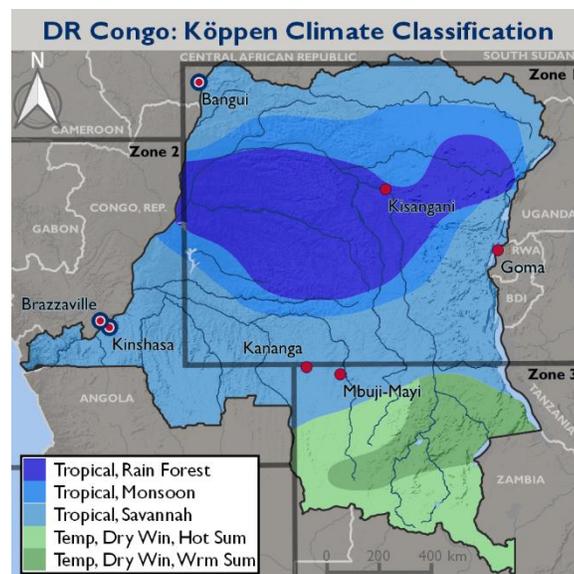


CLIMATE RISK PROFILE DEMOCRATIC REPUBLIC OF CONGO

OVERVIEW

The Democratic Republic of the Congo (DRC) is the largest country in Francophone Africa (spanning 2.3 million km²) and home to large swaths of arable land, vast quantities of natural resources and minerals, and critical habitats supporting rich biodiversity. Unfortunately, this abundance of resources has not translated into stability or wealth for the majority of people, as the country is currently characterized by significant social vulnerability, political instability, food insecurity and high poverty rates (64 percent). Climate variability and change are likely to exacerbate these concerns, particularly as the majority of agricultural production is rainfed (and provides livelihoods for the majority of the population), and climate-sensitive diseases like malaria are likely to expand into new areas. Increased temperatures and variable rainfall will also impact DRC's forests (important for livelihoods and ecosystem services), which are already under threat from land use change and growing demand for charcoal and tropical forest products. More extreme weather events like intense rainfall after prolonged dry spells lead to erosion and flash flooding, damage roads and infrastructure, wipe out crops and put additional lives at risk. For example, heavy rains in January 2018 caused severe flooding, landslides and silting in nine communes of Kinshasa, affecting more than 15,700 people and claiming 51 lives. (12, 13, 16, 17, 18, 20, 21, 24)



CLIMATE PROJECTIONS



1–2.5°C increase in temperatures by 2050 across the region



Increased variability in precipitation



Increased risk of floods and droughts

KEY CLIMATE IMPACTS

Water Resources & Energy

Reduced water availability and quality
Increased hydropower production in some seasons; reduced production in others



Agriculture

Reduced crop yields
Increased risk of pests and diseases
Increased risk of food insecurity



Ecosystems

Shift in range of species
Loss of habitat and biodiversity
Loss of tourism revenue



Health

Reduced water quality
Spread of vector- and waterborne diseases
Heat stress



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CLIMATE SUMMARY

DRC's vast territory, including inland lakes, mountains, grassland savanna, and tropical and highland forests, spans multiple climate classifications that can be grouped into three zones (also see map above):

	Landscapes and Rainy Seasons	Temperatures
Zone 1: <i>North & South Kivu, Ituri, northern portions of Kasai, Central Kasai and Tanganyika</i>	Tropical rainforests along the Congo River and its tributaries characterized by two rainy seasons (March–May and September–December), followed by two short dry seasons (June–August and January–February)	Averages range from 24–25°C; limited variability throughout the year
Zone 2: <i>Kinshasa, southern Kasai and southwestern Kasai Central</i>	Mountainous terraces and dense grasslands with predominantly tropical wet and dry climates and a dedicated rainy season (July–August)	Averages range from 24–25°C; limited variability throughout the year
Zone 3: <i>Southeastern Kasai Central, Kasai Oriental, Haut Katanga and southern Tanganyika</i>	Subtropical climates of savannas in the south and southeast with a single rainy season occurring between December–February	Slightly lower but consistent temperatures range from 22–23°C

HISTORICAL CLIMATE

Observations since the 1960s indicate:

- Increased temperature extremes; warmest day of the year increased by about 0.25°C per decade.
- Increased frequency of intense rainfall events.
- Increased temperatures of deep waters in Lake Tanganyika by 0.2–0.7°C.

FUTURE CLIMATE

Projected* changes include:

- Temperature increase of 1–2.5°C by 2050 and of 3°C by 2100.
- A rise in minimum temperatures that will exceed the rise in maximum temperatures.
- Continued increased frequency of intense rainfall events and prolonged dry spells.
- Possible decreases in dry season rainfall (June–August and September–November) in the southern region of the country by 2050.

*Meteorological observations across DRC are scarce, providing limited information on future rainfall levels. Some models project significant decreases in rainfall while others project increases. Nevertheless, although the annual total precipitation amounts might not change dramatically, rainfall is projected to become substantially more variable. (2, 3, 4, 6, 17)

SECTOR IMPACTS AND VULNERABILITIES

WATER RESOURCES

The Congo River has the largest discharge volume of any river in Africa and 62 percent of the Congo Basin lies within DRC. Most of the population depends on groundwater and springs located in dense forests and equatorial forests for drinking water. Almost 47 percent of DRC's internal renewable water resources consist of groundwater (typically exploited by communities via dug wells). The reliability of existing and potential irrigation schemes (although currently limited) may be affected given climate impacts on the hydrological system, especially in savanna zones. In addition to affecting water supply, more intense and frequent rainfall can increase the risk of flooding in rivers, streams and drainage ditches, which in turn impacts

Climate Stressors and Climate Risks WATER RESOURCES AND ENERGY	
Stressors	Risks
Rising temperatures	Increased sedimentation; reduced surface water quality
Increased frequency of intense rainfall	Reduced water quantity and quality in shallow wells and springs due to increased rates of evaporation
Decreased dry season rainfall	Increased damage to water infrastructure

water quality, especially in urban areas where open sewage, rubbish and the activities of local enterprises (e.g., farms, sand and gravel quarries) periodically contaminate water sources. (1, 2, 3, 6, 15, 22, 25)

AGRICULTURE

Agriculture is a central engine of DRC's economy and the primary source of livelihood for most Congolese, accounting for 40 percent of the national gross domestic product (GDP) and employing 70 percent of the country's population. With only about 10 million of approximately 80 million hectares of arable land under cultivation (mostly in the plateaus of Katanga region), DRC has the potential to become Africa's breadbasket. Promoting agricultural development is the cornerstone of the country's national economic development plan. However, climate variability and change may impact this goal, as DRC's agricultural activities (which combine farming, hunting/gathering/fishing and small animal husbandry) are mainly rainfed and subsistence in nature. In general, increased rainfall intensity damages crops and erodes fertile soil, which can lead to an intensification of crop diseases. Prolonged dry spells and rising temperatures stress plants and reduce yields, putting pressure on farmers to expand their cropland into forests. Climate variability and change may displace key activity seasons, impacting productivity and altering farmers' crop selection and production and processing practices. For example, compared to potatoes, which have high tolerance to a range of

ECOSYSTEMS

Forests are a valuable natural resource for DRC, not only for the products extracted (timber, charcoal, palm oil), but also as habitat for wildlife that draw tourists, and for the services they provide (carbon sinks, erosion control, water filtering and flow regulation). DRC's forests are part of the greater Congo Basin, which makes up 18 percent of the world's tropical forests. Deforestation within the Congo Basin has been linked to drying over the basin itself and changes in precipitation over the Sahel, Ethiopian highlands and Guinean coast. Climate change will have a range of impacts on forest ecosystems. When considering solely climatic conditions (i.e., excluding population growth, land use change and deforestation), models suggest a north- and southward expansion of tropical evergreen forests, an eastern shift in seasonal forest through the end of the 21st century, and a decline in grassland in the northeast. Climate change could also put at risk wildlife such as critically endangered mountain gorillas in Virunga National Park. While in theory protected areas safeguard these species from expanding development, climate change could

Climate Stressors and Climate Risks AGRICULTURE	
Stressors	Risks
Rising temperatures	Changes in soil fertility and crop yield: potential increases in selected crops (e.g., maize in Bandundu and Kasai-Occidental); reductions or failure/loss in others
More variable rainfall	Increased pests/pathogens, such as cassava mosaic, leaf rust, coffee rust, berry borer, potato taste defect and brown rot disease
Prolonged dry spells	Increased postharvest losses; spoilage of animal products
Increased extreme weather and floods	Shifts in timing of planting/harvesting
	Increased food insecurity and/or hunger
	Damage to road networks (decreasing access to markets)

weather conditions, pests and diseases, dry bean production is more sensitive to heat stress, and farmers have low capacity to address climate-sensitive diseases like bean root rot. In contrast, rice yields in the Kivus could increase. Rising temperatures will also alter pest and pathogen dynamics, particularly for diseases such as cassava mosaic virus and coffee rust, which have damaged crops in past years. (4, 5, 9, 17, 19)

Climate Stressors and Climate Risks ECOSYSTEMS	
Stressors	Risks
Rising temperatures	Potential for increased vegetative cover in some areas and change in forest species composition
Prolonged dry spells	Decrease in biodiversity as more climate-sensitive plant species fail to adapt
Increased extreme weather events	Loss/shift of habitats outside of protected areas, putting endangered species and wildlife in possible conflict with human settlements

put additional pressure on such parks, by both altering ecosystem dynamics and encouraging human encroachment into these areas. More specifically, the climate impacts described above may physically shrink the habitats that currently have protected status or shift the distribution of plant species upon which endangered species depend to areas outside of protection. This could put both humans and wildlife at risk from disease transmission and negatively impact local livelihoods dependent on tourism revenue. (2, 11, 18)

HUMAN HEALTH

Malaria is a leading cause of morbidity and mortality in DRC. Given the impact of rising temperatures and increased humidity on the lifecycle and habitat of malaria-carrying mosquito and parasite species, the temporal and geographic range of malarial zones may increase. Analysis suggests that by 2030 an additional 65,000–80,000 people in DRC will be at risk from endemic malaria (10–12 months of transmission suitability) in areas previously unsuitable for malaria transmission, mainly in the southwest (Kwango Province) and pockets of the east (Kivu Provinces). However, in central and northwest areas of DRC (e.g., Equateur, Mai Ndombe, Sankuru, Maniema), the season for malaria transmission is likely to be shorter (7–9 months compared to the current 10–12 months). Increases in temperature and episodes of more intense rainfall are also likely to impact the spread of waterborne diseases and emerging infectious diseases. Most people do not have access to safe drinking water and sanitation, and diarrheal diseases represent a significant public health burden in DRC. High air temperatures and periods of excessive rainfall create conditions that favor growth and

ENERGY

The abundance of surface water resources and the likely increase in precipitation make hydropower a promising source of much-needed electricity for DRC – potentially increasing capacity to an estimated 100,000 MW (current installed capacity from all sources is 2,677 MW). However, the changing characteristics of annual and seasonal precipitation in the region will alter surface flows and may affect the stability of hydropower production.

POLICY CONTEXT

INSTITUTIONAL FRAMEWORK

DRC’s recent efforts toward further decentralization may result in uncertainty regarding mandates for implementing climate change policies, especially at the provincial level. At the time of this writing, the Sustainable Development Directorate within the Ministry of Environment, Nature Conservation and Tourism is the lead agency responsible for climate change adaptation efforts. The country is a member of the Central African Forest Commission (COMIFAC), a treaty organization established to harmonize regional policies on forestry and biodiversity conservation.

Climate Stressors and Climate Risks HUMAN HEALTH	
Stressors	Risks
Rising temperatures Increased frequency of intense rainfall	Expanded ranges of disease vectors (e.g., mosquitos) to higher elevations and increased transmission of vector-borne diseases like malaria and Monkeypox virus
	Increased incidence of diarrheal diseases (particularly cholera)

spread of bacteria, such as *Vibrio cholerae* (cholera). For example, following intense rains and flooding events in January 2018, the number of cases of cholera increased from less than 5 to more than 100 reported weekly in Kinshasa. Increased forest clearing (which brings humans into contact with infected wildlife) and climate are 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 DRC. (7, 8, 14, 23, 25, 27, 28, 29)

Climate Stressors and Climate Risks ENERGY	
Stressors	Risks
Rising temperatures Increased rainfall variability	Possible increased hydroelectricity production potential but also greater unreliability

NATIONAL STRATEGIES AND PLANS

DRC ratified the Paris Agreement in December 2017 and the government is developing a NAMA (Nationally Appropriate Mitigation Action) with support from the EU, UNDP, and German and Australian Assistance. DRC is a participant in the REDD+ program. (10)

- [National Adaptation Plan of Action](#) (2006)
- [Intended Nationally Determined Contribution](#) (2016)
- [Initial National Communication](#) (2000)
- [Second National Communication](#) (2009)
- [Third National Communication](#) (2015)

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- Map Source: Adapted from Peel, M.C. et al. 2007. [Updated world map of the Köppen-Geiger climate classification](#); data accessed from [SDAT](#).

SELECTED ONGOING EXPERIENCES

Diverse bilateral, multilateral, philanthropic and religious organizations work across the sectors mentioned above. The table below represents ongoing projects in natural resource management, agriculture production and value chains, food security and climate change adaptation.

Program	Amount	Donor	Year	Implementer
Activities under Phase III of the Central Africa Regional Program for the Environment , including: <ul style="list-style-type: none"> • Forest Resource Management • Garamba Chinko Protected Areas Project 		USAID	2012–2020	<ul style="list-style-type: none"> • US Forest Service • African Parks Network • Wildlife Conservation Society (WCS) • Conservation International • World Resources Institute (WRI) • World Wildlife Fund
Feed the Future Strengthening Kivu Value Chains Activity	\$23 million	USAID	2017–2020	Tetra Tech ARD
Strengthening Hydro-Meteorological and Climate Services	\$8 million	World Bank	2017–2022	
Forest Dependent Communities Support Project	\$6 million	World Bank	2016–2021	
Improved Forested Landscape Management Project	\$36 million	World Bank	2014–2020	
Finalization and Operationalization of the National Forest Monitoring System	\$10 million	FAO	2016–2020	FAO, Ministry of Environment, Conservation and Sustainable Development, JICA, OSFAC, WCS, WRI
Sustainable Management of Forests by Indigenous Peoples	\$8 million	World Bank	2016–2021	Network of Local Indigenous Peoples for the Sustainable Management of Forest Ecosystems (REPALEF), CARITAS Congo Asbl
Integrated REDD+ Programme for the Province of Sud Ubangi	\$202 million	World Bank	2017–2021	Ministry of Agriculture–Agriculture Rehabilitation and Recovery Support Project (PARRSA) Coordination Unit
EU-FAO Partnership to Develop Early Warning Action Against Food Crisis and Promote Resilience	€34 million	EU	2015–2019	FAO
Forest Law Enforcement, Governance and Trade (FLEGT) Facility	€33 million	EU	2010–2018	European Forest Institute