

CLIMATE RISK COUNTRY PROFILE

DJIBOUTI



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This profile is part of a series of Climate Risk Country Profiles developed by the World Bank Group (WBG). The country profile synthesizes most relevant data and information on climate change, disaster risk reduction, and adaptation actions and policies at the country level. The country profile series are designed as a quick reference source for development practitioners to better integrate climate resilience in development planning and policy making. This effort is managed and led by Veronique Morin (Senior Climate Change Specialist, WBG) and Ana E. Bucher (Senior Climate Change Specialist, WBG).

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Climate and climate-related information is largely drawn from the [Climate Change Knowledge Portal \(CCKP\)](#), a WBG online platform with available global climate data and analysis based on the latest [Intergovernmental Panel on Climate Change \(IPCC\)](#) reports and datasets. The team is grateful for all comments and suggestions received from the sector, regional, and country development specialists, as well as climate research scientists and institutions for their advice and guidance on use of climate related datasets.

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FOREWORD

Climate change is a major risk to good development outcomes, and the World Bank Group is committed to playing an important role in helping countries integrate climate action into their core development agendas. The World Bank Group is committed to supporting client countries to invest in and build a low-carbon, climate-resilient future, helping them to be better prepared to adapt to current and future climate impacts.

The World Bank Group is investing in incorporating and systematically managing climate risks in development operations through its individual corporate commitments.

A key aspect of the World Bank Group's Action Plan on Adaptation and Resilience (2019) is to help countries shift from addressing adaptation as an incremental cost and isolated investment to systematically incorporating climate risks and opportunities at every phase of policy planning, investment design, implementation and evaluation of development outcomes. For all International Development Association and International Bank for Reconstruction and Development operations, climate and disaster risk screening is one of the mandatory corporate climate commitments. This is supported by the Bank Group's Climate and Disaster Risk Screening Tool which enables all Bank staff to assess short- and long-term climate and disaster risks in operations and national or sectoral planning processes. This screening tool draws up-to-date and relevant information from the World Bank's Climate Change Knowledge Portal, a comprehensive online 'one-stop shop' for global, regional, and country data related to climate change and development.

Recognizing the value of consistent, easy-to-use technical resources for client countries as well as to support respective internal climate risk assessment and adaptation planning processes, the World Bank Group's Climate Change Group has developed this content. Standardizing and pooling expertise facilitates the World Bank Group in conducting initial assessments of climate risks and opportunities across sectors within a country, within institutional portfolios across regions, and acts as a global resource for development practitioners.

For developing countries, the climate risk profiles are intended to serve as public goods to facilitate upstream country diagnostics, policy dialogue, and strategic planning by providing comprehensive overviews of trends and projected changes in key climate parameters, sector-specific implications, relevant policies and programs, adaptation priorities and opportunities for further actions.

It is my hope that these efforts will spur deepening of long-term risk management in developing countries and our engagement in supporting climate change adaptation planning at operational levels.



Bernice Van Bronkhorst

Global Director

Climate Change Group (CCG)

The World Bank Group (WBG)

COUNTRY OVERVIEW

The Republic of Djibouti is located in the Horn of Africa along the Gulf of Aden, at the southern entrance to the Red Sea. Djibouti is one of the smallest countries in Africa and shares borders with Eritrea, Ethiopia and Somalia and covers a land area of more than 23,000 square kilometers (km²), with a coastline of 372 km.¹ Djibouti is a highly arid country with little arable soil; nearly 90% of the country is classified as desert, with approximately 9% considered as pasture and about 1% forest. The terrain is comprised of arid lands scattered with shrubs throughout the country's plateaus, plains, volcanic formations and mountain ranges, some reaching 2,000 meters (m) in height. Across the country, altitude varies from 155 m below sea level at Lake Assal to over 2,000 m at Mount Moussa Ali. The eastern region is dominated by high ridges and relatively deep ravines. Western zones are comprised of regularly deepening plains and depressions marked by fracturing. The coastal plains, in the north of the country, include cliffs falling directly to the sea and pebble and sandy beaches. Djibouti is considered as resource scarce and is prone to natural disasters which can be further exacerbated by water scarcity, poor water management and poor land-use planning.²

The country experiences little precipitation and is largely unsuitable for agriculture and as a result, Djibouti imports nearly all of its food. Djibouti is considered a lower-middle income country and has some economic strength given its strategic location and serving as a bridge between Africa and the Middle East. The country's port complex, among the most sophisticated in the world, is the economic driver for the country. Djibouti has received significant public-debt financed investment in infrastructure, which has supported sustained economic growth in recent years; currently the country's debt stands at an estimated 70% of the country's Gross Domestic Product (GDP).³ Djibouti has a population of nearly 974,000 people (2019) with an annual population growth rate of 1.5% (2019),⁴ and is projected to reach 1.1 million people by 2030 and 1.3 million people by 2050. An estimated 78% of the current population resides in urban areas, which is expected to reach 85% in 2050. The country has a Gross Domestic Product (GDP) of \$3.3 billion (2019), and has experienced relatively volatile growth rates over the past decade, with a current annual growth rate of 7.5% in 2019 (Table 1).⁵

TABLE 1. Data snapshot: Key development indicators

Indicator	2018
Life expectancy at birth, total (years)	66.6
Population density (people per sq. km land area)	41.4
% of Population with access to electricity	60.4%
GDP per capita (current US\$)	\$3,141.90

¹ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

² UNDP (2020). Climate Change Adaptation – Djibouti. URL: <https://www.adaptation-undp.org/explore/eastern-africa/djibouti>

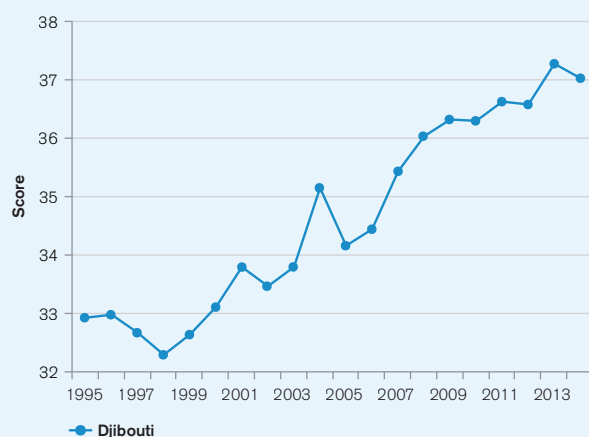
³ World Bank (2020). Djibouti – Overview. URL: <https://www.worldbank.org/en/country/djibouti/overview#1>

⁴ World Bank Open Data. Data Retrieved September 2020. Data Bank: World Development Indicators, Djibouti. URL: <https://databank.worldbank.org/source/world-development-indicators>

⁵ World Bank Open Data. Data Retrieved September 2020. Data Bank: Population Estimates and Projections, Djibouti. URL: <https://databank.worldbank.org/source/population-estimates-and-projections>

The ND-GAIN Index⁶ ranks 181 countries using a score which calculates a country's vulnerability to climate change and other global challenges as well as their readiness to improve resilience. This Index aims to help businesses and the public sector better identify vulnerability and readiness in order to better prioritize investment for more efficient responses to global challenges. Due to a combination of political, geographic, and social factors, Djibouti is recognized as highly vulnerable to climate change impacts, ranked 117 out of 181 countries in the 2019 ND-GAIN Index. The more vulnerable a country is the lower their score, while the more ready a country is to improve its resilience the higher it will be. Norway has the highest score and is ranked 1st. **Figure 1** is a time-series plot of the ND-GAIN Index showing Djibouti's progress

FIGURE 1. ND-GAIN Index for Djibouti



Djibouti is considered highly vulnerable to climate change and is expected to experience adverse impacts from increased temperatures, increased aridity, reduced precipitation, and rising sea levels. Socio-economic and environmental implications will particularly affect water resources, agricultural and livestock, coastal zones, health, and tourism sectors.⁷

Djibouti submitted its [Nationally-Determined Contribution](#) (NDC) to the UNFCCC in 2016, in support of the country's efforts to achieve its economic development goals, reduce its vulnerability to drought, protect the country against rising sea levels, improve water access, protect biodiversity and reinforce the resilience of rural populations. Djibouti's NDC is consistent with the country's overall goals of increasing its development, reducing its vulnerability and achieving long-term sustainable, economic development. Key focus is on the sustainability of the environment, water resources, infrastructure, agriculture sectors and coastal zones.⁸ Djibouti published its [Second National Communication](#) (NC2) to the UNFCCC in 2014.

Green, Inclusive and Resilient Recovery

The coronavirus disease (COVID-19) pandemic has led to unprecedented adverse social and economic impacts. Further, the pandemic has demonstrated the compounding impacts of adding yet another shock on top of the multiple challenges that vulnerable populations already face in day-to-day life, with the potential to create devastating health, social, economic and environmental crises that can leave a deep, long-lasting mark. However,

⁶ University of Notre Dame (2020). Notre Dame Global Adaptation Initiative. URL: <https://gain.nd.edu/our-work/country-index/>

⁷ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

⁸ Djibouti (2016). Nationally Determined Contribution. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Djibouti%20First/INDC-Djibouti_ENG.pdf

as governments take urgent action and lay the foundations for their financial, economic, and social recovery, they have a unique opportunity to create economies that are more sustainable, inclusive and resilient. Short and long-term recovery efforts should prioritize investments that boost jobs and economic activity; have positive impacts on human, social and natural capital; protect biodiversity and ecosystems services; boost resilience; and advance the decarbonization of economies.

CLIMATOLOGY

Climate Baseline

Overview

Djibouti has an arid tropical climate of semi-desert, except for the mountainous regions of the northern Gulf of Tadjourah. The country is characterized by high temperatures and high evaporation year-round. The country is particularly affected by low and irregular precipitation patterns. The climate is marked by two distinct seasons. The cool season (October-April) has mild temperatures ranging between 22°C and 30°C with relatively high humidity and sea winds. The hot and dry season (May to June and September to October) has high temperatures, which can range between 30°C and 40°C with often violent, hot and dry sand wind (khamsin). This season is the driest period.⁹

Analysis of data from the World Bank Group's [Climate Change Knowledge Portal](#) (CCKP) (**Table 2**) shows historical information for 1901–2019. Mean annual mean temperature for Djibouti is 27.8°C, with average monthly temperatures ranging between 23°C (January) and 32°C (July). Mean annual precipitation is 244.6 millimeters (mm), with highest rainfall occurring July to September, with relatively very low levels of precipitation occurring nearly all year round (**Figure 2**).¹⁰ **Figure 3** shows the spatial variation of observed average annual precipitation and temperature across Djibouti.

TABLE 2. Data snapshot: Summary statistics

Climate Variables	1901–2019
Mean Annual Temperature (°C)	27.8°C
Mean Annual Precipitation (mm)	244.6 mm
Mean Maximum Annual Temperature (°C)	32.2°C
Mean Minimum Annual Temperature (°C)	22.5°C

⁹ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

¹⁰ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti. URL: <https://climateknowledgeportal.worldbank.org/country/djibouti/climate-data-historical>

FIGURE 2. Average monthly temperature and rainfall of Djibouti for 1991–2019¹¹

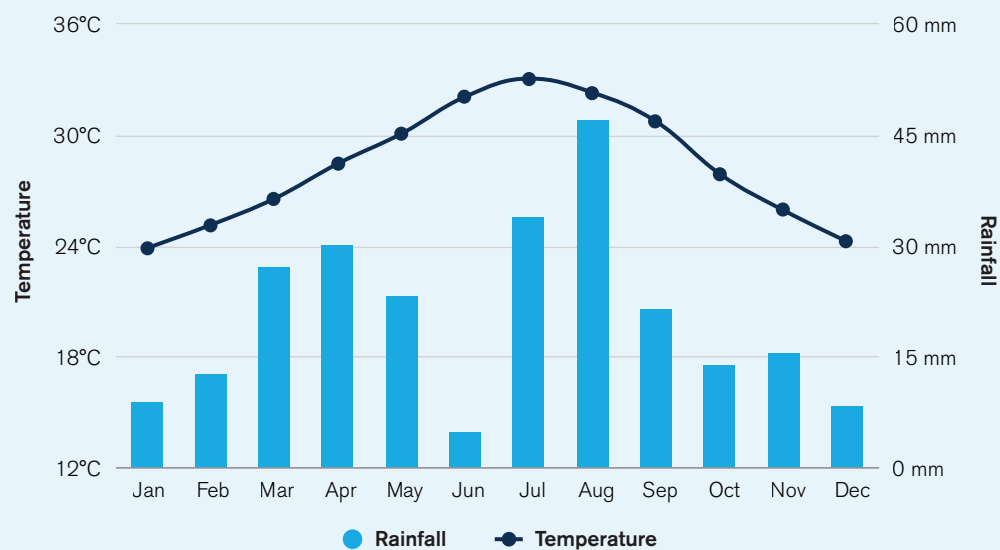
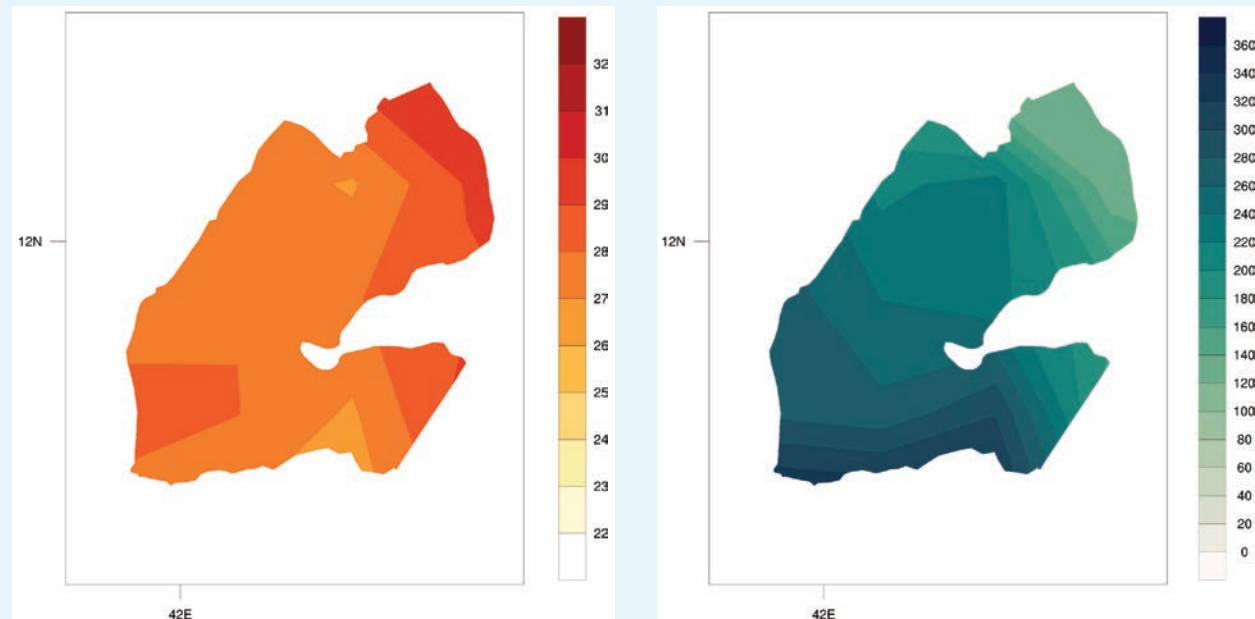


FIGURE 3. Map of average annual temperature (left); annual precipitation (right) of Djibouti, 1901–2019¹²



¹¹ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti. URL: <https://climateknowledgeportal.worldbank.org/country/djibouti/climate-data-historical>

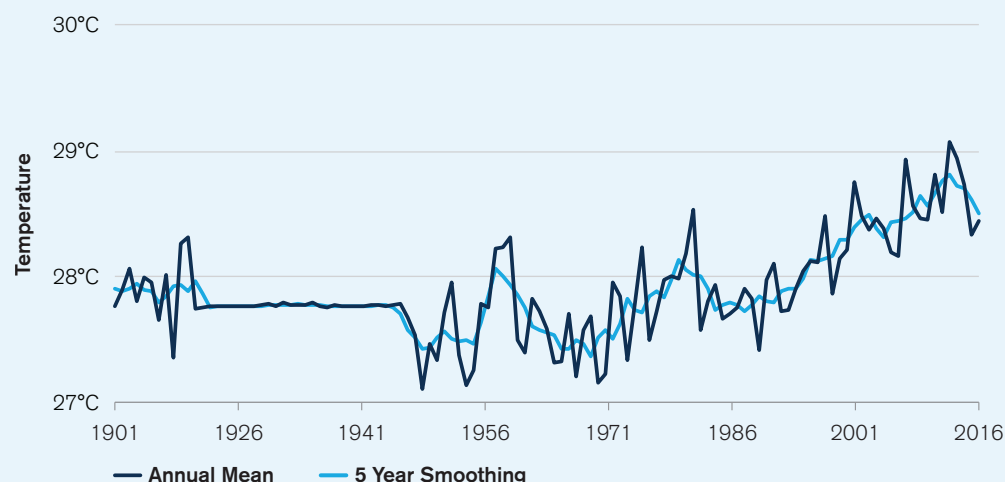
¹² WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti. URL: <https://climateknowledgeportal.worldbank.org/country/djibouti/climate-data-historical>

Key Trends

Temperature

Djibouti experienced temperature increase since the 1970s, with the southern and western regions observing the most significant temperature rise (**Figure 4**). The country also experienced extreme high temperature spikes.¹³ Additionally, the number of warm nights has increased dramatically. The greatest warming was observed during the summer hot season. A reduction in cool nights and increase in warm nights since 1960 have been observed.¹⁴

FIGURE 4. Observed temperature for Djibouti, 1901–2019¹⁵



Precipitation

Precipitation in Djibouti is highly variable and the country experiences very low levels of annual precipitation. Djibouti has experienced reduced water availability in some areas and increased periods of drought and dry spells. Stronger precipitation events resulting in flash flooding in recent years has also been observed due to an increase in heavy precipitation events. Djibouti has also experienced an increase in aridity across the country and intense droughts, the most significant occurring in 1989, 1994, 2004 and 2005.¹⁶

¹³ Omondi, P. et al., (2013). Changes in temperature and precipitation extremes over the Greater Horn of Africa region from 1961 to 2010. *International Journal of Climatology*. 34 (4). URL: <https://rmets.onlinelibrary.wiley.com/doi/abs/10.1002/joc.3763>

¹⁴ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

¹⁵ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti URL: <https://climateknowledgeportal.worldbank.org/country/djibouti/climate-data-historical>

¹⁶ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

Climate Future

Overview

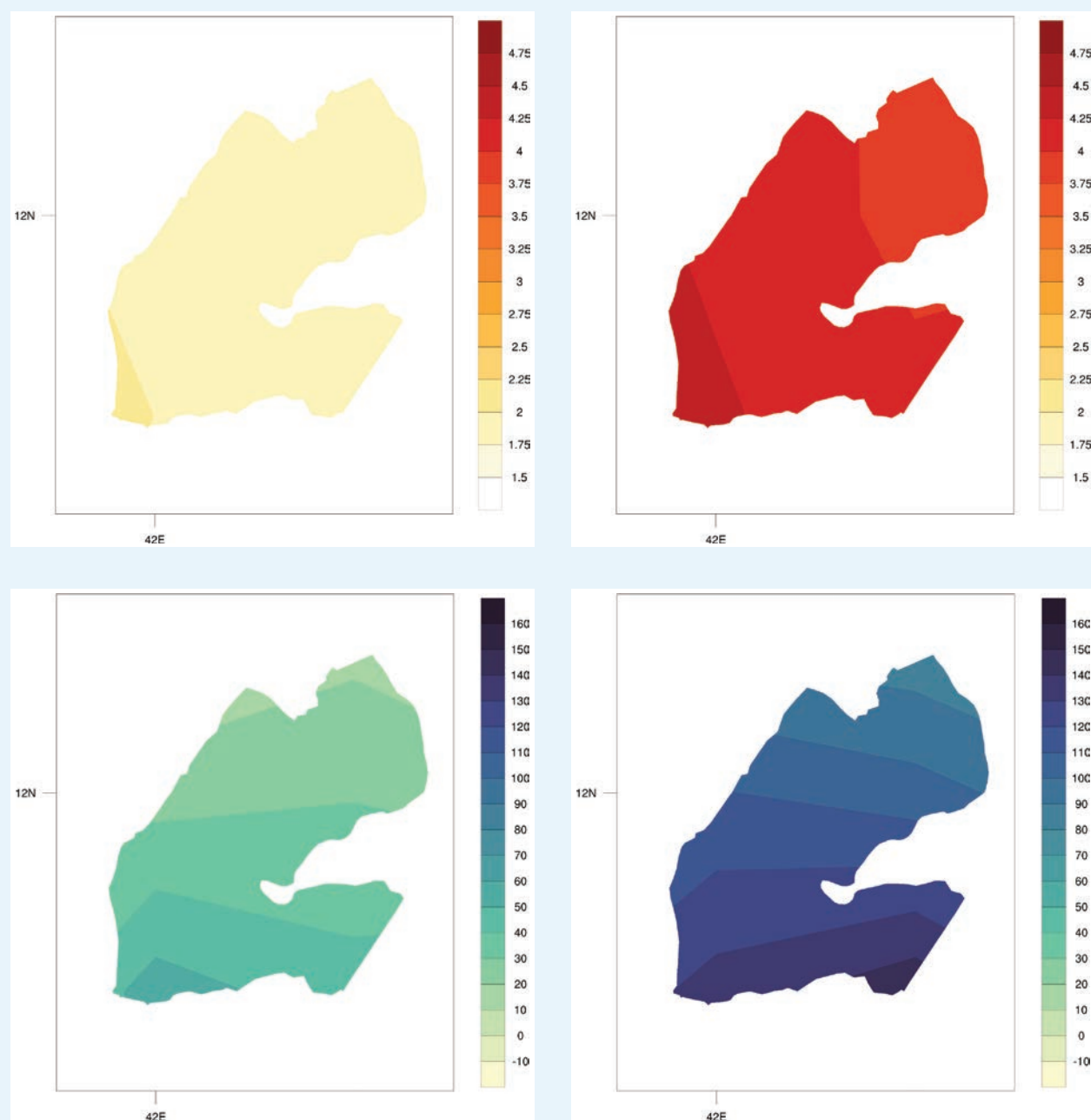
The main data source for the World Bank Group's Climate Change Knowledge Portal (CCKP) is the CMIP5 (Coupled Inter-comparison Project Phase 5) data ensemble, which builds the database for the global climate change projections presented in the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC). Four Representative Concentration Pathways (i.e. RCP2.6, RCP4.5, RCP6.0, and RCP8.5) were selected and defined by their total radiative forcing (cumulative measure of GHG emissions from all sources) pathway and level by 2100. The RCP2.6 for example represents a very strong mitigation scenario, whereas the RCP8.5 assumes business-as-usual scenario. For more information, please refer to [RCP Database](#). For simplification, these scenarios are referred to as a low (RCP2.6); a medium (RCP4.5) and a high (RCP8.5) emission scenario in this profile. **Table 3** provides CMIP5 projections for essential climate variables under high emission scenario (RCP8.5) over 4 different time horizons. **Figure 5** presents the multi-model (CMIP5) ensemble of 32 Global Circulation Models (GCMs) showing the projected changes in annual precipitation and temperature for the periods 2040–2059 and 2080–2099.

TABLE 3. Data snapshot: CMIP5 ensemble projection

CMIP5 Ensemble Projection	2020–2039	2040–2059	2060–2079	2080–2099
Annual Temperature Anomaly (°C)	+0.6°C to +1.4°C (+1.0°C)	+1.3°C to +2.5°C (+1.9°C)	+2.1°C to +4.1°C (+2.9°C)	+2.6°C to +5.4°C (+3.8°C)
Annual Precipitation Anomaly (mm)	–8.1 to +20.7 (2.4 mm)	–8.7 to +25.6 (2.0 mm)	–10.3 to +38.0 (3.2 mm)	–10.1 to +49.5 (7.2 mm)

Note: The table shows CMIP5 ensemble projection under RCP8.5. Bold value is the range (10th–90th Percentile) and values in parentheses show the median (or 50th Percentile).

FIGURE 5. CMIP5 ensemble projected change (32 GCMs) in annual temperature (top) and precipitation (bottom) by 2040–2059 (left) and by 2080–2099 (right), relative to 1986–2005 baseline under RCP8.5¹⁷



¹⁷ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti Projected Future Climate. URL: <https://climateknowledgeportal.worldbank.org/country/Djibouti/climate-data-projections>

Key Trends

Temperature

Projections show Djibouti experiencing increased temperatures of approximately 1°C every two decades. Monthly average temperature increases are expected to increase 1.9°C by the 2050s and by as much as 5.4°C by the end of the century.¹⁸ This is also likely to result in longer lasting and more intense heat waves with cold nights and cold spells also expected to significantly decline. Increase in temperatures are also likely to result in the increase in evaporation and further contribution to the 'drying' of the region.¹⁹

Across all emission scenarios, temperatures will continue to increase in Djibouti throughout the end of the century. As seen in **Figure 6**, under a high-emission scenario, average temperatures are projected to increase rapidly by mid-century. Across the seasonal cycle, temperature increases are likely to occur from November to February with daily temperatures greater than 25°C (**Figure 7**). Increased heat and extreme heat conditions will result in significant implications for human and animal health, water resources, and biodiversity.²⁰

FIGURE 6. Historical and projected average temperature for Djibouti from 1986 to 2099²¹

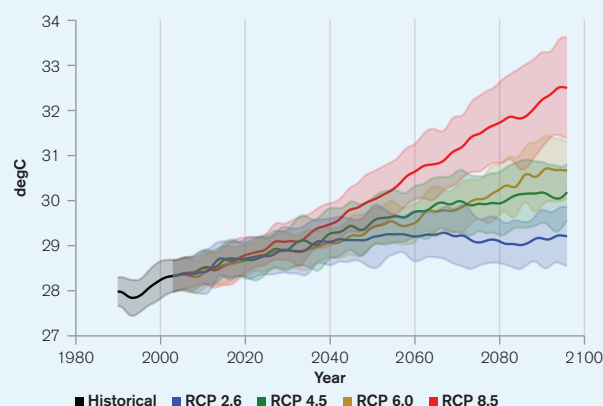
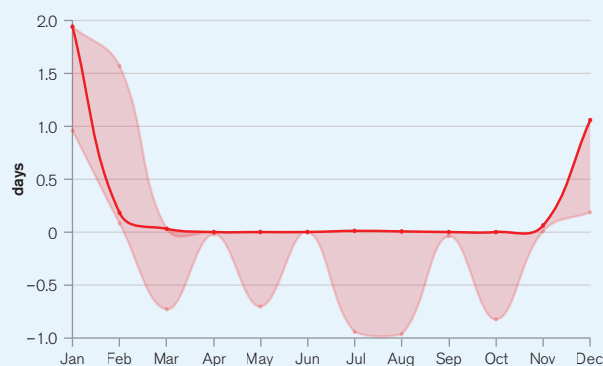


FIGURE 7. Projected change in summer days (Tmax > 25°C)²²



Precipitation

Rainfall trends in Djibouti are highly variable. Projections show a marginal increase for rainfall at the nationally aggregated level through the end of the century. Overall reductions in rainfall are expected during key grazing periods for livestock, additionally, winter rains (September to February) are expected to decrease, with noticeable impact expected during the country's primary growing season of September and October. Under high emissions scenarios (RCP8.5) the country is expected experience an increase in the frequency and intensity of extreme rainfall events,

¹⁸ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

¹⁹ Government of the Netherlands (2019). Climate Change Profile – Greater Horn of Africa. Ministry of Foreign Affairs. URL: <https://reliefweb.int/report/world/climate-change-profile-greater-horn-africa>

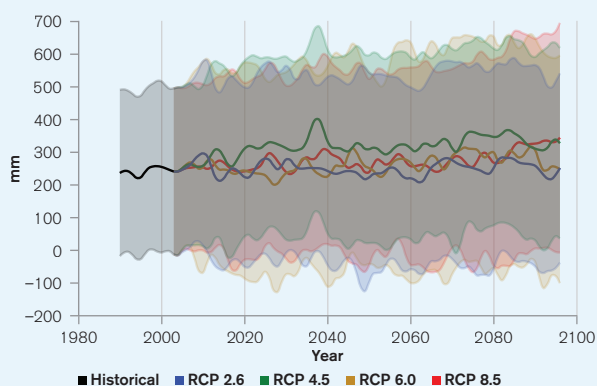
²⁰ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

²¹ WB Climate Change Knowledge Portal (CCKP, 2020). Interactive Climate Indicator Dashboard. Djibouti. URL: <https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=DJ&period=2080-2099>

²² WB Climate Change Knowledge Portal (CCKP, 2020). Interactive Climate Indicator Dashboard. Djibouti. URL <https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=DJ&period=2080-2099>

with the potential for increased periods of aridity. This is also expected to affect the water balance for the country, with the majority of projections indicating a decrease in water balance by the 2080s.²³ **Figure 8**, shows the change in the projected annual average precipitation for Djibouti. Water routing, storage and other management options can be highly varied depending if the precipitation input comes frequently or with long periods of aridity in between rainfall.²⁴ As seen below, annual average precipitation is already relatively low and is expected to increase marginally, at a national scale, by the of the century under a high emissions scenario of RCP8.5.

FIGURE 8. Annual average precipitation in Djibouti for 1986 to 2099²⁵



CLIMATE RELATED NATURAL HAZARDS

Overview

Djibouti has a very high degree of risk to natural hazards and over the last four decades, natural disasters have affected over a half million people. The country is highly vulnerable to floods, droughts, heat waves and earthquakes. Djibouti is also one of the most water-scarce countries in the world, which is further exacerbated by climate change. Sea-level rise also poses a significant threat to the country's coastline not only due to inundation and salinization increasing risk to port infrastructure and tourism along the coast.²⁶ The extended drought across Djibouti from 2008 to 2011 decreased the country's GDP by 4% with farmers and livestock herders being the hardest affected. Additionally, the agriculture sector lost 50% of its GDP, directly impacting over 15% of the population. Djibouti has no permanent rivers, streams or fresh water and as a result has extreme evaporation. An estimated 33% of the population lives in high hazard risk zones and 35% of the economy is chronically vulnerable to floods and drought.²⁷ The region is also impacted by an increase in frequency and intensity of extreme weather events such as heavy rainfall resulting in mudslides, flooding and flash floods. Additionally, anticipated is an increased frequency of extreme events, such as inter alia droughts, soil erosion and desertification. The country is expected

²³ Djibouti (2014). Vision Djibouti 2035. URL: <http://www.ccd.dj/w2017/wp-content/uploads/2016/01/Vision-Nationale.pdf>

²⁴ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti Water Dashboard. Data Description. URL: <https://climateknowledgeportal.worldbank.org/country/djibouti/climate-sector-water>

²⁵ WB Climate Change Knowledge Portal (CCKP, 2020). Interactive Climate Indicator Dashboard. Djibouti. URL: <https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=DJ&period=2080-2099>

²⁶ Government of the Netherlands (2019). Climate Change Profile – Greater Horn of Africa. Ministry of Foreign Affairs. URL: <https://reliefweb.int/report/world/climate-change-profile-greater-horn-africa>

²⁷ GFDRR (2016). Country Profile – Djibouti. URL: <https://www.gfdr.org/en/publication/country-profile-djibouti-0>

to become generally hotter and drier in projected future climates.²⁸ Sea level rise is projected to lead to the loss of a sizable proportion of the northern and eastern coastlines due to a combination of inundation and erosion, with consequential loss of agricultural land, infrastructure, and urban areas.²⁹

Data from the Emergency Event Database: EM-Dat, presented in **Table 4**, shows the country has endured various natural hazards, including floods, landslides, epidemic diseases, and storms.

TABLE 4. Natural disasters in Djibouti, 1900–2020³⁰

Natural Hazard 1900–2020	Subtype	Events Count	Total Deaths	Total Affected	Total Damage ('000 USD)
Flood	Flood	4	33	102,250	2,500
	Riverine Flood	3	155	90,000	3,219
	Flash Flood	2	62	348,500	—
Drought	Drought	9	—	1,188,008	—
Epidemic	Bacterial Disease (Cholera Outbreak)	4	88	3,628	—
	Parasitic Disease	1	43	2,000	—
Storm	Tropical Cyclone	2	2	25,775	—
Insect Infestation	Locust Infestation	1	—	—	—

Key Trends

Disaster risk from increased temperatures and water scarcity is expected to exacerbate existing tensions for water resources between agricultural, and livestock and human needs. The existing quality of available water from surface water and groundwater, is also likely to be altered. Water scarcity and changing rainfall patterns are will play a significant role for the agricultural sector.³¹ Increased temperatures and degraded agricultural conditions are expected to adversely impact livelihoods and economic resilience of vulnerable groups. The impacts of sea level rise and coastal erosion is particular concern for the country's tourism industry and port. **Figure 9** presents the risk of coastal flooding and extreme heat for Djibouti.³²

Climate change is expected to increase the risk and intensity of water scarcity and drought across the country. The primary sectors affected are water, agriculture, coastal zones, human health, and livestock. Decreased rainfall during critical grazing and planting periods are expected to have significant negative consequences for both the country's agriculture and livestock sector. Additionally, increased frequency of intense precipitation events will

²⁸ GFDRR (2013). Pursuing Low Regret Climate Adaptation and Disaster Risk Reduction in Djibouti – Project Highlights. URL: <https://www.gfdr.org/en/publication/pursuing-low-regret-climate-adaptation-and-disaster-risk-reduction-djibouti>

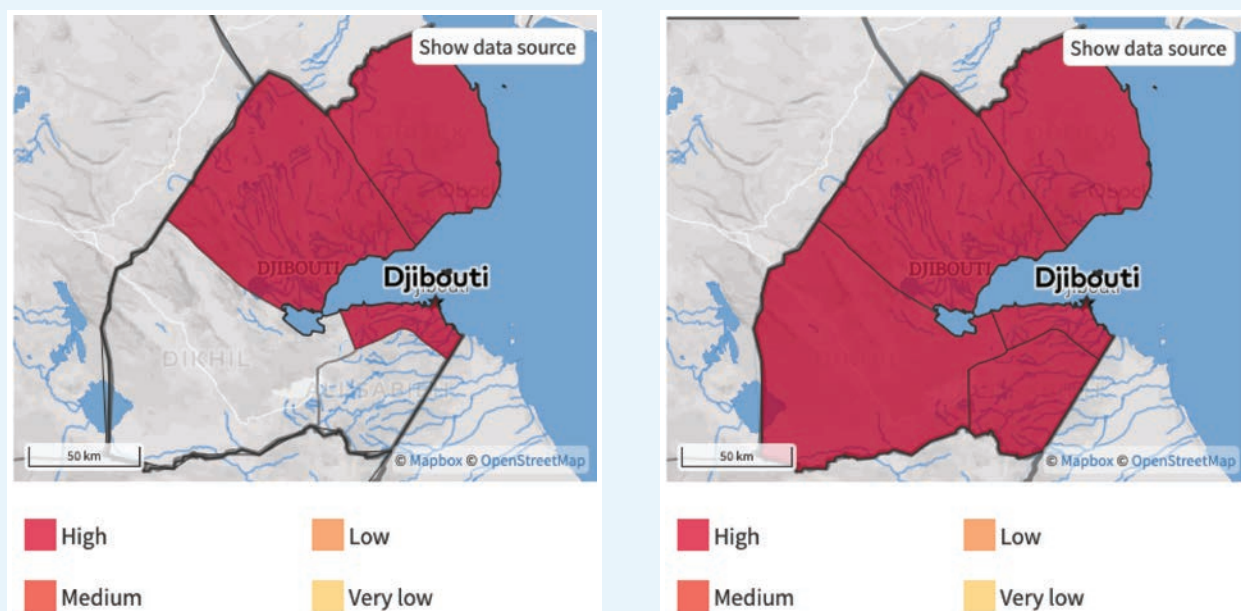
²⁹ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

³⁰ EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir, Brussels, Belgium. URL: <https://public.emdat.be/data>

³¹ GFDRR Innovation Lab (2020). Country Adaptation Profile: Djibouti. URL: <https://www.geonode-gfdrilab.org/documents/698>

³² Omondi, P. et al., (2013). Changes in temperature and precipitation extremes over the Greater Horn of Africa region from 1961 to 2010. International Journal of Climatology. 34 (4). URL: <https://rmets.onlinelibrary.wiley.com/doi/abs/10.1002/joc.3763>

FIGURE 9. Risk of Coastal Flood (left),³³ Risk of Extreme Heat (right)³⁴



lead to a heightened risk of flooding and flash floods. Higher temperatures with increased aridity may also lead to livestock stress and reduced crop yields.³⁵ This is likely to result in significant economic losses, damage to agricultural lands and infrastructure as well as human health and mortality. Furthermore, land degradation and soil erosion, exacerbated by recurrent flood and drought adversely impacts agricultural production, further affecting the livelihoods of the rural poor, given the limited resources with which to influence and increase adaptive capacity.³⁶

Implications for DRM

Djibouti is working to improve its ability to monitor and communicate hazards, specifically for seismic and flood risk, concerns are focused around the capital city of Djibouti City. The country is also working to update its preparedness and emergency plans to further support and advance its Disaster Risk Management (DRM) agenda. Djibouti's DRM priorities include strengthening the preparedness and response capacities at national level, mainstreaming DRM in land-use planning, increasing awareness and improving public understanding of hazard risk across the country and promoting community-based DRM through advocacy and education programs.³⁷ Efforts are also being placed on exploring disaster risk financing and insurance mechanisms; enhancing early warning systems; and, building the capacity and financial resources. Additional investment in the strengthening of early warning systems and integrating resilience into urban infrastructure investments remains a priority.³⁸

³³ ThinkHazard! (2020). Djibouti - Coastal Flooding. URL: <https://thinkhazard.org/en/report/70-djibouti/CF>

³⁴ ThinkHazard! (2020). Djibouti - Extreme Heat. URL: <https://thinkhazard.org/en/report/70-djibouti/EH>

³⁵ ACP-EU (2017). Natural Disaster Risk Reduction Program. Djibouti: Drought Post Disaster Needs Assessment. URL: <https://www.gfdr.org/en/djibouti-drought-post-disaster-needs-assessment>

³⁶ Djibouti (2013). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

³⁷ GFDRR (2016). Country Profile - Djibouti. URL: <https://www.gfdr.org/en/publication/country-profile-djibouti-0>

³⁸ Djibouti (2014). Vision Djibouti 2035. URL: <http://www.ccd.dj/w2017/wp-content/uploads/2016/01/Vision-Nationale.pdf>

Djibouti is one of the most at-risk countries to climate change. It faces a range of environmental problems, including water stress and desertification. The management of water resources are threatened by strong human pressures (population growth and increasing urbanization). Changes in the hydrological regime, combined with sea level rise, further aggravate the ongoing process of aquifer salinization (specifically in the Djibouti City area) and water quality degradation. Primary risks such as temperature increases, reduced precipitation, rising sea levels and escalating extreme weather phenomena (extreme rainfall episodes). These risks are likely to result in significant environmental and socio-economic vulnerabilities.³⁹ Djibouti remains highly vulnerable to climate variability and change in the immediate as well as longer-term. Impacts are already being experienced across the already highly arid country. Water scarcity and drought conditions are expected to increase risks of food insecurity and are likely to exacerbate conflict situations over scarce resources, settlements, and population/livestock movements. The country faces increased challenges to its small agricultural sector and the resulting loss of livelihoods and increased food insecurity. These are expected to be further compounded by climate stressors, environmental degradation, impacted water resources, and sea level rise presenting significant obstacles to the country's ongoing development and poverty reduction efforts.⁴⁰

Gender

An increasing body of research has shown that climate-related disasters have impacted human populations in many areas including agricultural production, food security, water management and public health. The level of impacts and coping strategies of populations depends heavily on their socio-economic status, socio-cultural norms, access to resources, poverty as well as gender. Research has also provided more evidence that the effects are not gender neutral, as women and children are among the highest risk groups. Key factors that account for the differences between women's and men's vulnerability to climate change risks include: gender-based differences in time use; access to assets and credit, treatment by formal institutions, which can constrain women's opportunities, limited access to policy discussions and decision making, and a lack of sex-disaggregated data for policy change.⁴¹

Agriculture

Overview

Djibouti's agriculture sector remains poorly developed. The country has less than 1,000 km² of arable land and approximately 30% of the population engages in rural farming activities, however this generates just 4% of GDP. As arable land is scarce, the majority of farming activities involve pastoralism. Improving access to water is the main priority for rural communities and for raising livestock production, however, groundwater resources are widely

³⁹ GCCA (2018). Responding to climate change in the energy and water sectors in Djibouti. URL: <https://www.gcca.eu/programmes/responding-climate-change-energy-and-water-sectors-djibouti>

⁴⁰ Djibouti (2016). Nationally Determined Contribution. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Djibouti%20First/INDC-Djibouti_ENG.pdf

⁴¹ World Bank Group (2016). Gender Equality, Poverty Reduction, and Inclusive Growth. URL: <https://openknowledge.worldbank.org/handle/10986/23425>

exploited. Crop production is poorly developed, due to lack of water, limitations in arable land and soil salinity. As such, Djibouti has a chronic food deficit and depends on imports to meet its food needs. This leaves the country highly sensitive to external shocks, including spikes in food and fuel prices.⁴²

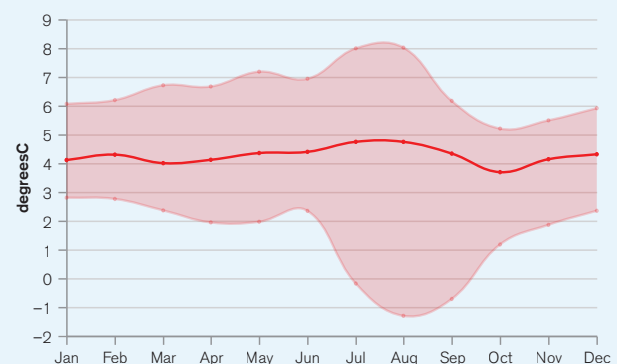
Animal husbandry has a long history in Djibouti and is considered a key element of the country's continued economic development. Efforts are underway to improve conditions for livestock and herders, through improved disease control, increased yields and through the improvement of fodder availability. The livestock sub-sector forms the strongest element in agriculture production. However, Djiboutians involved in animal husbandry are mainly nomadic. Djibouti is well-placed to export livestock and the country is already a center for cattle exports from Ethiopia and Somalia. The World Trade Organization estimates that approximately two million animals pass through Djibouti's trade center each year.⁴³

Climate Change Impacts

The projected climate change impacts to food production, agricultural livelihoods and food security in Djibouti are significant national as well as regional concerns. Impacts on food production and food security are linked to projected water supply constraints as well as temperature rise. Djibouti is projected to experience rising temperatures, increasing water scarcity and increased evapotranspiration. This is expected to threaten the yields of rainfed crops as well as livestock health.⁴⁴ Higher temperatures can further negatively impact crops due to an increase in weeds and diseases. Increased temperature, sea level rise, and decreased precipitation will also exacerbate existing water resources challenges for the sector.

In Djibouti, floods and droughts are expected to occur more frequently in coastal as well as inland areas, with urban centers around the coast at risk of flooding due to heavy rainfall, further complicating food security challenges and distribution efforts. The projected increased heat will increase stress on crops and is also likely to alter the length of the growing season. Decreased water availability is likely to reduce yields and the reduction in soil moisture may alter suitable areas for agriculture or the production of specific crops. Increased heat and water scarcity conditions are likely to increase evapotranspiration, expected to contribute to crop failures and overall yield reductions.⁴⁵ **Figure 10**

FIGURE 10. Average daily max temperature for Djibouti⁴⁶



⁴² IFAD (2016). Note de stratégie de pays. Djibouti. URL: <https://www.ifad.org/en/document-detail/asset/40146422>

⁴³ Oxford Business Group (2020). Plans to develop Djibouti's agriculture and fishing to promote food and employment security. URL: <https://oxfordbusinessgroup.com/analysis/living-land-and-sea-plans-develop-agriculture-and-fishing-promote-food-and-employment-security>

⁴⁴ IFAD (2016). Note de stratégie de pays. Djibouti. URL: <https://www.ifad.org/en/document-detail/asset/40146422>

⁴⁵ Djibouti (2015). Strategy of Accelerated Growth and Promotion of Employment (SCAPE) 2015–2019. URL: https://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/djibouti_scape-_anglais.pdf

⁴⁶ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti Agriculture. Dashboard URL: <https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=DJI&period=2080-2099>

shows the average daily max-temperature across the seasonal cycle. These higher temperatures have implications for impacts to soil moisture and thus crop growth as well as livestock health. As seen in the graph, Djibouti will experience significant temperature increases, averaging 4°C, throughout the year.

Adaptation Options

Djibouti and its donors are investing in projects to improve the country's agricultural resilience to climate change. Efforts include the improved water management capabilities, particularly in response to the severe water shortages and prolonged periods of drought. Areas of intervention include the Beyya Dader watershed in the Ali Sabieh Region, the Gaggade-Derela watershed in the Dkhil Region, and the Weima watershed in the Toudjourah-Obock Region. Efforts are also ongoing to increase the adaptive capacity and resilience of rural, agro-pastoral communities. Efforts focus on establishing a long-term guaranteed access to water resources, within the context of climate change, introducing shaded agro-pastoral perimeters to support agro-pastoral systems and increase awareness of rural communities in regards for opportunity to diversity their actions. The government has also committed to increase the capacity building of institutions and sectors to improve understanding of climate change impacts and key adaptation measures required.⁴⁷ Efforts should also be made to improve farmer and pastoralist knowledge about seasonal variability and longer term climate changes.

Water

Overview

Djibouti is a highly water scarce country. The country does not have a permanent source of surface water such as rivers or fresh water lakes and must rely on deep underground water tables, which are fed by rainwater infiltration, where they exist.⁴⁸ An estimated 95% of drinking water is supplied by groundwater, however underground water tables have been drawn down to approximately half of the normal quantity and annual rainfall does not supply enough for regeneration of water aquifers. Djibouti continues to experience periods of intense aridity and drought and during these periods cisterns and shallow wells dry-up during the dry season, traditionally lasting from April to September. As water scarcity in the country has become more pronounced, many herders and rural dwellers lose sources of livelihood, as a result, have been forced to seek refuge in urban centers, increasing their vulnerability.⁴⁹ Additionally, given the limited recharge of groundwater and the intensification of pumping, and seawater intrusion has been found to contribute to increasing the salinity rate and appearance of brackish water for communities along coastal areas.⁵⁰

Climate Change Impacts

Djibouti has somewhat highly variable rainfall, however the country is expected to experience and increase in the occurrence and intensity of heavy rainfall events, increasing risks of floods as well as likely resulting in increases in the intensity and frequency of dry periods and water scarcity. Increases in temperature is also expected to reduce

⁴⁷ Djibouti (2016). Nationally Determined Contribution. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Djibouti%20First/INDC-Djibouti_ENG.pdf

⁴⁸ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

⁴⁹ USAID (2020). Water and Sanitation – Djibouti. [28 September 2020]. URL: <https://www.usaid.gov/djibouti/global-health/water-and-sanitation>

⁵⁰ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

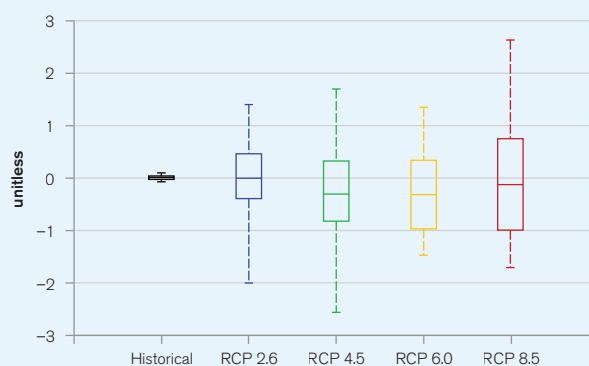
soil moisture, surface water, and underground water stocks as well as significantly increase desertification. These are likely to worsen the increasing water needs, notably for human use, but also for agriculture and livestock activities, given the increase in evapotranspiration and the decrease in soil moisture.⁵¹

The drinking water supply for the capital and the main urban centers is provided by the Djibouti National Water Office (ONED) is also highly vulnerable. In the majority of rural areas, the lack of financial means does not allow sufficient maintenance of existing infrastructure. The well field of the city of Djibouti now has nearly 35 boreholes, which are in continuous operation. The main towns in the interior regions are supplied by about fifteen boreholes. Losses in the pipeline network are estimated to account for between 20%–25%. The critical situation of groundwater is exacerbated by climate change influences, which are amplifying water resource deficits (particularly when considering high population growth and economic development activities).⁵²

Rainfall and evaporation changes also impact degrees of surface water infiltration and recharge rates for groundwater and low water storage capacities increases the country's dependence on unreliable rainfall patterns. Changes in rainfall and evaporation translate directly to changes in surface water infiltration and groundwater re-charge. This has the potential for further decreased reliability of unimproved groundwater sources and surface water sources during droughts or prolonged dry seasons. Increased strain on pump mechanisms can lead to breakdowns if maintenance is neglected and the potential for falling water levels in the immediate vicinity of wells or boreholes, particularly in areas of high demand. Additionally, temperature increases have the potential to result in increased soil moisture deficits even under conditions of increasing rainfall.

Figure 11 shows the projected annual Standardized Precipitation Evapotranspiration Index (SPEI) through the end of the century. The SPEI is 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. This is an important metric in understanding for the water sector in regards to quantity and quality of supply for human consumption and agriculture use as well as for the energy sector as reductions in water availability impacts river flow and the hydropower generating capabilities. At a national scale, Djibouti is projected to experience a slight reduction in rainfall through the end of the century. While coastal areas are expected to maintain current rainfall quantities, in land regions, and particularly the western areas of the county are projected to experience a reduction in rainfall.

FIGURE 11. Annual SPEI Drought Index in Djibouti for the period, 1986 to 2099⁵³



⁵¹ Djibouti (2014). Vision Djibouti 2035. URL: <http://www.ccd.dj/w2017/wp-content/uploads/2016/01/Vision-Nationale.pdf>

⁵² Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

⁵³ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti Water Sector Dashboard. URL: <https://climatedata.worldbank.org/CRMePortal/web/water/land-use/-/watershed-management?country=DJI&period=2080-2099>

Adaptation Options

Efforts are ongoing to increase and ensure more sustainable and affordable access to water resources through improved governance of water points via Community Water Management Committees and Water User Associations, establish an application of payment for water supply services to ensure the continuation of the provision of water, accompanied by specific measures to ensure affordability for the most vulnerable, and to ensure the efficiency and proximity of operating and maintenance services to water users. Greater efforts should be made to improve water management around the capital city, Djibouti City.

The government has also committed to building a water pumping plant and aqueducts for the conveyance of water from Ethiopia in order to supply the Ali Sabieh, Dikhil and Arta Regions, along with Djibouti City. This will have a capacity of 100,000 m³/day carried to the border between the two countries. A reservoir of 20,000 m³ will be built in Djibouti. The goals of this project are to provide the populations with access to affordable drinking water. Efforts are also ongoing to improve water management for agro-pastoral resources regarding surface water mobilization as well as sustainable land management. With funding provided by the World Bank, efforts will include the repair and construction of tanks for drinking water and livestock, the construction of two small experimental dams, and sustainable land management with a view to protecting hydraulic infrastructure and regenerating plant cover in the surrounding area.⁵⁴

Energy

Overview

The energy sector is critical to the country's economic activity, particularly concerning economic activities around its ports as well as its continued economic development. Djibouti relies entirely on imported fossil fuels and electricity to meet its energy needs. A new importer of energy, Djibouti has traditionally relied upon energy generated from heavy fuel oil and diesel power plants. However, since 2011, approximately 65% of Djibouti's electricity has been supplied through a 150 megawatts (MW) interconnection line from its hydro-electric resource rich neighbor, Ethiopia. Local power production now accounts for around 35% of the energy supply continues to be generated through local heavy fuel oil or diesel thermal power plants. Production is sourced from four key power plants: Boulaos, Marabout, Tadjoura and Obock.⁵⁵ Djibouti is also endowed with abundant solar, wind, and geothermal natural resources, along with extensive coastline and dedicated port areas. As such, the country has the potential to generate more than 300 MW of electric power from renewable energy sources with the proximity to fuel-producing nations of the Gulf. Djibouti currently has over 100 MW of installed generation capacity, of which only 57 MW is reliably available to serve the population and its key industries. Djibouti's geothermal resources have been recognized for years, and exploration activities are ongoing to identify economic vapor resources. Despite high resource potential and opportunities for cross-border export, Djibouti's power sector faces significant challenges, including overall coherence of planning and goals, infrastructure development, deal flow and market

⁵⁴ Djibouti (2016). Nationally Determined Contribution. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Djibouti%20First/INDC-Djibouti_ENG.pdf

⁵⁵ Oxford Business Group (2020). Diversification key to expansion of Djibouti's energy sector. URL: <https://oxfordbusinessgroup.com/overview/fuel-growth-diversifying-energy-mix-and-securing-adequate-supply-eye-expansion-central-development>

entry for independent producers.⁵⁶ At the household level, specifically for rural areas, kerosene, charcoal and firewood comprise the majority of household energy consumption.⁵⁷

Climate Change Impacts

Increasing temperatures and the increased frequency and intensity of aridity and drought are expected to further increase energy demand as well as increase strain on energy generation and transmission infrastructure. Changes in demand are likely to be through the expansion of peak-hour patterns, air conditioning intensity needs and the increased need for water desalination (used in processing and station cooling). Djibouti's existing infrastructure and generation capabilities are ill-prepared to cope with the projected effects of climate change and the increased demand. Existing energy systems are at risk of system failures and increased/expanded energy outages.⁵⁸ Djibouti has planned to increase its renewable energy consumption by 2030, however technology investments and infrastructure development are needed.

Cooling Degree Days shows the relationship between daily heat and cooling demand, typically sourced through a form of active cooling or an evaporative process. The change in cooling degree days provides insight into the potential for extended seasons of power demand or periods in which cooling demand (power demands) might increase. As seen in **Figure 12**, seasonal increases for cooling demands (considered for individual households, commercial enterprises and infrastructure) are expected to increase rapidly for the second half of the century, under the high emissions scenario RCP8.5. The Warm Spell Duration Index represents the number of days in a sequence of at least six days in which the daily maximum temperature is greater than the 90th percentile of daily maximum temperature. As shown in **Figure 13**, warm spells will increase significantly across all emission scenarios.

FIGURE 12. Change in Cooling Degree Days (65°F) in Djibouti for the period 2040–2059⁵⁹

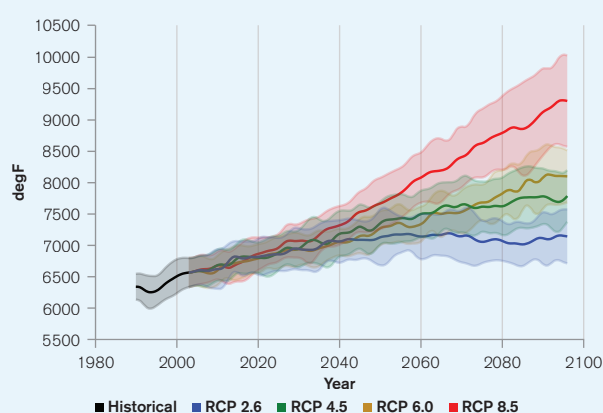
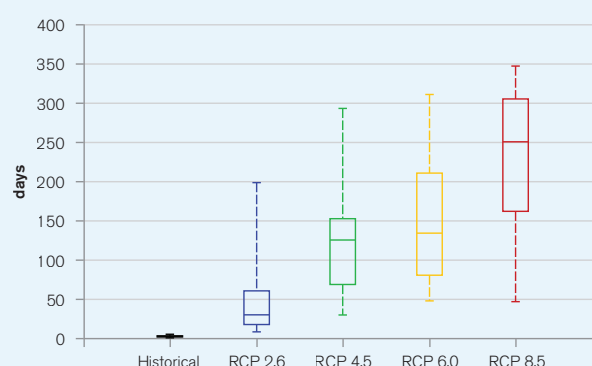


FIGURE 13. Warm Spell Duration Index in Djibouti for the period 1986 to 2099⁶⁰



⁵⁶ USAID (2020). Power Africa Fact Sheet – Djibouti. URL: <https://www.usaid.gov/powerafrica/djibouti>

⁵⁷ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

⁵⁸ Middle East Institute (2012). Implications of Climate Change on Energy and Security in the MENA Region. URL: <https://www.mei.edu/publications/implications-climate-change-energy-and-security-mena-region>

⁵⁹ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti – Energy. URL: <https://climateknowledgeportal.worldbank.org/country/djibouti/climate-sector-energy>

⁶⁰ WB Climate Change Knowledge Portal (CCKP, 2020): Djibouti Energy Sector Dashboard. URL: <https://climatedata.worldbank.org/CRMePortal/web/energy/oil-gas-and-coal-mining?country=DJI&period=2080-2099>

Adaptation Options

As a result of Djibouti's growing energy demand, the government is working to diversify its energy supply and to increase the amount of power generated from renewable sources, particularly solar. The government is currently undertaking a project to provide solar electricity to rural areas as an instrument for poverty reduction. Various mechanisms have been rolled out in Djibouti City and in rural areas, including personal kits, street lights, a mini power plant, drinking water supply and solar-powered light bulbs. Djibouti is also in the processes of sourcing investment for a second desalination plant to meet the country's drinking water needs.⁶¹ Djibouti should continue towards the development and implementation of innovative new regulatory and finance models to increase efficiency, especially for utilities and, ultimately implement customer energy savings programs and new approaches to the delivery of electricity, including renewable energies. The government has committed to build institutional and technical capacities of different units in the energy sector in specific response to climate change issues. Increased support for research and technological development should also be implemented to enable the electricity sector to deal more effectively with climate change.⁶²

Health

Overview

The dispersion of Djiboutians in concentrated urban areas and sparsely populated rural areas has resulted in differentiated health policies based on region. In order to achieve universal health coverage, the government has committed itself to improving health care access in the inner regions and provide care to vulnerable populations in order to meet the country's development goals of improving human capital through education and health care.⁶³ The public health profile of Djibouti includes continued challenges of food insecurity and under- and mal-nutrition. With an estimated 30% of children under five-years suffer from chronic malnutrition. HIV/AIDS, Malaria and Tuberculosis have become increasingly threatening. Incidence rates of malaria have continued to increase.⁶⁴

Climate Change Impacts

The projected increase in extreme heat, heatwaves, flooding and increasing aridity and drought events are of significant concern for the health of Djibouti's population, particularly poor and rural populations. Given the projection of higher temperatures, a resurgence of vector borne diseases such as malaria and other communicable diseases are expected. Changes in rainfall patterns as well as temperatures may change the geographical distribution of insect vectors of these diseases, such as mosquitoes or sandflies.⁶⁵

⁶¹ Djibouti (2016). Nationally Determined Contribution. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Djibouti%20First/INDC-Djibouti_ENG.pdf

⁶² Middle East Institute (2012). Implications of Climate Change on Energy and Security in the MENA Region. URL: <https://www.mei.edu/publications/implications-climate-change-energy-and-security-mena-region>

⁶³ Oxford Business Group (2020). Addressing challenges and facilitating universal health care in Djibouti's urban and rural areas. URL: <https://oxfordbusinessgroup.com/overview/renewed-focus-addressing-challenges-and-facilitating-universal-coverage>

⁶⁴ Oxford Business Group (2020). Addressing challenges and facilitating universal health care in Djibouti's urban and rural areas. URL: <https://oxfordbusinessgroup.com/overview/renewed-focus-addressing-challenges-and-facilitating-universal-coverage>

⁶⁵ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

The rise in temperature is likely to exacerbate respiratory diseases, and water-borne diseases may spread due to degradation of the quality of water resources. The current deterioration of water quality and related health risks are caused by the lack of access to clean water. Access to drinking water, sanitation and hygiene may become more difficult, resulting in new break outs of pathogenic microorganisms and potential bacteriological contamination.⁶⁶ Vector borne diseases and water contamination are expected to affect rural areas in particular, where access to drinking water and sanitation is already limited. The increase of heat waves and heat islands could strongly increase respiratory diseases. The increase in droughts and floods is likely to also destabilize the agricultural sector, which could have a significant impact on food security in the country, causing an increase in malnutrition.⁶⁷

Increasing temperatures are of increasing concern for Djibouti. For the country, the annual distribution of days with a high-heat index provides insight into the health hazard of heat. **Figure 14** shows the expected Number of Days with a Heat Index $>35^{\circ}\text{C}$ for the 2090s; showing a steady increase by mid-century and continuing to sharply increase by end of the century, under a high-emission scenario. Night temperatures ($>20^{\circ}\text{C}$), are also expected to rapidly increase in a high-emission scenario. Increased health threats can be projected and monitored through the frequency of tropical nights. Tropical Nights (**Figure 15**) represents the projected increase in tropical nights for different emission scenarios to demonstrate the difference in expected numbers of tropical nights.

FIGURE 14. Days with a Heat Index $> 35^{\circ}\text{C}$ ⁶⁸

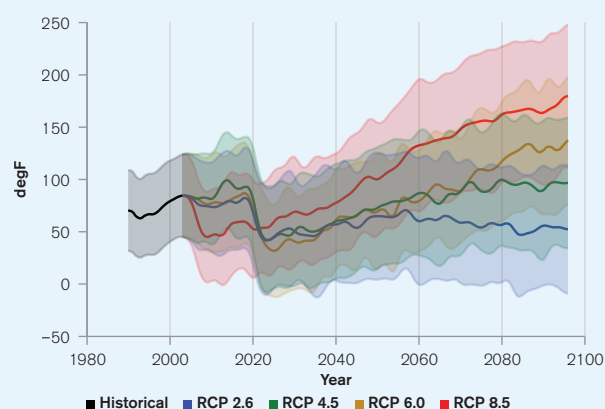
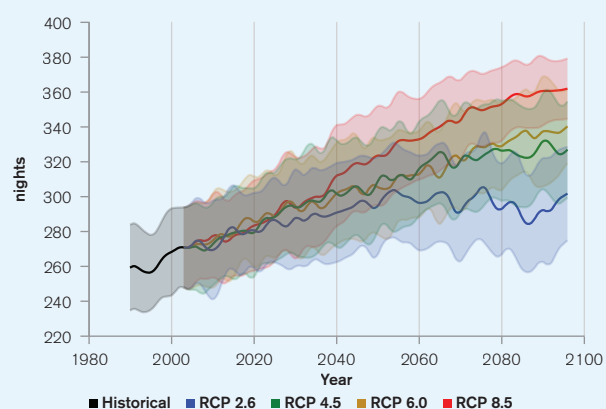


FIGURE 15. Number of Tropical Nights ($T_{\min} > 20^{\circ}\text{C}$)⁶⁹



⁶⁶ WHO (2016). Djibouti: Health Systems Profile, Key health system indicators. URL: https://applications.emro.who.int/docs/Country_profile_2013_EN_15385.pdf

⁶⁷ Djibouti (2013). Plan National de Développement Sanitaire PNDS 2013–2017. URL: <https://www.mindbank.info/item/3312>

⁶⁸ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti Health Sector Dashboard. URL: <https://climatedata.worldbank.org/CRMePortal/web/health/systems-and-service?country=DJI&period=2080-2099>

⁶⁹ WB Climate Change Knowledge Portal (CCKP, 2020). Djibouti Health Sector. URL: <https://climateknowledgeportal.worldbank.org/country/djibouti/climate-sector-health>

Adaptation Options

Djibouti is working to address weaknesses and challenges in its healthcare system in order for critical health services to function on a more sustainable and equitable basis. Establishing its integrated health-system, efforts are focused on combating the fight against HIV/AIDS, tuberculosis and malaria as well as working with community-based organizations to increase awareness and support local health services increase uptake.⁷⁰ Djibouti's health sector continue to focus on increasing and strengthening its health surveillance and risk mapping, that focus on health-related adverse conditions and a strengthened knowledge management and communication network for information sharing. Efforts should also focus on communication and health education to encourage healthy behaviors and has committed to raising community awareness about climate change induced risks and adaptation options.⁷¹

Coastal Zones and Sea Level Rise

Overview

Djibouti has a coastline of 372 km with an exclusive maritime area of 7,190 km². Djibouti's coastal zone houses more than two-thirds of the population as well as socio-economic activities. It is also the location of major investment programs in the port, hotels, livestock transport and mining infrastructure. Djibouti's coastline is largely narrow and the coast is bordered by flat, low and barren sandy plains. The coastal zone houses fragile ecosystems of coral reefs, mangroves and estuaries, which play a critical role in the subsistence of coastal communities. This area lies in a zone of upwelling with nutrient-rich water where coral reefs are poorly developed. A depth of 200 meters is reached within 8 to 10 kilometers off the coast.

Climate Change Impacts

Djibouti's coasts are at high risk from sea level rise (SLR), coastal erosion and storm surges and a significant retreat of the coastline is expected by the end of the century. The country's coastal zone is subject to environmental degradation and increasing concerns over the area's management of water resources as well as the preservation of marine biodiversity (coral reefs, mangroves, fishery resources and marine mammals). Degradation is largely linked with the rapid growth of the port and related economic activities, pollution (wastewater discharges) and pressure along the coastline from the frequent passage of ships. Projections of continued and significant sea level rise for the area raises significant concerns for the population, housing and infrastructure.⁷²

The coastline around and south of Djibouti city, is considered to have high degree of risk to *gradual* inundation. Given the ongoing, but gradual nature, this should still be considered and relevant inclusions in coastal planning processes. Salt water intrusion also presents a high degree of risks, specifically for low-lying barriers and river mouths along the country's coastline. The coastline of the estuaries located between the Eritrean border and Gulf of Tadjoura is also

⁷⁰ USAID (2020). Global Health – Djibouti. URL: <https://www.usaid.gov/djibouti/global-health>

⁷¹ WHO (2016). Djibouti: Health Systems Profile. Key health system indicators. URL: https://applications.emro.who.int/docs/Country_profile_2013_EN_15385.pdf

⁷² Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

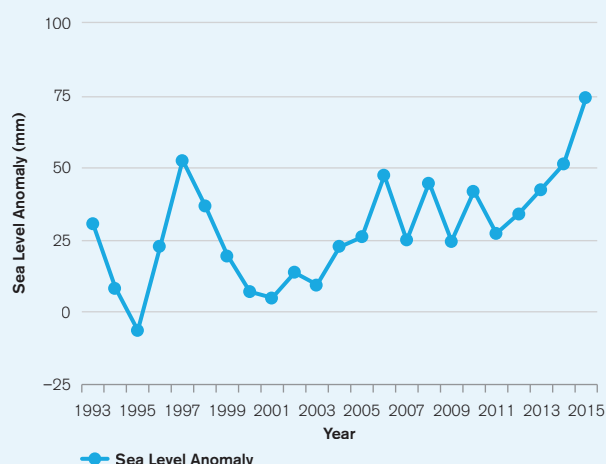
at risk for coastal zone erosions, specifically the northern areas of the Gulf of Tadjoura. This is also associated with the dry river-mouths and sedentary coastal plains. Human activities have already degraded coastal areas and ecological habitats along Djibouti's coastline. These degradations are likely to increase with SLR, the water warming and the increase of its salinity.

Figure 16 shows the change in sea level for Djibouti's coast since 1993.⁷³

Adaptation Options

Djibouti is committed to enhancing the adaptive capacity and resilience of its coastal areas and recognizes that without major efforts, the physical, human and financial impacts are expected to be significant. In order to address these challenges public authorities have developed an integrated management strategy specifically for coastal areas; a law establishing land and marine protected areas was presented in 2004. The construction of coastal protection structures should be considered to preserve coastal land and infrastructure. Additional efforts have been made in order to support populations in rural coastal areas to improve resilience and increase appropriate management of marine resources as well as develop ecotourism in the area. Rehabilitation efforts of mangroves are ongoing.⁷⁵ While coastal protection to sea level rise is often costly, adaptation and mitigation efforts undertaken now are expected to reduce damage and loss in the long-term.⁷⁶ Efforts should also be made to increase community awareness about the risks of coastal zone erosion, aquifer salinization and sea level rise.

FIGURE 16. Sea level anomaly of Djibouti, 1993–2015⁷⁴



⁷³ Appelquist, L. and Balstrøm, T. (2014). Application of the Coastal Hazard Wheel methodology for coastal multi-hazard assessments and management in the state of Djibouti. *Climate Risk Management*. 3(2014). P. 79–95. URL: <https://www.sciencedirect.com/science/article/pii/S2212096314000242>

⁷⁴ WBG Climate Change Knowledge Portal (CCKP, 2020). Djibouti Impacts – Sea Level Rise. URL: <https://climateknowledgeportal.worldbank.org/country/djibouti/impacts-sea-level-rise>

⁷⁵ Djibouti (2016). Nationally Determined Contribution. URL: https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Djibouti%20First/INDC-Djibouti_ENG.pdf

⁷⁶ Brown, S. et al. (2011). Sea Level Rise and Impacts in Africa. URL: <https://www.weadapt.org/sites/weadapt.org/files/legacy-new/placemarks/files/536cec204b2ea50585fbd9967d9-sea-level-rise-report-jan-2010.pdf>

Institutional Framework for Adaptation

Djibouti has taken a proactive stance in its efforts to adapt to climate change and mitigate the effects experienced in Djibouti. Djibouti's National Climate Change Committee (CNCC) is responsible for climate change related policy, coordination and action. The Secretariat of the CNCC is hosted by the Department of Environment and Sustainable Development, within the Ministry of Housing, Urban Planning and Environment. In 2017, the CNCC worked to enhance coherence between climate change actions and the countries existing national frameworks as well as to address climate change impacts in the key socio-economic sectors of the country. These efforts are focused on six priority areas:

- Ensuring water access;
- Promotion of best practices in the agriculture, forestry, fishery and tourism sectors;
- Reduce vulnerability to the effects of climate change for the most exposed social, economic or geographic sectors;
- Protect and enhance ecosystems and maintain the services they provide
- Ensure the development of sustainable and resilient cities; and
- Ensure resilience and sustainability of the country's key infrastructure.⁷⁷

Policy Framework for Adaptation

Djibouti submitted its Second National Communication in 2014 and its Nationally-Determined Contributions to the UNFCCC in 2016. These strategies also work in parallel with Djibouti's Vision 2035. The country is committed to increasing its adaptive capacity to climate change and increase sector collaboration, specifically for water resource management, renewable energy generation and coastal zone protections. To increase its adaptive capacity to projected impacts from climate change, Djibouti is committed to the increased use of renewable energy, capacity building and is in the process of developing a National Strategy for a Green Economy.⁷⁸

National Frameworks and Plans

- [Nationally Determined Contributions](#) (2016)
- [AfDB Country Strategy Paper 2016–2020](#) (2016)
- [Strategy of Accelerated Growth and Promotion of Employment](#) (SCAPE) (2015)
- [Vision Djibouti 2035](#) (2014) French
- [Second National Communication](#) (2014) French
- [National Health Development Plan 2013–2017](#) (2013) French
- [Initial National Communication](#) (2002) French

⁷⁷ UNDP (2019). National Adaptation Plans in focus: Lessons from Djibouti. URL: https://www.adaptation-undp.org/sites/default/files/resources/nap_in_focus_lessons_from_djibouti_eng_final_web.pdf

⁷⁸ Djibouti (2014). Vision Djibouti 2035. URL: <http://www.ccd.dj/w2017/wp-content/uploads/2016/01/Vision-Nationale.pdf>

Recommendations

Research Gaps

- Djibouti needs to invest in comprehensive, in-depth risk assessments across hazards and climate change impacts in order to establish a better understanding of the occurrence and magnitude of climate change events and the related vulnerabilities, development impact, and possible adaptation responses specifically for water resources and sea level rise
- Water supply, demand and management studies are needed nationwide
- Improved cataloging of the fisheries sector is needed to better understand sectoral risks and support local livelihoods along coastal zones
- Djibouti should widen the participation of the public, scientific institutions, women and local communities in planning and management, accounting for approaches and methods of gender equity
- Conduct community-level assessment on hazard risks to improve socio-economic capacity to adapt to climate change impacts and increase community-level resilience
- Strengthen environmental and biodiversity monitoring capabilities for more effective environmental resource management
- Increase understanding of impacts to Djibouti's coastal zones and sea level rise impacts specifically for port infrastructure and tourism sectors⁷⁹

Data and Information Gaps

- Develop early warning systems for hydrometeorological phenomena and improved climate risk management, specifically for sea level rise, water resources and agriculture and livestock impacts
- Improve early warning systems specifically for improved water management techniques and preparedness for longer dry seasons
- Conduct analysis on water transmission infrastructure to determine faults in lines in order to reduce loss during transport
- Engage in technology transfer, specifically regarding renewable energy and for the construction of geothermal, wind or photovoltaic power plant⁸⁰

⁷⁹ Djibouti (2015). Strategy of Accelerated Growth and Promotion of Employment (SCAPE) 2015–2019. URL: https://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/djibouti_scape-_anglais.pdf

⁸⁰ Djibouti (2014). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/djinc2.pdf>

Institutional Gaps

- Ensure integration of Djibouti's National Climate Change Strategy goals support sectoral and regional plans, in line with financial opportunities with donors
- Develop a national monitoring, reporting and verification system
- Support facilitation of renewable energy options through improved financing options and legal backing for public-private partnerships
- Consolidate macroeconomic and budgetary frameworks to determine international restraints and opportunities and potential for further economic investment and growth
- Coordinate the collection, analysis and reporting of climate, environmental and economic information across sectors to support integrated solutions and understanding of cross-cutting impacts of climate change
- Improve the validation of mechanisms and tools for the continuous evaluation at national, sectoral and regional level⁸¹

⁸¹ Djibouti (2015). Strategy of Accelerated Growth and Promotion of Employment (SCAPE) 2015–2019. URL: https://planipolis.iiep.unesco.org/sites/planipolis/files/ressources/djibouti_scape-_anglais.pdf

CLIMATE RISK COUNTRY PROFILE

DJIBOUTI



WORLD BANK GROUP