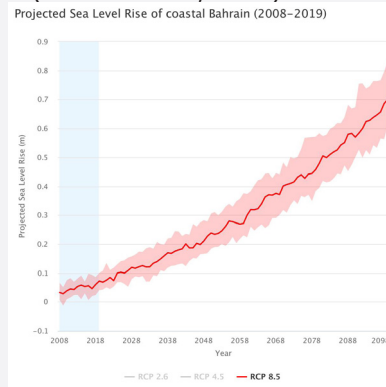


Figure-5: Projected Sea Level Rise of Coastal Bahrain (WB CCKP, 2021)

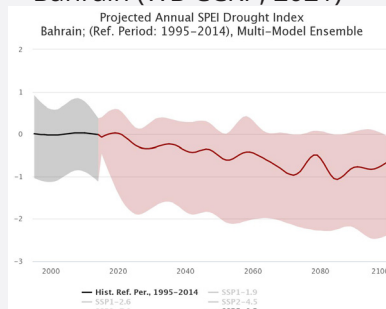


Figure-6: Projected Annual SPEI Drought Index (WB CCKP, 2021)

45 years, rapid population and economic growth has contributed to a decline in per capita freshwater availability of 4.4% per year – from 525 m³/yr in 1970 to about 70 m³/yr in 2015. At current rates, per capita freshwater availability could decline to less than 50 m³ by 2030 (Bahrain’s Third National Communication, 2020).

Figure 6 shows the projected annual Standardized Precipitation Evapotranspiration Index (SPEI)⁽⁵⁾ in Bahrain. The projected maximum annual SPEI drought index under a high-emissions scenario will score a value of -1.98 by 2050 and will reach -2.38 by the end of the century, implying an increasing high pressure on the already scarce water resources. A consequence of water scarcity includes inadequate sanitation which can lead to deadly diarrheal diseases and other water-borne illnesses (WWF, 2023).

c- Agriculture

Agriculture is negligible in Bahrain, accounting for 0.3% of GDP and covers only a small part of the country’s needs in food (Bahrain’s Third National Communication, 2020). The country imports 94% of its food to meet local demand (Yu Lim, 2020). Low agricultural productivity is caused by both limited arable land (only 2.1% of the land is arable) and a hyper arid climate. Agricultural water demand is associated with irrigated agriculture using traditional (i.e., flood irrigation) and modern methods (i.e., drip and sprinkler irrigation). It currently represents about 30% of annual water consumption in Bahrain. While agricultural water demand increased at an average annual rate of 4.1% during 1980s and 1990s, peaking about 185 Mm³ in 1999, it has gradually declined by an average of 2.1% per year since then, totalling 125 Mm³ in 2015. This parallels the reduction in agricultural land area due to widespread groundwater salinization; from a high of 10,000 hectares in 1999 agricultural land dropped to about 3,700 hectares in 2015 (Bahrain’s Third National Communication, 2020).

d- Energy

Figure 7 (left) shows that electricity consumption in Bahrain increased from 1990 (7.75 TWh) to 2019 (33.04 TWh). This increase in consumption also increased the total CO₂ emissions from the energy sector by 205.24% from 1990 to 2019 (figure 7, right). It is expected that electricity consumption will keep on augmenting (along with CO₂ emissions), especially with the expected rise in the Warm Spell Duration index⁽⁶⁾ until the end of the century under a high emission scenario (figure 8).

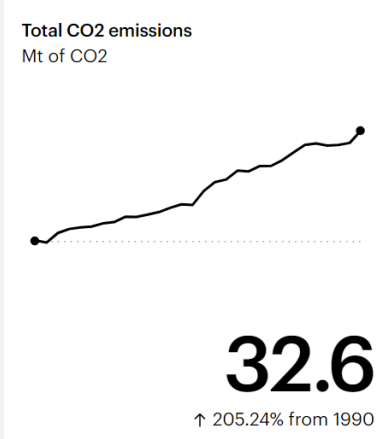
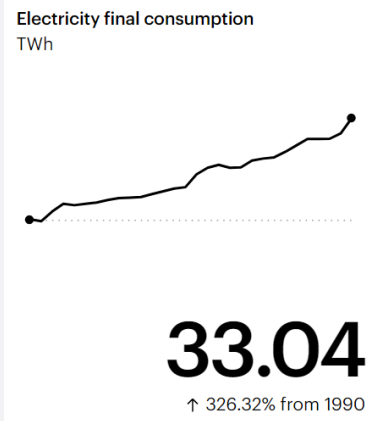
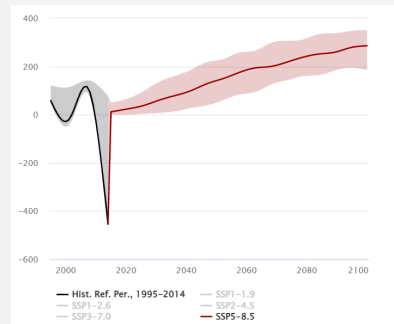


Figure-7: Electricity Final Consumption (top) and Total CO₂ Emissions (bottom) (IEA, 2019)



⁵ 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.

⁶ An index that depicts periods characterised by several days of very warm temperatures compared to local or regional averages.

Renewable Energy: Bahrain reached its 6% energy efficiency target in 2019, six years ahead of schedule. According to official sources, Bahrain's energy efficiency will improve as government ministries implement the National Energy Efficiency Action Plan (NEEAP). Some of the country's main solar initiatives include planning for a solar farm project on the Askar landfill, delivering 100 megawatts of renewable power; a 50-megawatt initiative to install solar panels on the roofs of hundreds of government-owned buildings, and the potential installation of "floating solar" technologies to be deployed for power generation in Bahrain's territorial waters to address the problem of land scarcity for larger solar farms (International Trade Administration, 2022).

e- Health

Climate change is understood to pose a potentially significant threat to public health. Increased exposures to thermal extremes, changing disease vector dynamics, and an increased incidence of food-related and waterborne infections are all likely to be experienced throughout the Bahraini population, with the elderly, patients with pre-existing medical conditions, and children, likely among those hit the hardest (Bahrain's Second National Communication, 2012).

IV- CLIMATE CHANGE RESPONSE: NATIONAL AND INTERNATIONAL

→ Some of the national responses to climate change in Bahrain include (Bahrain National Assessment Report, 2009):

1. National Environmental Strategy

National environmental strategy was officially approved by the Cabinet of Ministers through Edict No. 02-1902 released during the session held on 8th October 2006. It contains a foresight and action thoughts for several environmental issues including air pollution and climate change, water conservation and pollution control, land resources, and marine and coastal environment. Other sections of the strategy dealt with issues of mainstreaming environment into sustainable development. In this context, special attention was given to issues of tourism, transport, and waste management. However, implementations of NES require action plan as the latest is being reviewed and awaiting formal approval.

2. Bahrain State of Environment Report (BSOE)

Work on Bahrain State of Environment Report (BSOE) was initiated in 2007. The aim of the report is to assess state and trend of the

environment in the country and foresee possible development scenarios. Main issues dealt with in BSOE include marine and coastal environment, air, water resources, land use and biodiversity, and climate change. Work on BSOE is in its final stages.

3. National Biodiversity Strategy and Action Plan (NBSAP)

A national biodiversity report was prepared last year. Content of report is under consideration to be adopted as the first national Biodiversity report to biodiversity convention.

4. National Desertification Plan and Strategy

Bahrain national action plan (NAP) on combating desertification was prepared within the framework of sub-regional action program under the United Nations Convention to combat Desertification. NAP is currently under final review for formal adoption.

5. National Economic Strategy

The Kingdom of Bahrain seeks proper measures to mainstream environmental concerns in the national planning. This was affirmed in NES (2006-2011) and the National Economic Strategy (2009-2014). This comes in line with the new global governance of environment aiming at bringing about green solutions to development and promoting an environmentally friendly economy at all levels. In this regard, the National Economic Strategy prioritized sustainability in future economic growth, while taking environment into consideration. A five year set targets were elaborated upon in the strategy. Concerns were given to actions aimed at reducing energy consumption, clean energy technology, enforcement of pollution control laws, Improving water resource management, and conservation of biodiversity.

6. The Economic Vision 2030 for Bahrain

The economic vision 2030 for Bahrain is based on the premises of promoting factors that drive prosperity of the Bahraini community. Within this context, three interrelated principles emerged, which guide Bahraini ambitions: sustainability, competitiveness, and fairness. It is envisaged that national authorities will seek promotion and finding the proper environment to enable Bahraini communities of achieving these premises.

7. Bahrain 2030 National Planning Development Strategies

Bahrain 2030 National Planning Development Strategies project put a development plan concentrating on the possible ways of integrating environment into development. More precisely, how environment can support development without repercussion impacts. The National Development Planning Strategies contains five parts dealing with mostly with economic issues and social welfare. Environmental issues were given a special attention too by emphasizing the necessity for conservation and protection of natural resources.

8. Bahrain 2030 National Land Use Strategy

The 2007 National Structural Strategic Plan presented a long-term vision for the Kingdom of Bahrain over the 2030 horizon. The Plan emphasized the need to incorporate environmental considerations in the planning of all major projects in the country. The plan reflects the desire of relevant authorities to balance between economic, social, and environmental sustainability to achieve sustainable development.

9. Future Skills Strategy for Bahrain

This strategy is designed to support the creation of high value-added jobs for Bahrainis in rewarding careers and better match labour supply to future demand. The strategy outlines sector-based strategies to assist skills development in four areas expected to make a significant contribution to economic growth and provide opportunities for Bahrainis in high skilled occupations. These areas include manufacturing, health, tourism, and infrastructure and Services sectors.

National laws and policies (SCE, 2022):

Decree-Law no (2) of 1995 on Wildlife Conservation has the aim of protecting the environment and maintaining natural balance, combating all forms of pollution, avoiding short- and long-term negative effects which may result from the implementation of plans and programs for economic or industrial development, physical or other developmental programs that are aimed at improving the standard of living

→ The different international documents submitted as part of the UNFCCC are seen in table 1:

Table 1: Timeline of UNFCCC Document Submission (ClimateWatch, 2022)

| Date | Document Submitted |
|------|-------------------------------|
| 2005 | First National Communication |
| 2012 | Second National Communication |
| 2015 | INDC |
| 2016 | First NDC |
| 2020 | Third National Communication |
| 2021 | Updated First NDC* |

* As a developing country, the Kingdom of Bahrain is actively pursuing economic diversification considering sustainability as the pillar of its

growth. Despite its low annual GHG footprint, estimated approximately below 0.1% of the global GHG footprint, the Kingdom of Bahrain strives to avoid and reduce emissions in its economic development. As per Article 4.7 of the Paris Agreement, at the core of this NDC is mitigation co-benefits resulting from adaptation actions and economic diversification plans.

V- REFERENCES

- Bahrain National Assessment Report. (2009). Retrieved from https://www.un.org/esa/dsd/dsd_aofw_sids/sids_pdfs/msi_plus5/donor_input/Bahrain/bahrain.pdf
- Bahrain's Second National Communication. (2012). Retrieved from <https://unfccc.int/resource/docs/natc/bhrnc2.pdf>
- Bahrain's Third National Communication. (2020). Retrieved from https://unfccc.int/sites/default/files/resource/9143680_Bahrain-NC3-2-SCE%20Third%20National%20Communication%202020.pdf
- ClimateWatch. (2022). Retrieved from <https://www.climatewatchdata.org/countries/BHR>
- IEA. (2019). Retrieved from <https://www.iea.org/countries/bahrain>
- International Trade Administration. (2022). Retrieved from <https://www.trade.gov/country-commercial-guides/bahrain-renewable-energy-0>
- SCE. (2022) Retrieved from <https://www.sce.gov.bh/en/EnvironmentLaw?cms=iQRpheuphYtj6pyXUGiNqsUg9%2fHnbwlo>
- The Nature Conservancy. (2020). Retrieved from <https://www.nature.org/en-us/about-us/where-we-work/united-states/florida/stories-in-florida/why-mangroves-important/#:~:text=Mangroves%20provide%20natural%20infrastructure%20and,help%20bind%20and%20build%20soils>
- ThinkHazard. (2020). Retrieved from <https://thinkhazard.org/en/report/21-bahrain>
- University of Notre Dame. (2023). Retrieved from <https://gain.nd.edu/our-work/country-index/rankings/>
- World Bank Climate Change Knowledge Portal (WB CCKP). (2021). Retrieved from <https://climateknowledgeportal.worldbank.org/country/bahrain>
- 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>
- Yu Lim, G. (2020). Consumption challenge: Bahrain steps up food security efforts as it drops in global ranking. Retrieved from <https://www.foodnavigator-asia.com/Article/2020/02/12/Consumption-challenge-Bahrain-steps-up-food-security-efforts-as-it-drops-in-global-ranking#>

