

# CLIMATE RISK COUNTRY PROFILE

## CONGO, DEMOCRATIC REPUBLIC

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## ACKNOWLEDGEMENTS

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).

This profile was written by MacKenzie Dove (Senior Climate Change Consultant, WBG). Additional support was provided by Yunziyi Lang (Climate Change Analyst, WBG), Fernanda Zermoglio (Senior Climate Change Consultant, WBG) and Jason Johnston (Operations Analyst, WBG).

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 IDA and IBRD 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

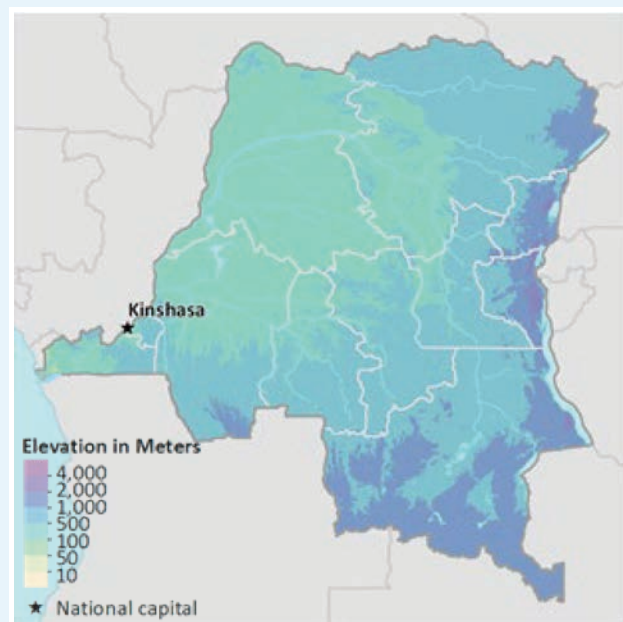
Climate Change Group (CCG)

The World Bank Group (WBG)

## COUNTRY OVERVIEW

The Democratic Republic of the Congo, herein referred to as the DRC, is located in central sub-Saharan Africa, within the Congo Basin. The DRC's territory straddles the Equator, with one-third of its land area to the north and two-thirds to the south. It is the second largest country in Africa, with a total land area of 2,345,408 km<sup>2</sup>. The DRC shares borders with the Republic of Congo to the northwest, the Central African Republic to the north, South Sudan to the northeast, Uganda, Rwanda, Burundi and Tanzania (Lake Tanganyika) to the east, Zambia to the southeast and Angola to the west. The DRC has a largely equatorial climate; however, this varies across the country's extensive land area. Generally, the country is hot and humid in the north and west, an area located within a significant portion of the Congo River Basin. The southern, central and eastern areas are generally cooler and drier.<sup>1</sup> The DRC is home to an exceptionally high degree of diversity biomes, ecosystems, and habitats, notably dry rainforests (Muhulu), open woodland forests (Miombo), savannahs, as well as cloud and gallery forests. A large network of protected areas, safeguarding this diversity, covers approximately 8% of the national territory. The majority of the land area of the DRC is within the world's second largest area of tropical rainforest, which is documented to store 8% of global forest carbon stocks.<sup>2</sup> It is also characterized by mountain terraces, plateaus, savannahs, grasslands and mountains (**Figure 1**).<sup>3</sup> The DRC has over 80 million hectares of arable land and over 1,100 listed minerals and precious metals.<sup>4</sup> The country has a significant natural resource base of timber, energy, minerals and gemstones.

**FIGURE 1.** Topography and elevation of the DRC<sup>5</sup>



The DRC is endowed with exceptional natural resources, including minerals such as cobalt and copper, hydropower potential, significant arable land, and immense biodiversity. However, the country currently has the third largest population of poor globally. Poverty in DRC is high, remains widespread and pervasive, and is increasing due to impacts from COVID-19. It is ranked 175 out of 189 countries on the UNDP's Human Development Index (2020).<sup>6</sup> The country's extensive history of conflict, poor governance, and weak institutions pose significant development

<sup>1</sup> Adaptation Partnership (2012). Democratic Republic of the Congo. Review of Current and Planned Adaptation Action: Middle Africa. URL: [https://www.preventionweb.net/files/25686\\_democraticrepublicofthecongo.pdf](https://www.preventionweb.net/files/25686_democraticrepublicofthecongo.pdf)

<sup>2</sup> UNDP (2019). Climate Change Adaptation – Democratic Republic of the Congo. URL: <https://www.adaptation-undp.org/explore/middle-africa/democratic-republic-congo>

<sup>3</sup> UNDP (2019). Climate Change Adaptation – Democratic Republic of the Congo. URL: <https://www.adaptation-undp.org/explore/middle-africa/democratic-republic-congo>

<sup>4</sup> World Bank (2021). DRC – Overview. URL: <https://www.worldbank.org/en/country/drc/overview#1>

<sup>5</sup> World Bank (2019). Internal Climate Migration Profile – DRC.

<sup>6</sup> UNDP (2019). Human Development Reports – Human Development Index. URL: <http://hdr.undp.org/en/data>

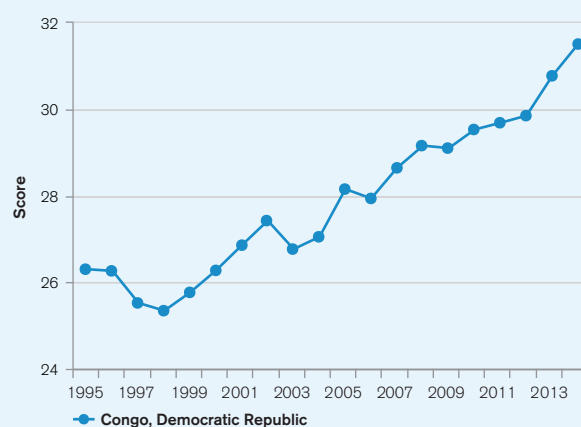
challenges. The DRC has a population of more than 86.7 million people (2019) with an annual population growth rate of 3.2%,<sup>7</sup> and a Gross Domestic Product (GDP) of \$50.4 billion (2019) with a current annual growth rate of 4.41% (**Table 1**). DRC's economic growth decelerated from its pre-COVID level of 4.4% in 2019, to an estimated 0.8% in 2020.<sup>8</sup> Approximately 44.5% of the country's population currently lives in urban areas. This is projected to increase to 52% and 64% of the population by 2030 and 2050, respectively.<sup>9</sup> The economy is largely driven by the extractives industry and a global demand for mined products. The country's recent economic growth (2005 to 2012) was associated with a moderate reduction in poverty. During this time, the poverty rate fell 5.3% from 69.3% in 2005 to 64% in 2012. The most recent World Bank Group estimates put the extreme poverty rate (<\$1.90 per day) in the DRC at 73% in 2018, one of the highest in sub-Saharan Africa, though there are significant regional differences. Inequality and poverty are significant barriers to economic growth, and increase the country's vulnerability to climate change as well as other shocks.<sup>10</sup>

**TABLE 1.** Data snapshot: Key development indicators<sup>11</sup>

Indicator	
Life Expectancy at Birth, Total (Years) (2019)	60.7
Population Density (People per sq. km Land Area) (2018)	37.1
% of Population with Access to Electricity (2018)	19%
GDP per Capita (Current US\$) (2019)	\$580.70

The ND-GAIN Index<sup>12</sup> 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, the DRC is recognized as highly vulnerable to climate change impacts, ranked 177 out of 181 countries in the 2020 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. **Figure 2** is a time-series plot of the ND-GAIN Index showing the DRC's progress.

**FIGURE 2.** ND-GAIN index for the DRC



<sup>7</sup> World Bank Data Bank (2021). World Development Indicators, DRC. URL: <https://databank.worldbank.org/source/world-development-indicators>

<sup>8</sup> World Bank (2021). DRC – Overview. URL: <https://www.worldbank.org/en/country/drc/overview#1>

<sup>9</sup> World Bank Data Bank (2020). Population estimates and projections, DRC. URL: <https://databank.worldbank.org/source/population-estimates-and-projections>

<sup>10</sup> World Bank (2021). DRC – Overview. URL: <https://www.worldbank.org/en/country/drc/overview#1>

<sup>11</sup> World Bank (2021). DataBank – World Development Indicators. URL: <https://databank.worldbank.org/source/world-development-indicators>

<sup>12</sup> University of Notre Dame (2020). Notre Dame Global Adaptation Initiative. URL: <https://gain.nd.edu/our-work/country-index/>

The DRC submitted its [Nationally-Determined Contribution](#) to the UNFCCC in 2016, which outlines the country's environmental goals and its sustainable development agenda. It published its [Third National Communication to the UNFCCC](#) in 2015. With respect to anticipated climate change impacts, the DRC's primary adaptation efforts are focused on the country's most vulnerable sectors: water resources, agriculture, land use and forestry, sanitation, health, and energy.<sup>13</sup>

## 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, 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

The seasonal migration across the equator of the Intertropical Convergence Zone (ITCZ) drives the country's climate. In the equatorial climate zone, located near the Equator, temperatures are high (annual average for Yangambi 24.6°C), humidity is high and rains fall throughout the year averaging between 1,600 mm and 2,000 mm annually. The country's tropical climate zones in the north and south of the equatorial zone experience more seasonal variability, with distinct dry (April to October) and rainy (November to March) seasons that are driven by the annual cycle of the ITCZ. Along the west coast is a small zone characterized by an oceanic climate due to the cold Benguela Current. Here, precipitation is approximately 800 mm per year, which, along with temperatures, are significantly lower than in the rest of the country. The highlands in the east of the country lie outside the path of the ITCZ and are subject to the influence of the southeastern trade winds, snow commonly occurs in the highest

<sup>13</sup> Ministry of Environment, Nature Conservation and Tourism (2016). DRC – Nationally-Determined Contribution. URL: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Democratic%20Republic%20of%20the%20Congo%20First/CPDN%20-%20R%C3%A9p%20D%C3%A9m%20du%20Congo.pdf>



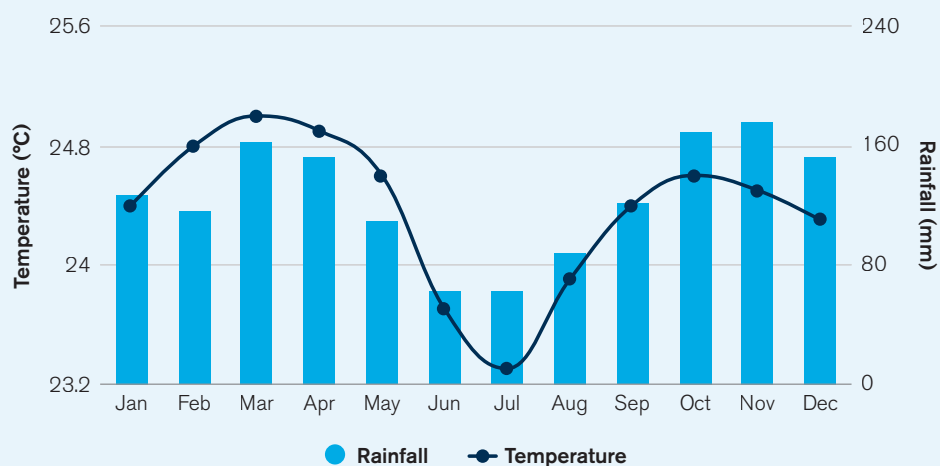
altitudes. Climate variability and change are likely to exacerbate existing vulnerabilities, political instability and conflict, food insecurity and the existing high poverty rates. Food security is of primary concern as the majority of the country's agriculture is primarily rainfed and conducted by small-holder farmers.<sup>14</sup>

Analysis of data from the World Bank Group's Climate Change Knowledge Portal (CCKP) (**Table 2**) shows historical climate information for the period between 1901–2020. Mean annual mean temperature for the DRC are 24.1°C, with average monthly temperatures ranging between 24.6°C (March) and 22.9°C (July). Mean annual precipitation is 1,508.3 mm. with rain falling throughout the year, as shown in the latest climatology, 1991–2020 (**Figure 3**).<sup>15</sup> More rainfall is received in the east of the country and is fairly constant along the equator.<sup>16</sup> **Figure 4** shows the spatial representation of the average annual precipitation and temperature across the DRC.

**TABLE 2.** Data snapshot: Summary statistics

Climate Variables	1901–2020
Mean Annual Temperature (°C)	24.1°C
Mean Annual Precipitation (mm)	1,508.3 mm
Mean Maximum Annual Temperature (°C)	29.7°C
Mean Minimum Annual Temperature (°C)	18.5°C

**FIGURE 3.** Average monthly temperature and rainfall of DRC for 1991–2020<sup>17</sup>



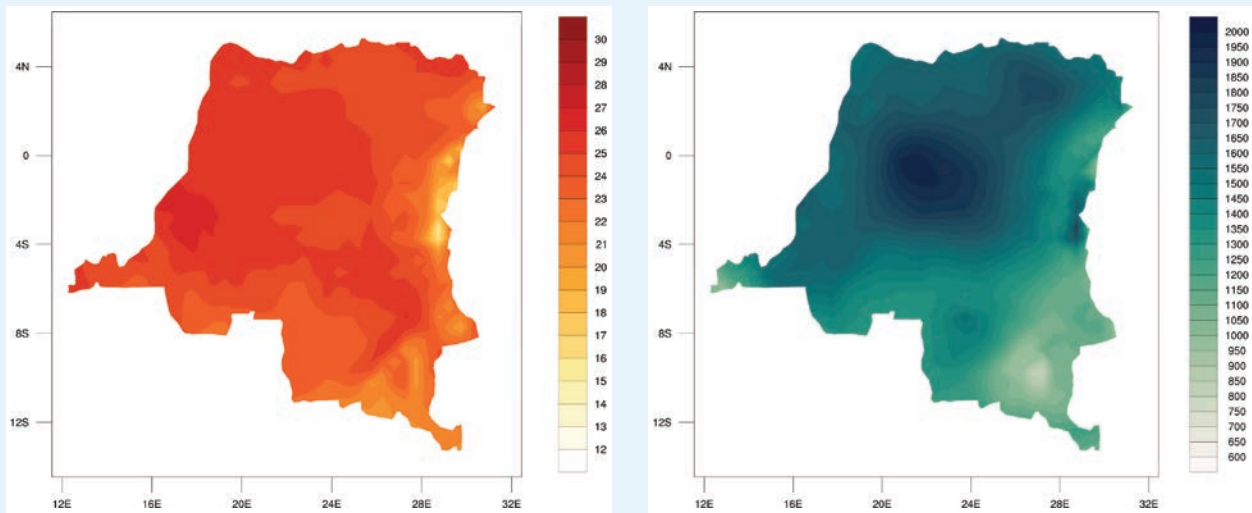
<sup>14</sup> Climate Services Center Germany (2016). Climate Fact Sheet – Democratic Republic of the Congo.

<sup>15</sup> WBG Climate Change Knowledge Portal (CCKP, 2021). DRC. URL: <https://climateknowledgeportal.worldbank.org/country/congo-democratic-republic/climate-data-historical>

<sup>16</sup> Ministry of Foreign Affairs (2018). Climate Change Profile – Democratic Republic of the Congo. URL: <https://reliefweb.int/sites/reliefweb.int/files/resources/DRC%2B%28east%29.pdf>

<sup>17</sup> WBG Climate Change Knowledge Portal (CCKP, 2021). DRC URL: <https://climateknowledgeportal.worldbank.org/country/congo-democratic-republic/climate-data-historical>

**FIGURE 4.** Map of average annual temperature (°C) (left); annual precipitation (mm) (right) for the DRC, 1991–2020<sup>18</sup>

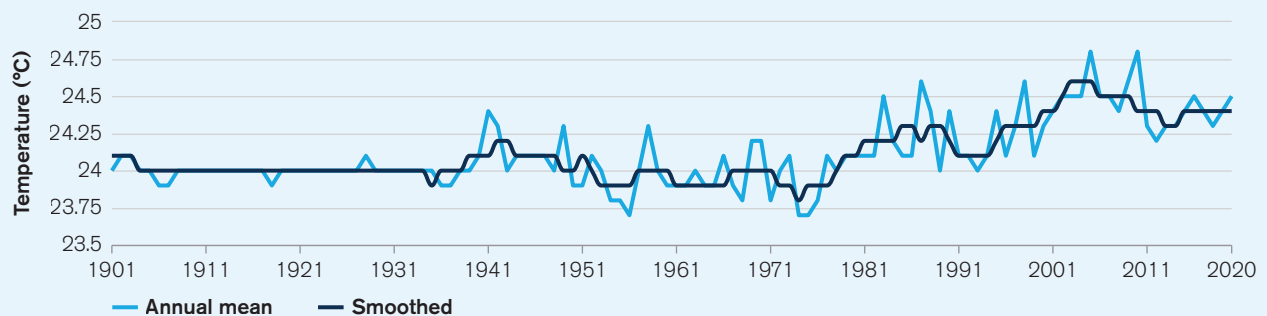


## Key Trends

### Temperature

In the northern and central to southwestern areas, near the capitol city of Kinshasa, temperature is relatively stable ranging between 24–25°C (**Figure 5**). The subtropical savannahs in the south and southeast experience slightly lower average temperatures of 22–23°C. Between 1901 and 2013 a small increase in temperature (0.05°C per decade) was observed, which was stronger over the last 30 years (0.17°C per decade). Additionally, the temperature of deep lake waters of Lake Tanganyika has increased by 0.2°C to 0.7°C since the 1960s.<sup>19</sup>

**FIGURE 5.** Observed temperature for the DRC, 1901–2020<sup>20</sup>



<sup>18</sup> WBG Climate Change Knowledge Portal (CCKP, 2021). DRC, Historical Climate. URL: <https://climateknowledgeportal.worldbank.org/country/congo-democratic-republic/climate-data-historical>

<sup>19</sup> USAID (2018). Climate Risk Profile - DRC. URL: <https://www.climatelinks.org/resources/climate-risk-profile-democratic-republic-congo>

<sup>20</sup> WB Climate Change Knowledge Portal (CCKP, 2021). DRC URL: <https://climateknowledgeportal.worldbank.org/country/congo-democratic-republic/climate-data-historical>

## Precipitation

The northern areas of the country, dominated by tropical forests along the Congo River are characterized by two rainy seasons (March to May and September to December). The Central and southeastern areas, which include mountain terraces and grasslands, have one rainy season (July to August), while the subtropical savannahs also have a single season, which occurs between December and February. Rainfall is highly variable across the country and since the 1960s no substantial overall changes in rainfall are observed.<sup>21</sup>

# Climate Future

## Overview

The main data source for World Bank Group's Climate Change Knowledge Portal (CCKP) is the CMIP5 (Coupled Inter-comparison Project No.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 the [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 (RCP 8.5) over 4 different time horizons. **Figure 6** 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.

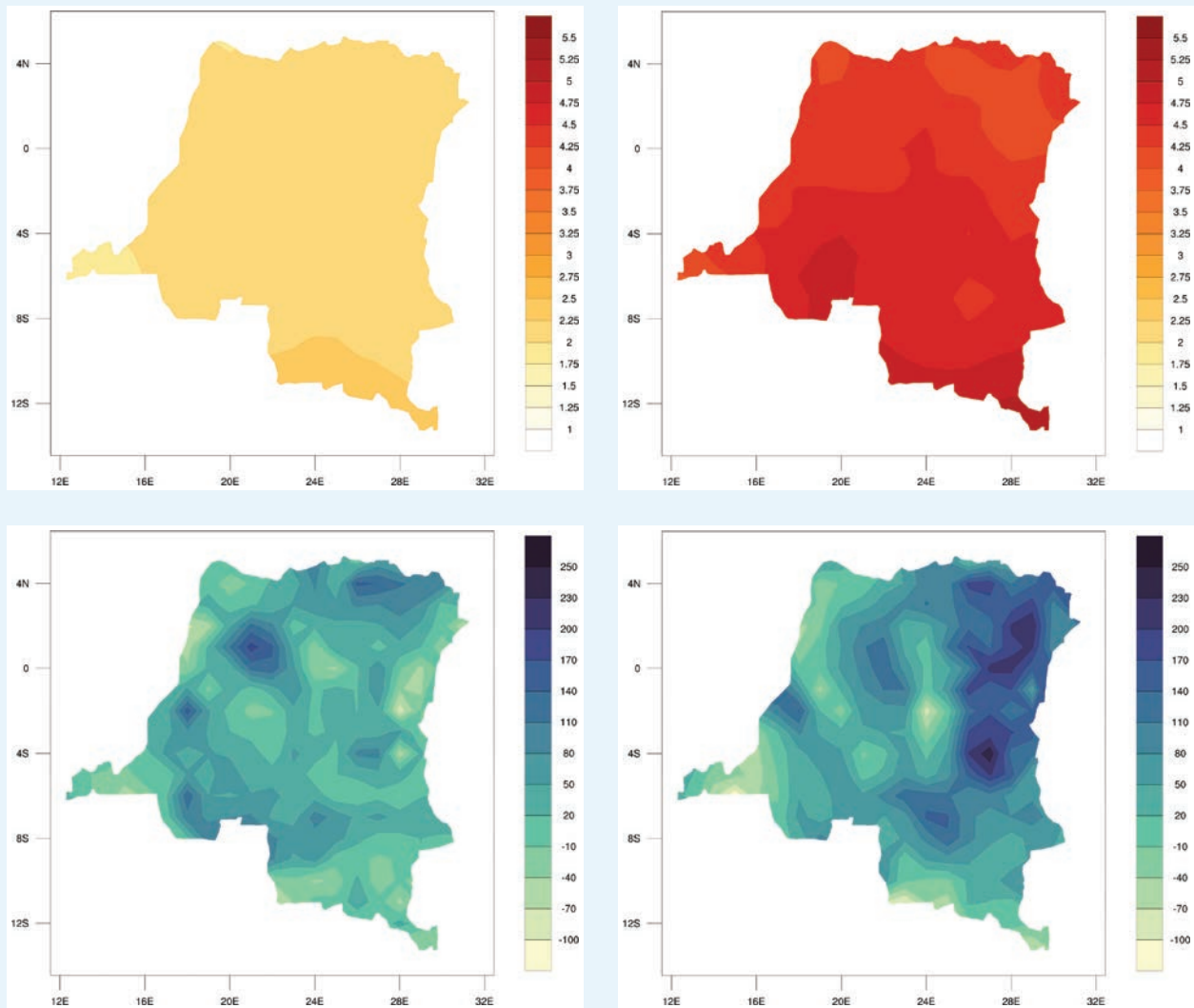
**TABLE 3.** Data snapshot: CMIP5 ensemble projections

Cmip5 Ensemble Projection	2020–2039	2040–2059	2060–2079	2080–2099
<b>Annual Temperature Anomaly (°C)</b>	<b>+0.5 to +1.4</b> (+1.0°C)	<b>+1.2 to +2.4</b> (+1.7°C)	<b>+2.0 to +3.7</b> (+2.5°C)	<b>+2.7 to +5.1</b> (+3.5°C)
<b>Annual Precipitation Anomaly (mm)</b>	<b>-13.7 to +21.6</b> (2.6 mm)	<b>-17.1 to +25.2</b> (3.5 mm)	<b>-17.0 to +34.0</b> (6.7 mm)	<b>-17.8 to +44.0</b> (10.5 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).

<sup>21</sup> Climate Services Center Germany (2016). Climate Fact Sheet – Democratic Republic of the Congo

**FIGURE 6.** 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 RCP8.5<sup>22</sup>



<sup>22</sup> WBG Climate Change Knowledge Portal (CCKP, 2021). DRC Projected Future Climate. URL: <https://climateknowledgeportal.worldbank.org/country/congo-democratic-republic/climate-data-projections>

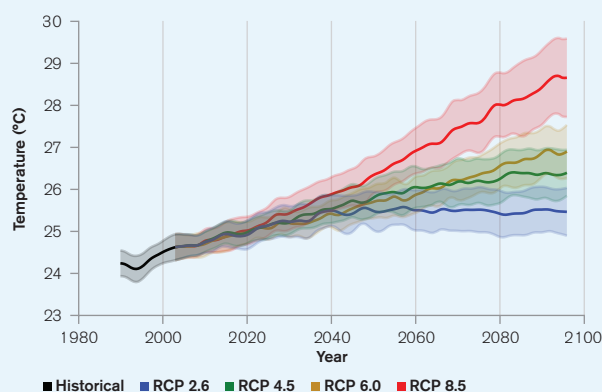
## Key Trends

### Temperature

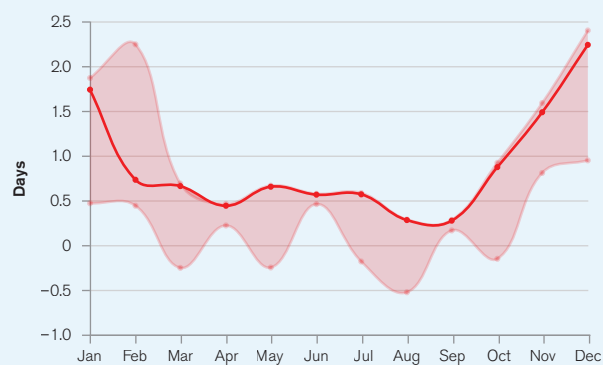
Annual temperatures in DRC are projected to increase, between +1.7°C to +4.5°C by end of the century. Heat waves are projected to become more common and longer-lasting.<sup>23</sup> Hot days and nights are projected to increase 13–58% and 33–86%, respectively. Additionally, cold days and nights are projected to decrease by 6–10% by the end of the century.<sup>24</sup>

Across all emission scenarios, temperatures will continue to rise across the DRC through the end of the century (**Figure 7**). Under a high-emission scenario (RCP 8.5), average temperatures will rise rapidly by mid-century. The highest rise in temperature is projected for the period between October to March (**Figure 8**). Rising heat and more frequent and intense extreme heat conditions will result in significant implications for human and animal health, agriculture, water resources, and ecosystems.

**FIGURE 7.** Historical and projected average temperature for the DRC from 1986 to 2099 (Reference Period, 1986–2005)<sup>25</sup>



**FIGURE 8.** Projected change in summer days (Tmax >25°C) (RCP8.5, Reference Period, 1986–2005)<sup>26</sup>



<sup>23</sup> Climate Services Center Germany (2016). Climate Fact Sheet – Democratic Republic of the Congo

<sup>24</sup> Ministry of Foreign Affairs (2018). Climate Change Profile – Democratic Republic of the Congo. URL: <https://reliefweb.int/sites/reliefweb.int/files/resources/DRC%2B%28east%29.pdf>

<sup>25</sup> WBG Climate Change Knowledge Portal (CCKP, 2021). Interactive Climate Indicator Dashboard - Agriculture. DRC. URL <https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=COD&period=2080-2099>

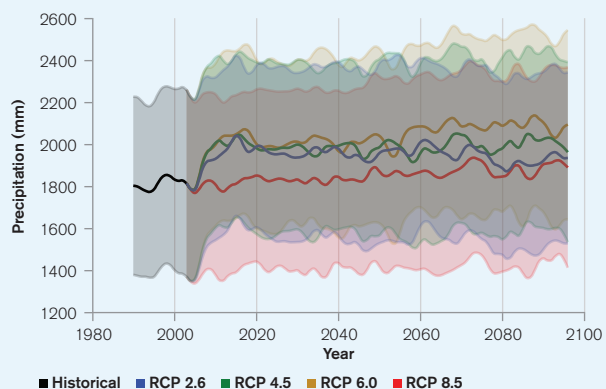
<sup>26</sup> WBG Climate Change Knowledge Portal (CCKP, 2021). Interactive Climate Indicator Dashboard - Agriculture. DRC. URL <https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=COD&period=2080-2099>



## Precipitation

The meteorological network and record of observations across DRC is scarce, posing a challenge for projections of future rainfall. While projections point to no significant changes in annual precipitation (**Figure 9**),<sup>27</sup> rainfall is projected to become substantially more variable, with a likely increase in frequency and intensity of extreme rainfall events. This is expected to have a negative impact on agriculture, water, energy, forestry, and health, as well as on available agricultural land, freshwater resources and ecosystems.<sup>28</sup> The rainfall intensity of heavy rain events is likely to increase by as much as 27%.<sup>29</sup> Seasonally, more rainfall is expected to fall during the already wet season that occurs between October and April. This is likely to translate into longer lasting dry spells. Impacts will be most pronounced via changes in the country's water balance and are likely to increase the incidence of floods.<sup>30</sup> Natural disasters driven by more frequent and more intense floods and droughts are projected to increase in number.

**FIGURE 9.** Projected changes in average annual across the DRC for the period between 1986 to 2099 (Reference Period, 1986–2005)<sup>31</sup>



## CLIMATE RELATED NATURAL HAZARDS

### Overview

The DRC is at risk for many natural hazards, including volcanic eruptions, earthquakes, floods, and droughts. Vulnerability to these hazards is exacerbated by poverty and political insecurity. Since 1997, millions of people entered conditions of acute vulnerability due to displacement, loss of economic livelihoods, and a fraying social fabric. Two volcanoes of the Virunga volcanic chain are some of the most active volcanoes in the world and pose a direct threat to more than one million inhabitants in the city of Goma and surroundings areas. In 2002, a volcanic eruption covered 13% of the city's surface area, destroying 80% of the local economy. The DRC also experiences extreme weather and climate variability, resulting in a high exposure to floods and droughts, which are projected to increase in frequency and severity due to climate change.<sup>32</sup> The most common natural disasters are floods and

<sup>27</sup> WBG Climate Change Knowledge Portal (CCKP, 2021). DRC Water Dashboard. Data Description. URL: <https://climateknowledgeportal.worldbank.org/country/congo-democratic-republic/climate-sector-water>

<sup>28</sup> Climate Services Center Germany (2016). Climate Fact Sheet – Democratic Republic of the Congo

<sup>29</sup> Ministry of Foreign Affairs (2018). Climate Change Profile – Democratic Republic of the Congo. URL: <https://reliefweb.int/sites/reliefweb.int/files/resources/DRC%2B%28east%29.pdf>

<sup>30</sup> Climate Services Center Germany (2016). Climate Fact Sheet – Democratic Republic of the Congo

<sup>31</sup> WBG Climate Change Knowledge Portal (CCKP, 2021). Climate Data-Projections. DRC. URL: <https://climateknowledgeportal.worldbank.org/country/congo-democratic-republic/climate-sector-water>

<sup>32</sup> GFDRR (2019). Overview – Congo, Democratic Republic. URL: <https://www.gfdr.org/en/congo-democratic-republic>

heavy rainfall events and droughts. Excess rainfall is projected to be strongest in the central areas of the country, with increased aridity and droughts forecast for the southern zones. Heavy rainfall is also projected to result in flooding, causing river bank erosion and/ or overflows, landslides and waterlogging of agricultural fields, leading to likely crop failures.<sup>33</sup> The most impactful natural disasters in the DRC have been floods and epidemics which accounted for 27% and 58% of all disasters, respectively.<sup>34</sup> Lower-income populations tend to reside in more hazard prone locations, with high potential for significantly increased exposure of already vulnerable populations.<sup>35</sup>

Food security will be affected by land and infrastructure degradation due to erosion/landslides, a rise in livestock and crop diseases due to temperature increases, direct crop failure due to floods and heavy rains, and possible nutrient leaching and fungal growth due to high humidity. Water availability will be affected by possible periods of drought in the southern zones, but no serious water stress is projected for agriculture areas in the east of the country. In urban areas, increasing population density combined with erratic rainfall may lead to water stress as lifeline services fail to keep up with demand. Vulnerability from these hazards pose major challenges for economic and political stability and the longer-term fiscal sustainability of the DRC.

Data from the Emergency Event Database: EM-Dat database,<sup>36</sup> presented in **Table 4**, shows the country has endured various natural hazards, including floods, landslides, wildfires, and storms.

**TABLE 4.** Natural disasters in the DRC, 1900–2020

Natural Hazard 1900–2020	Subtype	Events Count	Total Deaths	Total Affected	Total Damage ('000 USD)
<b>Drought</b>	Drought	2	0	800,000	0
<b>Earthquake</b>	Ground Movement	5	53	23,161	7,200
<b>Epidemic</b>	Bacterial Disease	43	5,834	193,396	0
	Viral Disease	28	11,731	801,845	0
<b>Flood</b>	Flash Flood	4	206	95,385	15,000
	Riverine Flood	19	245	547,598	0
<b>Landslide</b>	Landslide	8	434	2,543	0
<b>Storm</b>	Convective Storm	3	24	75,147	0
	Tropical Cyclone	1	17	22,500	0
<b>Volcanic Activity</b>	Ash Fall	3	347	170,400	9,000
<b>Wildfire</b>	Land Fire (brush, bush, pasture)	3	11	59,898	0

<sup>33</sup> Ministry of Foreign Affairs (2018). Climate Change Profile – Democratic Republic of the Congo. URL: <https://reliefweb.int/sites/reliefweb.int/files/resources/DRC%2B%28east%29.pdf>

<sup>34</sup> IUCN (2016). Regional assessment of Ecosystem-based Disaster Risk Reduction and Biodiversity in West and Central Africa. URL: <https://portals.iucn.org/library/sites/library/files/documents/2016-082.pdf>

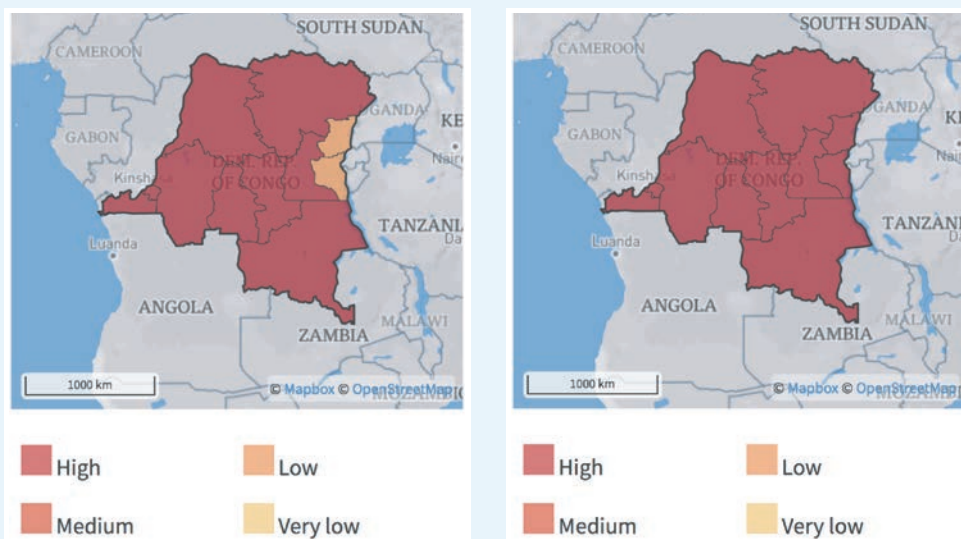
<sup>35</sup> Ministry of Foreign Affairs (2018). Climate Change Profile – Democratic Republic of the Congo. URL: <https://reliefweb.int/sites/reliefweb.int/files/resources/DRC%2B%28east%29.pdf>

<sup>36</sup> EM-DAT: The Emergency Events Database - Université catholique de Louvain (UCL) - CRED, D. Guha-Sapir, Brussels, Belgium. URL: [http://emdat.be/emdat\\_db/](http://emdat.be/emdat_db/)

## Key Trends

Climate change is projected to increase the risk and intensity of floods, as more rainfall will be received during heavy rainfall events. The likelihood of mudslides and landslides, particularly in the country's mountainous areas is likely to increase. As rainfall becomes more intense, soil erosion and waterlogging of fields could translate into decreased yields and increase food insecurity. Rising temperatures are also likely to extend periods of aridity, especially in the vulnerable south. Importantly, higher temperatures and drought will negatively impact water storage capacity, which could in significant economic losses, damage to agricultural lands and infrastructure as well as human casualties. Land degradation and soil erosion, exacerbated by recurrent floods, adversely impact agricultural production, disproportionately affecting the livelihoods of the rural poor. The country's recurrent political instability and poverty will further exacerbate these issues with potential to also exacerbate potential for violence and conflict.<sup>37</sup> **Figure 10** show the risks of flooding and other natural disaster risks, such as wildfires, across the country.

**FIGURE 10.** Risk of river flood (left)<sup>38</sup>; risk of wildfire (right)<sup>39</sup>



Deforestation, watershed degradation, land use changes, urbanization and poor management of growing settlements have exacerbated the impact from floods and droughts. These conditions also contribute to water scarcity and pollution, limiting water for drinking, agriculture, and other uses. Heavy rainfall can also trigger riverine, coastal and flash floods. Heavy rainfall and flash floods are common in the country's mountain areas and can also trigger landslides and mudslides. Increasing urbanization, into flood plains and/or low-lying areas also has increased flood risk, as functioning

<sup>37</sup> Ministry of Foreign Affairs (2018). Climate Change Profile – Democratic Republic of the Congo. URL: <https://reliefweb.int/sites/reliefweb.int/files/resources/DRC%2B%28east%29.pdf>.

<sup>38</sup> ThinkHazard! (2019). DRC River Flood. URL: <http://thinkhazard.org/en/report/68-democratic-republic-of-the-congo/FL>

<sup>39</sup> ThinkHazard! (2019). DRC Urban Flood. URL: <http://thinkhazard.org/en/report/68-democratic-republic-of-the-congo/WF>

water drainage systems are nearly non-existent. Water stress may be further exacerbated with competing demands between household consumption and agriculture, which may necessitate the building of dams and irrigation networks. Increased heat will further strain water resources and impacts from changing rainfall patterns.<sup>40</sup>

## Implications for DRM

The government of the DRC is currently working with the United Nations Development Program to develop the country's first disaster risk reduction policy and to strengthen its disaster risk management capabilities. The country's latest National Strategic Development Plan (Plan National Stratégique de Développement) (2019–2023) includes climate adaptation and disaster risk management (DRM) as a core pillar. However, limited tracking of the government's budget for disaster risk reduction poses a challenge. Priorities for the country's DRM agenda include:

- (i) improving national capacity to monitor and forecast hazards and transfer this information into decision making and planning;
- (ii) strengthening early warning systems and contingency planning; and,
- (iii) strengthening national institutional capacity for DRM.

At the national level, training programs are ongoing to support institutional capacity to prepare for, manage, and respond to key natural disasters, primarily those related to volcanic activities in the Goma region. The DRC would also greatly benefit from investments in hydro-meteorological observations and related services, which can increase the accuracy and quality of forecasted natural disaster events.<sup>41</sup>

## CLIMATE CHANGE IMPACTS TO KEY SECTORS

The DRC is highly vulnerable to seasonal variability as well as long-term climate change. As vulnerability rises, so will the political, security, social, economic and environmental cumulative impacts. Droughts and floods in particular are likely to have significant consequences on the environment, society, the food security situation, and the wider economy. Significant impacts are projected for the country's water resources, agriculture, health, and forestry sectors. Additionally, heavy rains, floods, drought, and soil erosion places urban and rural infrastructure at risk, particularly those serving the poor and vulnerable groups. Environmental degradation, changes in water resources, and loss of biodiversity and ecosystem services constitute serious obstacles to the country's continued development. Changes in precipitation patterns can have far-reaching consequences for ecosystems and biodiversity, food production, the water industry and rivers.<sup>42</sup> Climate variability and change are likely to exacerbate

<sup>40</sup> Ministry of Foreign Affairs (2018). Climate Change Profile – Democratic Republic of the Congo. URL: <https://reliefweb.int/sites/reliefweb.int/files/resources/DRC%2B%28east%29.pdf>

<sup>41</sup> GFDRR (2019). Overview – Congo, Democratic Republic. URL: <https://www.gfdr.org/en/congo-democratic-republic>

<sup>42</sup> Ministry of Environment, Nature Conservation and Tourism (2016). DRC – Nationally-Determined Contribution. URL: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Democratic%20Republic%20of%20the%20Congo%20First/CPDN%20-%20R%C3%A9p%20D%C3%A9m%20du%20Congo.pdf>

these concerns, as the majority of agricultural production is rainfed, providing livelihoods for a large part of the population. Rising temperatures and more variable rainfall will also impact the country's forests, which are critical to rural livelihoods, and the ecosystem services they provide, which are already under threat from land use changes and a growing demand for charcoal and tropical forest products. More extreme weather events such as intense rainfall after prolonged dry spells can lead to erosion and flash flooding, damage roads and infrastructure, wipe out crops and put additional lives at risk.<sup>43</sup>

## 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.<sup>44</sup>

# Agriculture

## Overview

The agricultural sector is critical to the DRC's economy and food security and is considered one of the most vulnerable to projected climate changes. The agricultural sector accounts for 40% of the national GDP, employs 70% of the country's population, and is the primary source of income for the majority of Congolese.<sup>45</sup> The sector plays a critical role in reducing food insecurity, malnutrition and rural poverty and combines farming, hunting, small animal husbandry, supplemented with fishing in communities close to lakes and streams. Crop production varies by region, but maize and cassava are major staples, and most areas support livestock. Other staple crops include cassava, plantains, maize, sweet potato, beans, groundnut, and mangoes. Only 10 million hectares of the approximately 80 million hectares of DRC's arable land is currently cultivated; the majority of which is concentrated in the plateaus of the Katanga region.<sup>46</sup> Promoting agricultural development is the cornerstone of the country's national economic development plan, which aims to improve productivity, as well as the technical and organizational capacities of producers and private institutions to support production.

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<sup>43</sup> USAID (2018). Climate Risk Profile - DRC. URL: <https://www.climatelinks.org/resources/climate-risk-profile-democratic-republic-congo>

<sup>44</sup> World Bank Group (2016). Gender Equality, Poverty Reduction, and Inclusive Growth. URL: <http://documents1.worldbank.org/curated/en/820851467992505410/pdf/102114-REVISED-PUBLIC-WBG-Gender-Strategy.pdf>

<sup>45</sup> USAID (2018). Climate Risk Profile - DRC. URL: <https://www.climatelinks.org/resources/climate-risk-profile-democratic-republic-congo>

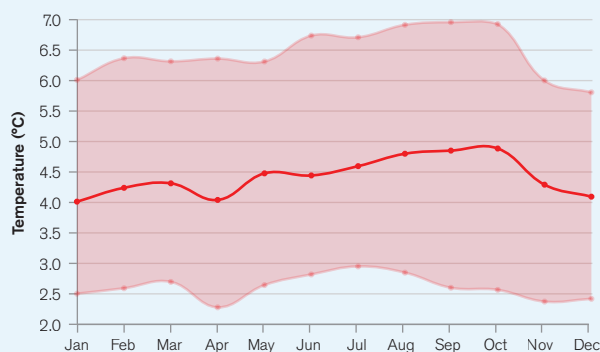
<sup>46</sup> Democratic Republic of the Congo (2009). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>



## Climate Change Impacts

More intense rainfall and rising temperatures are likely to significantly hamper development goals, as they will likely impact crop productivity and necessitate significant changes to current farming practices. The projected change in rainfall intensity will undoubtedly continue to damage crops and erode fertile soils, potentially leading to the introduction of novel crop diseases and the intensification of others. Prolonged dry spells and rising temperatures will stress plants and reduce yields, putting pressure on farmers to expand their cropland into forests.<sup>47</sup> While potatoes and maize have a high tolerance to a range of weather conditions, pests and diseases, dry beans are sensitive to heat stress, and farmers have an extremely low capacity to address climate-sensitive diseases, such as bean root rot, which impact productivity. Additionally, rising temperatures are likely to adversely impact yields and quality of plantains, soy, dry beans, and coffee. Rising temperatures will also alter pest and pathogen dynamics, particularly for diseases such as cassava mosaic virus and coffee rust.<sup>48</sup> In contrast, rice yields in the Kivu regions could increase. In addition to threatening yields, prolonged dry spells could also lead to significant losses of livestock and/or spoilage of livestock products.<sup>49</sup> Heavy rainfall and floods may force shifts in the timing of the planting and harvesting seasons. Additionally, heavy rains and floods will continue to damage road networks, decreasing access to markets and isolating rural communities.<sup>50</sup> **Figure 11** shows the projected change in daily max-temperature across the year by the 2090s under a high emission scenario (RCP 8.5). These higher temperatures have implications for impacts to soil moisture and crop growth, which are projected to have impacts throughout the year. **Figure 12** presents the spatial variation of the projected changes in the number of hot days with temperatures over 35°C for the 2050s and 2090s, under the emissions scenario, RCP8.5. The change in high-heat days has implications for agriculture crops and livestock, as well as human health.

**FIGURE 11.** Average daily max temperature for the DRC (RCP8.5, Reference Period, 1986–2005)<sup>51</sup>



<sup>47</sup> USAID (2017). Climate Risks in Food for Peace Geographies – Democratic Republic of the Congo. URL: [https://www.climate-links.org/sites/default/files/asset/document/20170222\\_USAID%20ATLAS\\_DRC%20Food%20Security%20Climate%20Screening.pdf](https://www.climate-links.org/sites/default/files/asset/document/20170222_USAID%20ATLAS_DRC%20Food%20Security%20Climate%20Screening.pdf)

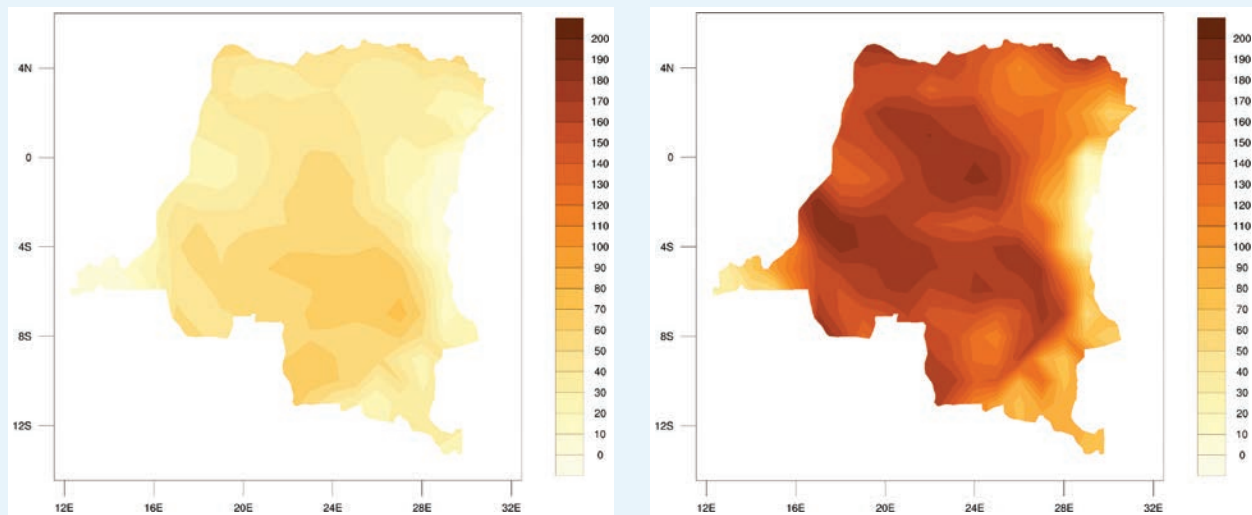
<sup>48</sup> Ministry of Environment, Nature Conservation and Tourism (2016). DRC – Nationally-Determined Contribution. URL: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Democratic%20Republic%20of%20the%20Congo%20First/CPDN%20-%20R%20C3%A9p%20D%20C3%A9m%20du%20Congo.pdf>

<sup>49</sup> USAID (2017). Climate Risks in Food for Peace Geographies – Democratic Republic of the Congo. URL: [https://www.climate-links.org/sites/default/files/asset/document/20170222\\_USAID%20ATLAS\\_DRC%20Food%20Security%20Climate%20Screening.pdf](https://www.climate-links.org/sites/default/files/asset/document/20170222_USAID%20ATLAS_DRC%20Food%20Security%20Climate%20Screening.pdf)

<sup>50</sup> USAID (2018). Climate Risk Profile - DRC. URL: <https://www.climate-links.org/resources/climate-risk-profile-democratic-republic-congo>

<sup>51</sup> WBG Climate Change Knowledge Portal (CCKP, 2020). The DRC Agriculture. Dashboard URL: <https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=COD&period=2080-2099>

**FIGURE 12.** Maps showing spatial variation of the change in the number of heat days (>35°C) by 2040–2059 (left) and by 2080–2099 (right), relative to the 1986–2005 baseline under RCP8.5<sup>52</sup>



## Adaptation Options

Both the sensitivity of the agricultural sector to climate and its high reliance on rainfall and water resources have important implications for the DRC's farmers, livestock owners, fisher-folk, and the wider economy. The sector would benefit from targeted research to increase knowledge on specific climate change related impacts to the agriculture sector. Improved access to seasonal information is necessary to better inform the timing of planting. The sector should target the conservation of surrounding natural ecosystems to safeguard critical agricultural systems, such as those related to soil fertility and conservation. The DRC is currently working on a land use zoning plan, in order to limit the areas to be allocated specifically to agricultural activities; and link these to reforestation programs in deforested areas. Training and awareness raising on the impacts of climate on productivity can inform on farm management strategies and reinforced agricultural extension programs. Involving local communities, including farmers, in the improved management of local forest ecosystems will be critical. Improved roads and transport networks can safeguard market access.<sup>53</sup> To further strengthen adaptive capacities of the agricultural sector, the use of high-yield crop varieties could be introduced with improved post-harvest techniques. Funding could also be increased to strengthen the agricultural research and extension system so that technologies can be tested and adapted to the local environment and the resulting knowledge shared with farmers.<sup>54</sup>

<sup>52</sup> WBG Climate Change Knowledge Portal (CCKP, 2020). The DRC Agriculture. Dashboard URL: <https://climatedata.worldbank.org/CRMePortal/web/agriculture/crops-and-land-management?country=COD&period=2080-2099>

<sup>53</sup> Ministry of Environment, Nature Conservation and Tourism (2016). DRC – Nationally-Determined Contribution. URL: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Democratic%20Republic%20of%20the%20Congo%20First/CPDN%20-%20R%C3%A9p%20D%C3%A9m%20du%20Congo.pdf>

<sup>54</sup> FPRI (2012). East African agriculture and climate change: A comprehensive analysis - Democratic Republic of the Congo. URL: <https://hdl.handle.net/10568/42040>

# Water

## Overview

DRC contains 62% of the Congo Basin and the country has one of the highest volumes of freshwater in the African continent. Surface water and groundwater sources are critical to food security and health throughout the country. While the future of rainfall in the region remains somewhat uncertain, it is clear that single rain events will become more intense, likely impacting water resource availability and quality at more localized scales. The rivers and lakes of the DRC comprise a large source of freshwater and contain arteries linking the country's economy through a roughly 12,000 km network of navigable water. However, access to safe water remains a critical issue for rural populations due in large part to lack of investment in service provision.<sup>55</sup>

## Climate Change Impacts

There is mounting evidence that the Congo Basin rainforest is essential to national and regional rainfall patterns: air produces twice as much rain after passing over land with extensive tropical vegetation.<sup>56</sup> Water quality and availability will be a significant challenge in and around major urban areas, as rainfall becomes more intense, and floods more frequent. Rising temperatures will also further impact storage, infiltration, and increase the risk from contaminants. Already, intense rainfall events push rivers and streams beyond their banks, disrupting transportation and damaging critical infrastructure. More intense and frequent rainfall can increase the risk of flooding in rivers, streams and drainage ditches, which in turn impacts water quality, especially in urban areas where open sewage, rubbish can periodically contaminate water sources and increase sedimentation. For the eastern and southern areas of the country, a decrease in dry-season rainfall will likely necessitate improvements to water infrastructure.<sup>57</sup> Basic clean water and sanitation services are limited throughout the country, with an estimated 50 million Congolese lacking access to safe water and 80–90% of the population lacking access to improved sanitation. While this is largely due to damages that infrastructure suffered during the prolonged conflicts of the 1990s and 2000s, climate changes could exacerbate the situation by reducing water quality and increasing the incidence of floods, which continue to damages available infrastructure.<sup>58</sup>

Changes in precipitation patterns, including more frequent heavy rainfall events will impact river flows, water management and floods. Transport networks are also impacted by rainfall intensity and flood events. These disruptions increase public transit headways and transit re-routing, decreases travel speed and results in time delays.<sup>59</sup> As temperatures rise, evaporation rates will increase, negatively impacting infiltration and the recharge

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<sup>55</sup> USAID (2017). Climate Risks in Food for Peace Geographies – Democratic Republic of the Congo. URL: [https://www.climatelinks.org/sites/default/files/asset/document/20170222\\_USAID%20ATLAS\\_DRC%20Food%20Security%20Climate%20Screening.pdf](https://www.climatelinks.org/sites/default/files/asset/document/20170222_USAID%20ATLAS_DRC%20Food%20Security%20Climate%20Screening.pdf)

<sup>56</sup> Spracklen, D. V., Arnold, S. R., & Taylor, C. M. (2012). Observations of increased tropical rainfall preceded by air passage over forests. *Nature*, 489(7415), 282–285. <https://doi.org/10.1038/nature11390>

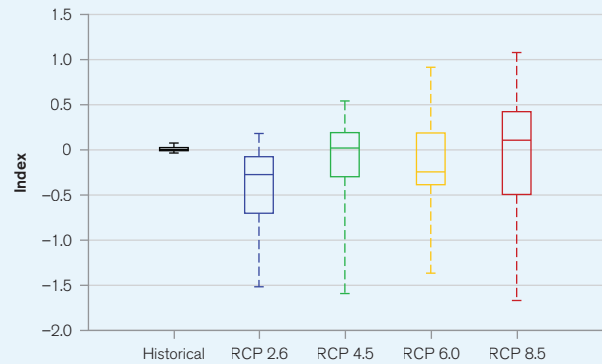
<sup>57</sup> Democratic Republic of the Congo (2009). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>

<sup>58</sup> USAID (2017). Climate Risks in Food for Peace Geographies – Democratic Republic of the Congo. URL: [https://www.climatelinks.org/sites/default/files/asset/document/20170222\\_USAID%20ATLAS\\_DRC%20Food%20Security%20Climate%20Screening.pdf](https://www.climatelinks.org/sites/default/files/asset/document/20170222_USAID%20ATLAS_DRC%20Food%20Security%20Climate%20Screening.pdf)

<sup>59</sup> He, Y., Thies, S., Avner, P. and Rentschler, J. (2020). The Impact of Flooding on Urban Transit and Accessibility. A Case Study of Kinshasa. URL: <http://documents1.worldbank.org/curated/en/807121608236985691/pdf/The-Impact-of-Flooding-on-Urban-Transit-and-Accessibility-A-Case-Study-of-Kinshasa.pdf>

rates for groundwater. Low-water storage capacity makes the country vulnerable to unreliable rainfall patterns. This has the potential to further decrease the reliability of unimproved groundwater sources and surface water sources during droughts or prolonged dry periods. These can increase strain on pumping mechanisms, leading to breakdowns if maintenance is neglected. Additionally, rising temperatures could increase soil moisture deficits even under conditions of increasing rainfall. The Standardized Precipitation Evapotranspiration Index (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 understanding for the water sector in regard 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. The DRC is projected to experience significantly heightened dry conditions and significant drought severity, which will likely increase pressure on water resources for the country and region by mid-century and by end of the century (**Figure 13**).

**FIGURE 13.** Annual SPEI Drought Index in the DRC for the period, 1986 to 2099 (Reference Period, 1986–2005)<sup>60</sup>



## Adaptation Options

Improving water use efficiencies across the sector is key to safeguarding the ecological and physical functions of water bodies in the near to long term. The country's water management plans should take into account the sector's current and future vulnerabilities, and develop fit for purpose actions to manage water sources, in addition to addressing the geo-political issues surrounding the Congo River Basin writ large. Targeted research should identify water resource challenges and geographic hotspots of risk at community and regional levels. This information can be used to inform adaptation efforts. The lack of hydrological data across the Congo River system needs to be addressed and studies should focus on understanding the quality of surface and underground water resources. Water infrastructure should be targeted at increasing resilience. Investments made to water management will have multiple benefits across sectors: agriculture, health, food security, disaster management, among these. As water use efficiency is promoted, households and communities in urban areas will likely also benefit.<sup>61</sup>

<sup>60</sup> WBG Climate Change Knowledge Portal (CCKP, 2020). DRC Water Portlet. URL: <https://climatedata.worldbank.org/CRMePortal/web/water/land-use/-/watershed-management?country=COD&period=2080-2099>

<sup>61</sup> Democratic Republic of the Congo (2009). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>

# Forestry

## Overview

The DRC's forests are part of the greater Congo Basin, which makes up 18% of the world's tropical forests. The DRC houses the world's second largest area of tropical rainforest, which covers 59% of its territory and stores approximately 8% of global forest carbon.<sup>62</sup> Forests are a valuable natural resource for the DRC, as source of extracted products (timber, charcoal, palm oil), as well as habitat for wildlife that draw tourists, and the services these forests provide (carbon sinks, erosion control, water filtering and flow regulation).

## Climate Change Impacts

Deforestation within the Congo Basin has been linked to a potential drying over the basin as well as changes in precipitation over the Sahel, Ethiopian highlands and Guinean coast.<sup>63</sup> Since 2010, deforestation in DRC has increased significantly and was second highest in deforestation only to Brazil in 2020.<sup>64</sup>

The release of greenhouse gases due to deforestation and forest degradation are the country's principal emissions source. The primary drivers for deforestation and forest degradation in the country are subsistence agriculture, fuelwood production (providing 90% of the country's energy needs) and logging, , as well as road and urban infrastructure which continues to expand into forest areas.<sup>65</sup> Weak governance and weak or limited institutional capacity and mechanisms to limit deforestation and enforce regulations remains a challenge.<sup>66</sup>

While human activity is certainly a threat to the country's forests, rising temperatures could alter the forest species composition. Current model outputs suggest a likely north and southward expansion of tropical evergreen forests, an eastern shift in seasonal forest through the end of the century, and a decline in grassland in the northeast.<sup>67</sup> Prolonged dry-spells are likely to lead to biodiversity loss, as climate-sensitive plant and animal species fail to adapt in a timely manner. More frequent extreme weather events and heavy rainfall are projected to result in the shift or loss of habitats for protected areas, such as Virunga National Park. This will put endangered species and wildlife at risk, potentially increasing their exposure and contact with human settlements,<sup>68</sup> negatively impact local livelihoods dependent on tourism revenue.

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<sup>62</sup> Democratic Republic of the Congo (2015). REDD+ Investment Plan 2015–2020. URL: [http://www.fonaredd-rdc.org/wp-content/uploads/2017/06/REDD-Investment-Plan\\_English.pdf](http://www.fonaredd-rdc.org/wp-content/uploads/2017/06/REDD-Investment-Plan_English.pdf)

<sup>63</sup> USAID (2018). Climate Risk Profile - DRC. URL: <https://www.climatelinks.org/resources/climate-risk-profile-democratic-republic-congo>

<sup>64</sup> Weisse, M. and Goldman, L. (2021). Primary Rainforest Destruction Increased 12% from 2019 to 2020. Global Forest Watch. [31 March, 2021]. URL: <https://blog.globalforestwatch.org/data-and-research/global-tree-cover-loss-data-2020/>

<sup>65</sup> World Bank (2013). Deforestation Trends in the Congo Basin – Reconciling Economic Growth and Forest Protection. URL: <https://openknowledge.worldbank.org/bitstream/handle/10986/12477/9780821397428.pdf?sequence=1&isAllowed=y>

<sup>66</sup> Climate Investment Funds (2011). Investment Plan- Democratic Republic of the Congo. URL: [https://www.climateinvestmentfunds.org/sites/cif\\_enc/files/FIP%204%20DCR%20IP\\_0.pdf](https://www.climateinvestmentfunds.org/sites/cif_enc/files/FIP%204%20DCR%20IP_0.pdf)

<sup>67</sup> USAID (2017). Climate Risks in Food for Peace Geographies – Democratic Republic of the Congo. URL: [https://www.climatelinks.org/sites/default/files/asset/document/20170222\\_USAID%20ATLAS\\_DRC%20Food%20Security%20Climate%20Screening.pdf](https://www.climatelinks.org/sites/default/files/asset/document/20170222_USAID%20ATLAS_DRC%20Food%20Security%20Climate%20Screening.pdf)

<sup>68</sup> USAID (2018). Climate Risk Profile - DRC. URL: <https://www.climatelinks.org/resources/climate-risk-profile-democratic-republic-congo>



## Adaptation Options

Since 2008, the DRC has been demonstrating strong political commitment on REDD+6 nationally as well as internationally in the context of the UNFCCC. The DRC established the national REDD+ infrastructure, led by the National REDD+ Coordination (CN-REDD), with support from the FCPF and the UN-REDD Programme. Significant progress in the preparation phase of REDD+ (phase 1: readiness) includes, among others: (i) national consensus on the drivers of deforestation and forest degradation in 2012; (ii) the adoption of the National REDD+ Strategy by the Council of Ministers in 2012; (iii) the establishment of the National REDD+ Fund (FONAREDD) and its initial capitalization based on a Letter of Intent (LoI) between the Government of DRC and CAFI signed in April 2016; (iv) the revision of the National REDD+ Investment Plan 2015–2020, which has become the basis for FONAREDD to allocate resources, and (v) the finalization of the REDD+ safeguard instruments, namely the Environmental and Social Management Framework (ESMF) and five sub-frameworks, in 2015. In May 2015, the DRC became the first country worldwide to present its REDD+ Readiness-Package<sup>7</sup> to the FCPF, which was endorsed by the FCPF Participants Committee. The country is now in the implementation phase of REDD+ (phase 2: investments) and piloting its first results-based REDD+ program in Mai-Ndombe (phase 3: results-based payments).<sup>69</sup>

## Energy

### Overview

The DRC has one of the lowest rates of electrification in the world, with a national electrification access rate of just 19%, equating to 1% in rural areas and 19% in urban areas (2014). However, the country is endowed with large mineral, hydro and renewable resources and estimates suggest that there is potential to install up to 100,000 MW of hydropower capacity.<sup>70</sup> Safeguarding and increasing the country's energy generation and access is critical to the DRC's development agenda and efforts to improve the population's standard of living. Constraints in the current energy supply exist and include limited generation, low access to modern services, high costs to consumers, irregular supplies and significant cost of energy investments. Biomass (including wood fuel, charcoal, and agricultural waste), petroleum, and electricity are the three main sources of energy in the country. Fuelwood is the dominant source of energy for cooking.<sup>71</sup> Approximately 95% of the country's energy needs are currently met by biomass sources. However, the country has a potentially diverse energy mix from oil, gas, solar and hydro-electric power generation, but less than 3% of it is currently exploited.<sup>72</sup>

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<sup>69</sup> WBG (2018). Mai-Ndombe Emission Reductions Program. Project Appraisal Document (P160320). URL: <https://pubdocs.worldbank.org/en/724541540553482191/pdf/P160320-PAD-14-september-2018.pdf>

<sup>70</sup> Power Africa (2019). Power Africa Fact Sheet – DRC. URL: <https://www.usaid.gov/powerafrica/democratic-republic-congo>

<sup>71</sup> Democratic Republic of the Congo (2009). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>

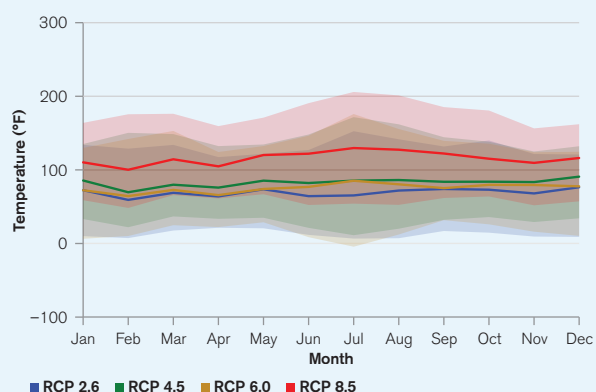
<sup>72</sup> LSE Grantham Institute (2019): DRC – Overview. Approach to Climate Change. URL: <http://www.lse.ac.uk/GranthamInstitute/country-profiles/democratic-republic-of-congo/>

## Climate Change Impacts

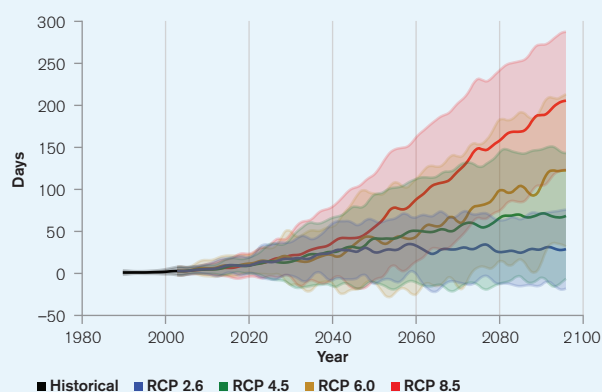
Approximately 98% of the country's generated domestic power comes from hydropower, especially the two Inga dams (Inga I & Inga II). While there is potential for the expansion of hydro-power capacity, a lack of investment, a weak financial sector and political instability continue to limit action. As timber demands increase deforestation, fuelwood and charcoal production will continue to increase the country's GHG emissions and the degradation of forested areas. Extreme weather events such as heavy rains can damage infrastructure, roads, and communication networks, as well as disrupt supply lines. An increase in the frequency and intensity of heavy rains and floods is likely to impact the already fragile infrastructure systems and potentially disrupt river flows which could affect hydro-power generation.<sup>73</sup>

Cooling Degree Days show 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 14**, seasonal increases for cooling demands are projected to increase throughout the year. 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 15**, warm spells are projected to sharply increase in the second half of the century.

**FIGURE 14.** Change in Cooling Degree Days (65°F) in the DRC for the period 2040–2059 (Reference Period, 1986–2005)<sup>74</sup>



**FIGURE 15.** Warm Spell Duration Index in the DRC for the period 1986 to 2099 (Reference Period, 1986–2005)<sup>75</sup>



<sup>73</sup> SEA (2013). Stratégie nationale SEA4ALL-RDC. URL: [https://www.se4all-africa.org/fileadmin/uploads/se4all/Documents/Country\\_RAGAs/Democratic\\_Republic\\_of\\_Congo\\_FR\\_Released.pdf](https://www.se4all-africa.org/fileadmin/uploads/se4all/Documents/Country_RAGAs/Democratic_Republic_of_Congo_FR_Released.pdf)

<sup>74</sup> WBG Climate Change Knowledge Portal (CCKP, 2020). DRC – Energy. URL: <https://climateknowledgeportal.worldbank.org/country/congo-democratic-republic/climate-sector-energy>

<sup>75</sup> WBG Climate Change Knowledge Portal (CCKP, 2020). DRC Energy Sector Dashboard. URL: <https://climateknowledgeportal.worldbank.org/country/congo-democratic-republic/climate-sector-energy>

## Adaptation Options

The DRC aims to meet its national energy needs by investing in electricity production, improving access to electricity, increasing electricity exports to the sub-region and developing renewable energy sources. To achieve these goals, the country is working to 1) liberalize the electricity sector (production, transportation and distribution) and 2) increased public and private investments. The Government intends to restructure the National Electricity Company (SNEL), set up a Regulatory Authority, rehabilitate hydroelectricity plants and existing transmission and distribution infrastructures, and construct new distribution infrastructure by the 2030s. New hydroelectric plants are planned for Kakobola, Grand Katende and Zongo II, as well as the mega project of Inga III and Grand Inga dams, which would represent the world's largest hydropower scheme (projected 40GW power capacity). The 2014 Electricity Sector law aims to consolidate laws relating to electricity generation, transmission, distribution, trading and use, as well as promotion of competition in the sector and support of energy efficiency and environmentally-focused policy. To increase access to energy in rural areas and secondary cities, a National Electrification Agency and a National Electrification Fund were created.<sup>76</sup>

## Health

### Overview

The DRC is highly vulnerable to adverse health impacts due to rising temperatures and more variable precipitation. Malaria is a leading cause of morbidity and mortality in the DRC and it is projected to extend in seasonality and geography. Rising temperatures and increased humidity will impact the lifecycle and habitat of malaria-carrying mosquito and parasite species, resulting in a change and spread of the temporal and geographic range of malarial zones. In existing malaria-prone areas, malaria cases are projected to triple by mid-century.<sup>77</sup> By mid-century it is projected that an additional 65,000–80,000 people will be at risk from endemic malaria (10–12 months of transmission suitability) in areas previously unsuitable. These are primarily located in the southwest (Kwango Province) and areas in the east (Kivu Provinces). In the central and northwest areas of DRC (Equateur, Mai Ndombe, Sankuru, Maniema), the season for malaria transmission is likely to be reduced (7–9 months compared to the current 10–12 months). DRC's health system can be strengthened to further improve child and maternal health as well as prepare for viral diseases.<sup>78</sup>

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<sup>76</sup> LSE Grantham Institute (2019). DRC – Overview, Approach to Climate Change. URL: <http://www.lse.ac.uk/GranthamInstitute/country-profiles/democratic-republic-of-congo/>

<sup>77</sup> Democratic Republic of the Congo (2009): Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>

<sup>78</sup> World Bank Group (2020). Fourth Additional Financing for the Health System Strengthening for better Maternal and Child Health Results Project. URL: <http://documents1.worldbank.org/curated/en/913191592186507411/pdf/Democratic-Republic-of-the-Congo-Fourth-Additional-Financing-for-the-Health-System-Strengthening-for-Better-Maternal-and-Child-Health-Results-Project.pdf>

## Climate Change Impacts

Increases in temperature and episodes of more intense rainfall are also likely to impact the spread of waterborne diseases and emerging infectious diseases, access to safe drinking water. Flooding is also likely to damage sanitation infrastructure, increase water borne and diarrheal diseases, with a likely increase in cholera.<sup>79</sup> Increased forest clearing and thus an increased contact between humans and wildlife are also significant drivers of transmission of the Monkeypox virus (MPX) from wildlife to humans. Future climate projections show MPX's range shift into regions where MPX has not been recorded previously, including increased suitability in eastern parts of the country.<sup>80</sup>

Higher temperatures, water scarcity, flooding, drought, conflict, and displacement, will negatively impact agricultural production, causing breakdown in food systems. This will disproportionately affect most vulnerable people at risk to hunger and can lead to increased food insecurity. This is especially critical for DRC as the majority of agriculture is farmed at a subsistence level and is reliant upon rainfall, making it highly vulnerable to changing weather patterns and long-term climate change trends. The poor and vulnerable groups risk further deterioration into food and nutrition crises if exposed to extreme climate events. Furthermore, more severe and frequent flooding may displace communities and increase the risk of water-borne diseases, and higher temperatures may threaten food and nutritional security, agricultural livelihoods, and increase heat-related deaths, specifically in children and the elderly. Vulnerable groups risk further deterioration into food and nutrition crises if exposed to extreme climate events of flooding, drought and extreme heat. Increasing temperatures also remain of significant concern, although is often overlooked as a public health risk.<sup>81</sup>

In the DRC, the annual distribution of days with a high-heat index provides insight into the health hazard of heat. The annual distribution of days with a high-heat index provides insight into the health hazard of heat. **Figure 16** shows the projected change in the Number of Days with a Heat Index >35°C for the 2090s; showing a sharp increase in the number of very hot days, starting to accelerate by mid-century and continuing to sharply increase under a high-emission scenario by end of the century. Tropical Nights (**Figure 17**) shows night temperatures (>20°C), which are projected to rapidly increase in a high-emission scenario. Health implications can be tracked by looking at the changing frequency of tropical nights, which again, follow similar warming patterns.

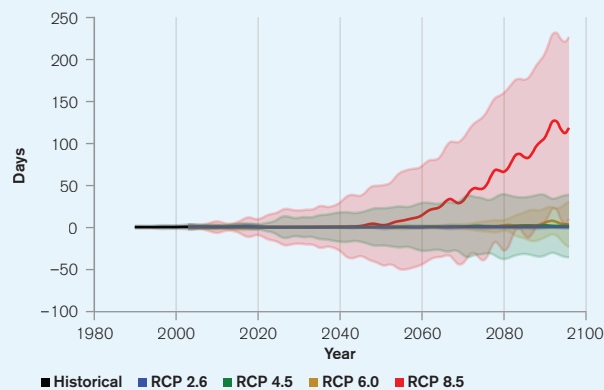
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<sup>79</sup> USAID (2018). Climate Risk Profile - DRC. URL: <https://www.climatelinks.org/resources/climate-risk-profile-democratic-republic-congo>

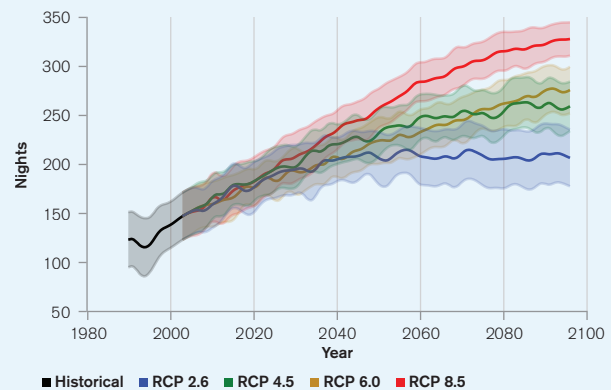
<sup>80</sup> USAID (2017). Climate Risks in Food for Peace Geographies – Democratic Republic of the Congo. URL: [https://www.climatelinks.org/sites/default/files/asset/document/20170222\\_USAID%20ATLAS\\_DRC%20Food%20Security%20Climate%20Screening.pdf](https://www.climatelinks.org/sites/default/files/asset/document/20170222_USAID%20ATLAS_DRC%20Food%20Security%20Climate%20Screening.pdf)

<sup>81</sup> Democratic Republic of the Congo (2009). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>

**FIGURE 16.** Days with a Heat Index >35°C (Reference Period, 1986-2005)<sup>82</sup>



**FIGURE 17.** Number of Tropical Nights (Tmin >20°C) (Reference Period, 1986-2005)<sup>83</sup>



## Adaptation Options

The DRC's limited health care system remains a significant challenge to the country's development goals. Since the mid-2000s and as part of a socio-economic reconstruction effort, the DRC instituted significant structural reforms to the health sector. While some progress has been made, for example, in expanded geographic coverage at primary health centers, health care and service delivery systems continue to be fragmented and fragile. Additionally, the quality of health system infrastructure and equipment continues to hinder effective access and availability since 2014, less than 30% of health facilities are operational.<sup>84</sup>

Impacts on water quality, water resources, sanitation and drainage, and vector-borne diseases are all areas for concern. These impacts require not only continued investment and focus on climate sensitive health issues, but also full integration of climate change into the DRC's efforts at strengthening and expanding its healthcare services. Climate vulnerability and risk assessments on human health could help inform priority areas for investments, including those related to health monitoring, epidemiological tracking of risks and surveillance. building the capacity of health care will be instrumental in properly identifying diseases as they emerge.<sup>85</sup>

<sup>82</sup> WBG Climate Change Knowledge Portal (CCKP, 2020). DRC Health Sector Dashboard. URL: <https://climatedata.worldbank.org/CRMePortal/web/health/systems-and-service?country=COD&period=2080-2099>

<sup>83</sup> WBG Climate Change Knowledge Portal (CCKP, 2020). DRC Health Sector. URL: <https://climatedata.worldbank.org/CRMePortal/web/health/systems-and-service?country=COD&period=2080-2099>

<sup>84</sup> World Bank (2014). Investing in Universal Health Coverage – Opportunities and challenges for health financing in the DRC. URL: <http://documents.worldbank.org/curated/en/782781468196751651/pdf/103444-WP-P147553-PUBLIC-Health-PER-Investing-in-Universal-Health-1608488.pdf>

<sup>85</sup> Democratic Republic of the Congo (2009). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>

## Institutional Framework for Adaptation

The Government of the DRC continues to develop policies and institutional strategies to improve its climate change adaptation efforts and support its overall development agenda. The country is also focusing on decentralization, with the Sustainable Development Directorate within the Ministry of Environment, Nature Conservation and Tourism becoming responsible for all climate change adaptation efforts in the early 2000s. The Directorate aims to implement the recommendations and resolutions of the World Commission on Sustainable Development and the COP to the Conventions of Biodiversity, Climate Change and Desertification. These efforts are also reflected in the country's second update to the Growth and Poverty Reduction Strategy Paper (2011–2015).<sup>86</sup> Identified policy efforts include the protection of the environment and addressing impacts of climate change, along with strengthening governance and stability; diversifying the economy, accelerating growth and promoting employment; and improving access to basic social services and strengthening human capital. The Environment Protection Law (2011) promotes mainstreaming of environmental and sustainable development issues into all policies, plans and programs across all relevant sectors, and includes an obligation to adopt and implement national measures for climate change mitigation and adaptation and disaster management. However, to date, progress has been limited and the DRC's ability to engage with the development process and implement laws over the medium term has often been challenged by instability, uprising conflict, weak institutions and extreme poverty.<sup>87</sup>

## Policy Framework for Adaptation

The DRC ratified the UNFCCC in 1995 and the Kyoto Protocol in 2005. It submitted its Third National Communication to the UNFCCC in 2015 and its Nationally-Determined Contributions in 2016. The country ratified the Paris Agreement in late 2017 and is in the process of developing its Nationally Appropriate Mitigation Action. The country's National Adaptation Plan was finalized in 2006. The DRC's climate change adaptation strategies focus on the preparation and strengthening of both institutions and institutional frameworks, improving responsible environmental management and adaptation efforts. In line with the country's development efforts, adaptation strategies are also being developed and implemented to address vulnerabilities which will be exacerbated by climate change, and to continue efforts to strengthen the country's social and economic structures against vulnerability.<sup>88</sup>

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<sup>86</sup> Ministry of Environment, Nature Conservation and Tourism (2016). DRC – Nationally-Determined Contribution. URL: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Democratic%20Republic%20of%20the%20Congo%20First/CPDN%20-%20R%C3%A9p%20D%C3%A9m%20du%20Congo.pdf>

<sup>87</sup> LSE Grantham Institute (2019). DRC – Overview, Approach to Climate Change. URL: <http://www.lse.ac.uk/GranthamInstitute/country-profiles/democratic-republic-of-congo/>

<sup>88</sup> Ministry of Environment, Nature Conservation and Tourism (2016). DRC – Nationally-Determined Contribution. URL: <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Democratic%20Republic%20of%20the%20Congo%20First/CPDN%20-%20R%C3%A9p%20D%C3%A9m%20du%20Congo.pdf>



## National Frameworks and Plans

- [Climate Change Profile](#) (2018)
- [Nationally Determined Contributions](#) (2016)
- [Third National Communication](#) (2015), French
- [Law on the Protection of Nature](#) (2014), French
- [Electricity Sector Law](#) (2014)
- [Poverty Reduction Strategy Paper](#) (2013)
- [Second National Communication](#) (2009)
- [National Adaptation Program of Action](#) (2006), French
- [First National Communication](#) (2000), French

## Recommendations

### Research Gaps

- Gain a better understanding of the timing and magnitude of incidence of several important indicators of climate change in the future, as well as the key vulnerabilities, developmental impacts, and possible adaptation responses
- Improve, support and reinforce the teaching of meteorology, climatology and general hydrology in the higher education and university channels of natural sciences
- Implement national Quality Assurance programs for current and/or future industrial processes in the country
- Strengthen environmental monitoring capabilities for strengthened and more effective environmental management
- Rehabilitate the network for collecting meteorological, climatological and hydrological data throughout the national territory<sup>89</sup>

### Data and Information Gaps

- Improve technical capacity to analyze hydro-met data and project impacts across sectors; specifically, regarding health and natural disaster events
- Establish institutional capacity for providing timely early warning systems to farmers for improved decision making and understanding seasonal variability for key agricultural zones.
- Increase understanding of water resource threats and groundwater risks to improve long term management and improve water use efficiency in agriculture and urban management
- Improve regulation and enforcement to protect forests, rainforests and protected areas
- Improve data collection and analysis on forest loss and land degradation, in coordination with national REDD and REDD+ programs<sup>90</sup>

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<sup>89</sup> Democratic Republic of the Congo (2009). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>

<sup>90</sup> World Bank (2013). Deforestation Trends in the Congo Basin – Reconciling Economic Growth and Forest Protection. URL: <https://openknowledge.worldbank.org/bitstream/handle/10986/12477/9780821397428.pdf?sequence=1&isAllowed=y>

## Institutional Gaps

- Improve the structure and adoption of the National Environment Act, which should be reinforced through the National Climate Change Committee and Sustainable Development Directorate<sup>91</sup>
- Integrate climate change concerns into relevant policies and planning processes at the state and national levels
- Finalize and adopt the framework bill on the environment as well as outstanding nature conservation bills
- Finalize regulations to fund and implement impact studies regarding climate change impacts for the country and key sectors<sup>92</sup>

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<sup>91</sup> Democratic Republic of the Congo (2009). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>

<sup>92</sup> Democratic Republic of the Congo (2009). Second National Communication to the UNFCCC. URL: <https://unfccc.int/sites/default/files/resource/Executive%20Summary.pdf>

# CLIMATE RISK COUNTRY PROFILE

## CONGO, DEMOCRATIC REPUBLIC



WORLD BANK GROUP