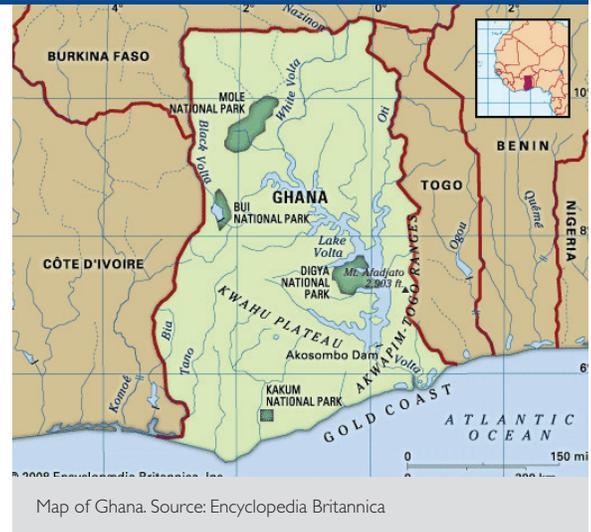




# Climate Change Adaptation in GHANA

Ghana has experienced severe droughts and floods in the last two decades, some of which have had severe economic and social implications. The projected impacts of climate change are likely to add to the human and economic toll of floods and drought, resulting in significant consequences for key development areas such as food security, water resources management, health, and economic growth. In recognition of the increasing climate-related challenges, the Government of Ghana and the donor community have begun to determine vulnerability and adaptation priorities, and to integrate this knowledge into development and sectoral planning. A number of government adaptation priorities remain in the early stages or unaddressed, including mainstreaming adaptation into sector-specific and local-level planning, strengthening the capacity of the national climate information center, and expanding investment in early warning systems to better target adaptation efforts, as well as a number of sector-specific measures.



Map of Ghana. Source: Encyclopedia Britannica

## CLIMATE IMPACTS AND VULNERABILITY

### Historic Weather and Climate

- Observations indicate that average annual temperatures have risen 1.0°C since 1960, an average rate of 0.21°C per decade.
- Overall precipitation in Ghana decreased by 2.4 percent per decade between 1960-2006.
- Ghana experiences periodic extreme events such as rainstorms, floods, and droughts.
- Sea level has risen 2.1 mm per year at the Port of Takoradi over the last 30 years.

### Projected Weather and Climate

While projections for Ghana vary across climate models depending on assumptions, the majority indicate:

- Average annual temperatures are predicted to increase by 1.0-3.0°C from the 1970-99 average by the 2060s.
- Projected changes in annual precipitation for the 2030s range from a decrease of 9 percent to an increase of 8 percent from the 1970-99 average.
- Rainfall is expected to exhibit greater variability, and a larger percentage of precipitation is anticipated to fall during heavy rainfall events.
- Droughts are anticipated to become more frequent and intense.
- Sea level may rise by 75-190 mm by 2100.

## KEY SECTOR VULNERABILITIES

### Food Security

The agriculture and livestock sectors underpin Ghana's food security and economy. Agriculture constitutes 33 percent of the country's gross domestic product, and serves as the source of livelihoods for over 50 percent of the population. The effects of climate change, with warmer temperatures and greater incidence of drought of particular concern, are likely to result in a range of direct and indirect impacts affecting the agriculture and livestock sectors, which in turn will have implications for food security. Studies suggest that by 2050, the length of the growing season in parts of West Africa may decline by 5 percent or more, which will affect the production and yields of crops such as maize, millet, sorghum, and rice. Greater incidence of temperature extremes may also increase stress on crops, as many crops such as maize are already grown close to their thermal tolerance limits. Non-climate stressors, such as desertification, land degradation, and erosion, are likely to exacerbate these climate impacts. Together, these climate and non-climate stressors increase the vulnerability of rural populations to poverty, and have social consequences such as changes in land tenure agreements, migration, and urban expansion. Adaptive measures to improve land management, such as conservation agricultural practices and the adoption of crop varieties with shorter growing times and greater drought tolerance, can help to mitigate these impacts.

## Water Resources

Water resources in Ghana are already affected by climate variability, and are highly vulnerable to climate change. Climate change impacts may lead to alterations in the quantity and quality of water available for human consumption, agriculture, industry, and hydropower. Temperature increases may decrease river runoff, and changes in precipitation may affect both runoff and groundwater recharge. Other potential impacts of climate change include lowered water tables, reduced stream flows, diminished availability of water in lakes and reservoirs, and salinization of estuaries and aquifers due to sea level rise. Non-climate stressors, such as pollution, inadequate infrastructure, increasing impervious surfaces, and poor water management, are expected to exacerbate these climate impacts. Adaptation measures such as greater investment in water harvesting strategies (e.g., storage of surface runoff in small reservoirs) may serve as important coping measures and help to mitigate the negative impacts of climate change.

## Health

Current climate variability affects health throughout Ghana and climate change is likely to impose new stresses, resulting in a number of direct and indirect impacts, which are summarized in the table below. It is estimated that more than half of the diseases in Ghana have a direct link to climate variability and exposure, and climate change may lead to higher infection rates of diseases such as malaria and meningitis. The sensitivity of different populations to climate change-related impacts on health may be exacerbated by poverty-related issues such as malnutrition and poor sanitation. In addition, the country's adaptive capacity, or its ability to anticipate, be prepared for, and respond to these impacts, may be constrained by factors such as inadequate health infrastructure and resources that result in limited access to health care as well as inaccessible and poorly equipped health facilities. An important part of responding to these challenges will be monitoring the non-climate factors affecting adaptive capacity such as poverty and the quality and accessibility of the health system.

## Potential Impacts of Climate Change on Health in Ghana

Impact Mode	Impacts	Consequences
Direct	<ul style="list-style-type: none"> <li>Exposure to thermal extremes, especially heat waves.</li> <li>Altered frequency and/or intensity of other extreme weather conditions (droughts, floods, storms, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>Altered rates of heat- and cold-related illness, especially cardiovascular and respiratory diseases.</li> <li>Deaths, injuries, and damage to public health infrastructure.</li> </ul>
Indirect (due to disturbances of ecological systems)	<ul style="list-style-type: none"> <li>Impacts on range and activity of mosquitoes and parasites.</li> <li>Altered local ecology of water- and food-borne infective agents.</li> <li>Altered food (especially crop) productivity due to changes in climate, weather, and associated pests and diseases.</li> <li>Shifts in the quantity, quality, and distribution of fresh water.</li> <li>Sea level rise with population displacement and damage to infrastructure.</li> <li>Extreme events such as floods and droughts, with population displacement and damage to infrastructure.</li> <li>Increased levels and biological impacts of air pollution, including pollens and spores.</li> <li>Social, economic, and demographic dislocations due</li> </ul>	<ul style="list-style-type: none"> <li>Change in the transmission zones of mosquito-borne diseases and the numbers of people affected.</li> <li>Changed incidences of diarrhea and infectious diseases.</li> <li>Regional malnutrition and hunger with consequent impairment of child growth and development especially in vulnerable communities.</li> <li>Injuries, increased risk of various infectious diseases (due to migration, overcrowding, contamination of drinking water).</li> <li>Asthma and allergic disorders, other acute and chronic respiratory disorders, and deaths.</li> <li>Wide range of consequences affecting public health (e.g. mental health, nutritional impairment, infectious diseases, civil strife).</li> </ul>

## KEY ECOSYSTEM VULNERABILITIES

### Forests

Forest ecosystems harbor rich biodiversity and provide resources and services that are critical for the health and livelihoods of the communities that depend on them as well as for the greater economy. Non-climate stressors affecting forests in Ghana include extensive harvest and use of fuelwood and charcoal; seasonal biomass clearings for farming, grazing, mining, and developing settlements; minimal reforestation of deforested lands; shorter fallow periods due to high population growth; and reductions in the stocking levels of timber in high forest areas. These factors have led to an annual decrease in forest cover of 2.0 percent from 1990-2010. Climate change and variability further aggravate the effects of these non-climate stressors. For instance, higher temperatures and increases in the incidence of severe droughts may make Ghana increasingly vulnerable to forest fires. Climatic shifts can also change the age/class distribution of trees and alter landscape patterns, with consequences for biodiversity.

### Coastal Zones

Ghana's coastal zone is of great economic significance. In addition to five major cities and a quarter of the population, the coastal zone hosts critical infrastructure, such as the ports at Tema and Takoradi, and economic activities, such as oil and gas exploration, cement production, and aluminum smelting. Coastal areas are already suffering from severe erosion due to both climate and non-climate stressors.

They are also subject to increasing population pressure and urbanization, and continued climate change may exacerbate existing stresses.

Projected sea level rise may contribute to further erosion along sandy shores and expose a number of coastal areas to storm surge, as natural barriers such as barrier islands disappear. Sea level rise may also increase the frequency of floods, and exacerbate storm surge and flooding caused by heavy rains, inundating low-lying coastal areas with implications for human settlements and infrastructure. A rise in sea level may also cause salinization of estuaries and aquifers, affecting the quantity and quality of water available. It also may impact salt production, coastal agriculture, fisheries, and lead to the loss of coastal wetlands. Changes in precipitation may alter the productivity of Ghana's coastal fisheries by affecting habitat availability and influencing population growth rate, while shifting wind patterns can affect coastal upwelling, which is vital for fishery productivity.

## NATIONAL STRATEGIES, PLANS AND INSTITUTIONS RELEVANT TO CLIMATE CHANGE

### National Strategies and Plans

- Initial National Communication (2001): Provides an inventory of greenhouse gas emissions, a vulnerability and adaptation assessment, a mitigation and abatement analysis, plans for education and public awareness, and potential adaptation and mitigation projects.
- National Climate Change Adaptation Strategy (NCCAS) (currently under preparation): Utilizes a participatory approach and incorporates sectoral vulnerability and adaptation assessments carried out by national experts to develop priority adaptation programs (see box at right).

### Institutional Framework

The Environmental Protection Agency (EPA) is an independent environmental regulatory agency within the Government of Ghana with the responsibility of ensuring Ghana's environmental quality through environmental regulation and enforcement, and mainstreaming environmental concerns within the development process at the national, regional, and district levels. The implementation of climate change adaptation projects and the mainstreaming of climate change adaptation throughout the government and private sector are carried out by the Ministry of Environment, Science, and Technology (MEST). MEST is currently in the process of finalizing the NCCAS, and will also establish a National Climate Change Committee, made up of 25 expert members from the planning community, academia, and research institutions. The committee will:

- Supervise the day-to-day management of the NCCAS
- Supervise programs and projects related to the fulfillment of the NCCAS
- Provide support for local capacity building and participation
- Approve projects and programs for funding
- Recommend impact evaluations.

## GOVERNMENT ADAPTATION PRIORITIES

NCCAS-related strategies for adaptation that are of particular relevance to initiatives of the United States Agency for International Development include:

- Build capacity of extension officers in new farming technologies to enhance their support to farmers.
- Promote within the agricultural sector alternative livelihoods skills to improve living standards.
- Promote the adoption of crop varieties and livestock breeds better adapted to changing climatic conditions.
- Strengthen land use planning laws and practices to encourage sustainable development and health outcomes in light of climate change threats.
- Improve environmental sanitation by strengthening institutions and enforcement of laws and bylaws.
- Improve existing waste management infrastructure and provide new and affordable technologies for environmental sanitation.
- Develop rapid disaster response capacities in the country.

### NCCAS Priority Adaptation Programs

1. Increasing resilience to climate change impacts by identifying and enhancing early warning systems
2. Developing alternative livelihoods to minimize the impacts of climate change for the poor and vulnerable
3. Enhancing national capacity to adapt to climate change through improved land use management
4. Adapting to climate change through enhanced research and awareness creation
5. Developing and implementing environmental sanitation strategies to adapt to climate change
6. Managing water resources as climate change adaptation to enhance productivity and livelihoods
7. Minimizing climate change impacts on socio-economic development through agricultural diversification
8. Minimizing climate change impacts on human health through improved access to healthcare
9. Determine demand- and supply-side measures for adapting the national energy system to impacts of climate change
10. Develop sustainable livelihoods through enhanced fisheries resource management

## KEY PLAYERS AND INITIATIVES

Donor-funded adaptation-specific activities have focused on strategies, plans, or assessments, integrating adaptation into general development and sector initiatives, and raising awareness of climate change issues. Government efforts include the 12 Policy Advice Series. This series, launched by Ghana's EPA with the support of United Nations Development Programme, is designed to improve understanding of climate change and disaster risk issues by policy-makers and senior technocrats. These documents, which have already begun to be released, represent an effort to educate key decision makers and foster swift strategic decision-making on key climate change and disaster issues. The topics covered are: 1) climate change and national development planning, 2) agriculture and food security, 3) disaster risk management, 4) coastal zones and resources, 5) education, 6) energy, 7) forestry and biodiversity, 8) health, 9) human settlement, 10) tourism, 11) transport, and 12) water resources. Other important assessments and initiatives are shown in the following table:

Title	Lead Organization	Funding Source
<b>Assessments/reports</b>		
Ghana: Economics of Adaptation to Climate Change Study	World Bank	Governments of the United Kingdom, Netherlands, Switzerland, Norway, and Finland/ World Bank
Climate Change Screening of Danish Development	Danish International Development Assistance (DANIDA)	DANIDA
<b>Initiatives</b>		
Innovative insurance products for adaptation to climate change (2009-13)	Ministry of Finance and Economic Planning/National Insurance Commission/Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ)	German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
Sustainable Land Management Programme (2005-2009)	United Nations Development Programme (UNDP)	Global Environment Facility
National Action Programme to Mainstream Climate Change into Ghana's Development	EPA/UNDP	UNDP
Ghana - Food Security and Adaptation to Climate Change in the Afram Plains of Ghana	Advancing Capacity to Support Climate Change Adaptation (ACCCA)	United Kingdom Department of the Environment, Food and Rural Affairs/ European Commission
Supporting Integrated and Comprehensive Approaches to Climate Change Adaptation in Africa-Ghana	UNDP, MEST/EPA	Government of Japan (GOJ)

## PRIORITY CHALLENGES AND CONSTRAINTS FOR DECREASING VULNERABILITY AND INCREASING RESILIENCE

Despite these efforts, a number of adaptation needs remain in Ghana. These include the further refining and launching of the NCCAS and developing sector-specific and local-level planning. There is also a need to further increase the capacity of the National Climate Change Information Center and increase public awareness of the risks of climate change more broadly. In addition, Ghana needs to move quickly to mainstream adaptation into sectoral and local planning efforts. Sector-specific adaptation needs exist for disaster risk reduction and management, agriculture, coastal zones, and water. Investment and adaptation can address climate change vulnerabilities in ways that safeguard progress toward economic development goals.

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