In recent years, the effects of climate change have been felt all over the world: from the floods in Pakistan and Nigeria to the heatwaves in India, the US and Europe. Although the effects may appear to be universal, the implications for life and livelihoods vary greatly between regions. In view of these effects, how are African countries faring? How is climate change impacting people’s lives and livelihoods?

According to the Intergovernmental Panel on Climate Change (IPCC) report on climate impacts, adaptation and vulnerabilities, the African continent, despite its status as one of the lowest contributors to greenhouse gas emissions, is already experiencing widespread losses and damages due to human-induced climate change. Indeed, as the African Union points out in its Climate Change and Resilient Development Strategy and Action Plan (2022-2032), the continent is one of the most vulnerable regions to climate change. This vulnerability stems from several factors such as high dependence on rain-fed agriculture, inequitable access to financial resources and weak adaptive capacity, among others.

These risks and vulnerabilities are underscored in the Notre Dame Global Adaptation Initiative (ND-GAIN Index), which shows that 9 out of the 10 countries most vulnerable and least resilient to climate change are located in Africa. The countries include Chad, the Central African Republic, Guinea-Bissau, Eritrea, the Democratic Republic of Congo, Sudan, Niger, Zimbabwe and Liberia. The question, however, is: how do vulnerability and lack of resilience play out in the day-to-day lives of these populations? Which sectors are most affected and in most urgent need of local, national
and global action? This knowledge is at the core of ensuring relevant, effective and sustained climate action. To this purpose, APRI has developed an interactive map that displays the effects of climate change on key sectors with immediate and direct impacts on lives and livelihoods in the 9 countries.

The information contained in the map has been compiled from Nationally Determined Contributions, Biennial Update Reports, National Adaptation Plans, National Communications and climate change or sector-specific reports by international organizations such as the African Development Bank, the World Bank, the United Nations Environment Programme, the International Renewable Energy Agency, the Food and Agriculture Organization of the United Nations and the United Nations Development Programme, among others. The compiled data indicates the state of affairs between 2010 and 2022, unless otherwise indicated on the map. Additional information on the specific data sources for each country is available on the `Reference` cards in the map.
CHAD
Variability in precipitation

Rising temperatures

AGRICULTURE

45% national GDP

Climate change impacts

Reduced agricultural season, decrease in agricultural yield
Lower yields of food crops: millet, sorghum and maize
Shrinking production area for cash crops (e.g. cotton)
Extension of distribution area of crop pests
Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Groundwater pollution

- Dried-up wells and boreholes
- Reduction in surface water and groundwater table
### Forestry

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Change</th>
<th>Lost</th>
</tr>
</thead>
<tbody>
<tr>
<td>63%</td>
<td>1.5 Mha</td>
<td>50%</td>
</tr>
</tbody>
</table>

**Territory** is a desert, and there is a decrease in forest cover (2001-2016). Forest and bush fires are more common.

**Climate change impacts**

- **Rising temperatures**
- **Variability in precipitation**

- Increased dieback of woody plants and soil cracking in Sahelian zone
- Reduction in number of large trees in Sudanian zone
- Disappearance of plant species, especially aquatic ones
- Increased risk of forest and bush fires
Energy consumption from wood and charcoal: >90%

Total exports from petroleum: 92%

Population has access to electricity: 11%

Climate change impacts:
- Rising temperatures
- Variability in precipitation
- Floods

Damaged transport infrastructure (essential for trade): degraded roads and bridges

Shortage of biomass for energy production
Climate change impacts

Higher morbidity and mortality from tropical and water-related diseases
Increase in number of meningitis cases and advance of its seasonal onset
Increase in risk of malnutrition and food insecurity
Loss of spawning areas in floodplains and marshes of Lake Chad
Salinization of surface waters + loss of oxygen saturation: most fish species endangered and many lost
Production shortage and reduction in economic gains for fishers

FISHERIES

3% GDP from fisheries

108 suitable for exploitation out of 136 freshwater species

35% production from Lake Chad

Climate change impacts

Rising temperatures
Variability in precipitation

Loss of spawning areas in floodplains and marshes of Lake Chad
Salinization of surface waters + loss of oxygen saturation: most fish species endangered and many lost
Production shortage and reduction in economic gains for fishers
REFERENCES (I)

- German Federal Ministry for Economic Cooperation and Development (BMZ), Potsdam Institute for Climate Impact Research (PIK), Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and KfW Development Bank, (2021). Climate Risk Profile: Chad.
REFERENCES (II)

CENTRAL AFRICAN REPUBLIC
AGRICULTURE

50% national GDP
7,000 km² cultivated land
15 Mha suitable land
72% population employed

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

- Altered pest and pathogen existence
- Inability to store perishable products
- Increased erosion and waterlogging in agricultural areas
WATER

5% in access to drinking water (2015-2020)

63% population lacks access to safe water

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Loss in surface water and strain on pumping mechanisms

Altered groundwater recharge and poor water quality
forests used as energy resources
45% territory covered by forest
40-50% of exports from commercial forestry

Climate change impacts
- Rising temperatures
- Variability in precipitation

Shrinkage of protected habitats
Endangered species at risk of conflict with human settlements
Extinction of heat-sensitive species
Reduced means of livelihood for people in rural areas
**ENERGY**

- **88%** electricity generated from hydropower
- **90%** energy sourced through wood
- **15%** population has access to electricity

**Climate change impacts**

- Variability in precipitation
- Floods

- Disrupted river flows, hindered power generation
- Damaged infrastructure, higher investment costs
- Impaired access to energy for households and productive uses
Children under 5 experience stunting:

- 40% children under 5 experience stunting

Health impacts:

- 130 deaths out of 1,000 children under 5

Climate change impacts:

- Rising temperatures
- Variability in precipitation
- Floods

Increase in epidemics due to transference into new areas:

- Increase in waterborne diseases and emerging infectious diseases

Further breakdown in food systems, increase in food insecurity


AGRICULTURE

- 58% territory suitable for agricultural use
- > 80% population employed
- 90% total export revenue from cashews

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Flooding & waterlogging
- Sea level rise & salinization

Permanent loss of land (sea encroachment, flooding and soil salinization)

Lower yields in key commodities such as peanuts and rice

Disrupted food supply and reduced incomes
WATER

- 69% population access to potable water
- 11 m³/s dry season flow in Corubal River main surface water source
- 175 km upriver saltwater intrusion

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Sea level rise

- Decrease in surface waterbodies
- Decrease in the water table
- Lack of water for pastures, conflicts between pastoralists and farmers
- Deterioration in water quality: saline infiltration into aquifers and infestation by waterborne plants
Higher deforestation rate, higher incidence of forest fires
Increased erosion due to deforestation in mangrove forest (first-line defense against erosion and flooding)
Altered composition of forest species, extinction

Forestry

- > 70% territory covered by forest
- 3% global mangrove territory
- ↓ 32% in mangrove forest cover since 1940

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Sea level rise
ENERGY

83% 
energy supply from bioenergy (2019)

90% 
energy consumption from biomass resources

33% 
population has access to electricity

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Sea level rise

Biomass scarcity and poor reproductive capacity of floristic species

Lower availability of resources for energy generation
Malaria cases out of 1,000 population at risk: 89

Undernourished out of 10 people: 2

Climate change impacts:
- Rising temperatures
- Variability in precipitation

Changes to habitat range for vector-borne diseases such as malaria and dengue fever

Increase in food insecurity
Endangered mangrove ecosystems, critical breeding grounds for replenishing fish stocks of both Senegal and Guinea-Bissau
Hypersalinated estuaries, decrease in fish production
Migration and extinction of species
REFERENCES (I)

- Food and Agriculture Organization of the United Nations (FAO), International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and International Center for Tropical Agriculture (CIAT), (2019). Climate-Smart Agriculture in Guinea-Bissau.


REFERENCES (III)


Agriculture

- 95% agriculture rain-fed
- 20% agricultural GDP from livestock
- < 25% food needs met when rainfall low

Climate change impacts
- Rising temperatures
- Variability in precipitation
- Reduced size of land suitable for sorghum (most important cereal)
- Lower productivity of crops and livestock
- Loss of biological diversity due to lack of water
- Exacerbated pests and diseases

Impact of Ukraine War
- 100% dependent on wheat imports from Russia and Ukraine (2021)
WATER

- 60% of wells are contaminated
- 85% of population depends on groundwater
- 71% of population access to safe drinking water

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods
- Sea level rise

Shortage of water supply and lower water quality
Damaged drainage infrastructure and wastewater treatment facilities
Increased groundwater salinity
Exacerbated conflict for water between pastoralists and cultivators
Submergence and displacement of mangroves in inter-tidal areas

Shortage of biomass for house construction, gum Arabic and wild medicine

Loss of income from forest products
Energy

- 71% energy supply from bioenergy (2019)
- 80% household energy needs from biomass resources
- 52% population has access to electricity

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Damages to electric power lines
Shortage of biomass for energy production
HEALTH

50% children experience stunting in rural areas

480 maternal mortality ratio per 100,000 live births

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Changes in prevalence and distribution of malaria
Increase in malnutrition and incidence of vector-borne diseases
Increase in bacterial reproduction in water sources
FISHERIES

3% national GDP from fisheries

250 fish species out of 1,000 commercially important

15% fishery potential achieved

Climate change impacts

- Rising sea surface temperatures
- Sea level rise & salinization

Toxic algal blooms (such as red tide) in the Red Sea: chronic and lethal impacts for shellfish population

Increase in coral bleaching and mortality: threatened coral reef ecosystem


REFERENCES (II)

DEMOCRATIC REPUBLIC OF CONGO
AGRICULTURE

- 40% national GDP
- 10 Mha cultivated
- 80 Mha arable
- 70% population employed

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

- Reduced yields and damaged crops
- Lower quality of staple crops and eroded fertile soils
- Loss of livestock
- Lower access to markets
WATER

62% Congo Basin in the DRC
12,000 km network navigable water
54% population lack access to safe water

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Significant drought severity, lower infiltration and recharge rates
Pressure on water resources and strain on pumping mechanisms
Lower water quality and availability
Increased risk of flooding in rivers, disrupted transportation
**FORESTRY**

- **59%**
  - territory is tropical rainforest

- **2nd highest**
  - deforestation in the world (2020)

- **8%**
  - global forest carbon stored in DRC

**Climate change impacts**

- Altered composition of forest species
- Biodiversity loss
- Shift/loss of habitats in protected areas (Virunga)
- Endangered species and wildlife at risk, increased contact with humans

**DEFORESTATION IN CONGO BASIN**

- Potential drying over the basin
- Changes in rainfall over Sahel, Ethiopian highlands and Guinean coast
ENERGY

98% generated power from hydropower

19% electrification access rate

95% energy needs from biomass sources

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Damaged infrastructure, roads and communication networks
Disrupted river flows, lower hydro-power generation
Increasing demand for cooling
HEALTH

3x malaria cases in malaria-prone areas by 2050

65,000-80,000 additional people will be at risk from endemic malaria

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

- Damaged sanitation infrastructure
- Increase in waterborne and diarrheal diseases and heat-related deaths
- Lower agricultural production, increased food insecurity
- Displaced communities
SUDAN
AGRICULTURE

Climate change impacts

Rising temperatures
Variability in precipitation

Intensification of desertification of arable areas
Shift southward of humid agro climatic zones
Vast arable lands increasingly unsuitable
Decline in crop yield

DESERTIFICATION
Shift of the boundary between semi-desert and desert since 1930s
≈ 50-200 km southwards
WATER

- 73% annual fresh water from the Nile
- > 80% water dependency on its neighbours
- ↓ 20-30% in water flow of the Nile in 40 years

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods
- Sea level rise

- Reduced groundwater recharge, salinization of coastal aquifers
- Limited access to safe drinking water, water crisis
- 40% decrease in water storage from 2030 onwards
- Acidification of water resources due to air pollution
FORESTRY

- 36% territory is forests and rangeland areas
- 68% forest and woodland areas lost in secession
- 2.4% annual deforestation rate

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Extreme storms

Increase in forest fires

- Prevalence of pests and invasive species, plant and tree diseases
- Gum Arabic belt (key livelihood source for forest-based communities): shift southward and limited productivity
Climate change impacts

- Rising temperatures
- Variability in precipitation
- Storms and floods
- Sea level rise

Shorter lifespan of roadways and increase in cost of maintenance

Reduced water availability for hydropower generation

Port Sudan (major trading port): damaged infrastructure
HEALTH

38% children under 5 experience stunting

73.4 malaria cases per 1,000 population at risk

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Changes in prevalence of malaria and meningitis
Increase in malnutrition and stunting
Increase in incidence of water-borne diseases
FISHERIES

55% inland fisheries lost after secession

$5.3 M imports of fish products (2017)

60% total production is coral reef fish

Climate change impacts

Rising sea surface temperatures

Sea level rise & salinization

Loss of habitat and breeding grounds: mangroves and coral reefs
Decrease in fish populations and biodiversity due to reduced river flow and drying of wetlands
REFERENCES

NIGER
AGRICULTURE

39% national GDP

> 15M cattle, one of the largest populations in Sahel region

80% population employed

Climate change impacts

Rising temperatures

Variability in precipitation

Floods

Reduction in duration of agricultural season

Exacerbation of crop pests (e.g. millet head miner moth) and diseases

Reduction/loss of agricultural production and stunted plant growth

Loss of livestock
Variability in precipitation
Rising temperatures
Floods

96% surface water from Niger River and affluents
> 90% drinking water from groundwater
50% territory in physiological catchment of Niger River

Climate change impacts

Rising temperatures
Variability in precipitation
Floods

Lower flow of Niger River at Niamey
Reduction of groundwater recharge
Increased risk of silting
Lower water quality
FORESTRY

74% territory covered by Sahara desert

200,000 ha in forest cover every year

> 50% main forest cover lost (1990-2010)

Climate change impacts

Rising temperatures

Variability in precipitation

Loss of forest species
Lower productivity of the forest potential
Decrease in natural regeneration

DRIVERS OF FOREST REGRESSION

Demographic pressure
Wind & water erosion
Loss of livelihoods
ENERGY

- > 90% households use wood for cooking
- > 75% national electricity needs from imports
- 13% population has access to electricity

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Shortage of biomass for energy production
Degraded infrastructure in road transportation (key for Niger):
  - cracks in roads, bridges and protective structures
Higher maintenance and replacement costs for infrastructure
Increase in exposure to vector-borne diseases (e.g. malaria, dengue fever)

- ≈ 77% increase in meningitis cases by 2050
- ≈ 10% increase in measles cases by 2050

Increase in food insecurity
REFERENCES (I)

REFERENCES (II)

ZIMBABWE
AGRICULTURE

80% production is rain-fed
42% total land area
67% total employment

Climate change impacts

- Rising temperatures
- Variability in precipitation

Suitable production areas will shrink
Decreased agricultural yields
Lower livestock production

MAIZE
- Staple food
- One of the most climate-vulnerable
- Decrease in production
- Total replacement costs $88M/year
WATER

90% from surface water resources

149 dams account for 80% allocated water to storage

+8,000 dams total

Climate change impacts

- Rising temperatures
- Variability in precipitation

Limited runoff, lower groundwater recharge

Higher costs for water treatment and wastewater management

Increased demand, diminished water availability
Forestry

- 4.1% of total GDP from forest rents (2016)
- 6.5 Mha in forest cover (1990-2010)
- > 1 Mha lost due to wildfires per year

Climate change impacts
- Rising temperatures
- Variability in precipitation

- More frequent and intense wildfires
- Modified species composition of ecosystems
- Smaller extension of forest ecosystems

Drivers of deforestation
- Expansion of agricultural land
- Overharvesting of fuel wood
- Encroachment of human and industrial settlements
ENERGY

- 59% from hydropower (Lake Kariba)
- 39% from coal power plants: Hwange, Munyati, Harare & Bulawayo
- 68% households use wood for cooking

Climate change impacts:
- Rising temperatures
- Variability in precipitation
- Extreme weather events

Reduced river runoff
Limited hydropower generation
Damaged energy infrastructures
Higher demand for cooling
HEALTH

Increase in food insecurity and stunting
Increase in vector-borne diseases: malaria, dengue and yellow fever
Increase in water-borne diseases: diarrhoea and typhoid fever
Altered geographic distribution of malaria

Rising temperatures
Variability in precipitation
Floods

462 maternal mortality ratio/100K live births
98 malaria cases out of 1,000 population at risk
29% children under 5 are stunted
REFERENCES (I)

REFERENCES (II)

LIBERIA
AGRICULTURE

40% food crops lost per year, pests and lack of storage

80% is subsistence farming, rain-fed

85% cultivated land is rice, cassava and vegetables

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Exacerbated pests and diseases
Cacao and coffee (major exports) under pressure
Depleted nutrient-rich topsoil and reduction in arable land area
Damaged rubber production
70% population has access to improved water sources

≈0.7–25% in runoff in the St. Paul River Basin by the 2020s

Climate change impacts

- Rising temperatures
- Variability in precipitation
- Floods

Lower water levels, degraded water quality due to contamination

Damaged water infrastructure

Overwhelmed water treatment plants

Higher costs for water purification to supply potable water
The energy sector faces significant challenges due to climate change impacts.

**Energy Supply from Bioenergy (2019):** 86%

**Population Relies on Biomass for Energy Needs:** 95%

**Population Has Access to Electricity:** 28%

**Climate Change Impacts:**
- Rising temperatures
- Floods
- Sea level rise

**Damaged Infrastructure in Power Stations and Transmissions**

**Limited Access to Biomass Fuel Sources**

**Altered Timing and Size of Peak Electricity Demands for Cooling Needs**

**Lower Water Availability for Hydropower Generation**
Cause of death for children < 5 is malaria.

Climate change impacts:
- Increase in incidence of vector and waterborne diseases
- Lower yields of subsistence crops (rice and maize)
- Higher food insecurity due to weak infrastructure
- Expansion of the dengue fever from neighbouring Côte d'Ivoire

73% of food needs are imported.

2 food insecure out of 10 households.

#1 cause of death for children < 5 is malaria.
3.2% of GDP from fisheries

65% of animal protein needs of the country come from fish

Climate change impacts

- Rising sea surface temperatures
- Sea level rise
- Extreme weather events
- Variability in precipitation

Endangered mangrove ecosystems, critical breeding grounds for fish

Reduced biodiversity and fish stocks due to death, diminished reproductive cycles and migration to cooler waters
REFERENCES

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