

FACT SHEET

FEBRUARY 2018

CLIMATE CHANGE VULNERABILITY AND ADAPTATION IN EAST AFRICA

ENERGY AND TRANSPORTATION

BACKGROUND

The East Africa vulnerability, impacts, and adaptation assessment (VIA) was undertaken by the East African Community (EAC) with support from the USAID/Kenya and East Africa Planning for Resilience in East Africa through Policy, Adaptation, Research, and Economic Development (PREPARED) Project. The study adopted the Intergovernmental Panel on Climate Change (IPCC) assessment framework and used locally observed climate data and socioeconomic information for a 30-year period (1981–2010). Detailed analysis for the VIA focused on the Lake Victoria Basin (LVB), the largest water body in the region, which is important to farming, fisheries, transportation, and water supply in the five EAC Partner States included in the VIA (Burundi, Kenya, Rwanda, Tanzania, and Uganda).

The VIA developed and demonstrated an approach to integrating adaptive strategies that respond to the risks due to climate change. The assessment contributed to development of the EAC Climate Change Master Plan (2011–2031), which links the EAC's Climate Change Policy, Climate Change Strategy, and Climate Change Master Plan into a vision for a resilient future for East Africa.

This brief captures the major findings for energy and transport infrastructure, one of five thematic sectors covered by the analysis in the VIA. It also presents detailed policy actions that were developed based on the findings. The foundational work for the VIA, the current climate baseline and future projections, are presented in the first brief in this series and summarized here.



PHOTO: PREPARED/ TEDDY CHENYA

CLIMATE BASELINE

Data from 1981–2010 indicate a large variance in average annual rainfall variability across the region, with higher variability in the long rains of March–June (MAMJ). In aggregate, the patterns in monthly rainfall suggest that the short rains of October–December (OND) have increased, and the long rains have decreased in the LVB over most of the past century. Overall, rainfall has been declining 20–100 millimeters every 10 years and drier periods are getting longer and more pronounced during the long rains. Wet and dry periods have occurred in distinct 10-year cycles. With regard to surface temperatures, data for 1930–2016 indicate that the average monthly maximum temperature over the LVB has increased +0.7°C to +1.2°C and the average monthly minimum has increased +1.0°C to +1.1°C.

CLIMATE PROJECTIONS

The VIA projections for changes in rainfall and mean surface temperature for 2030, 2050, and 2070 are based on historical and downscaled future scenarios for maximum and minimum temperature data for scenarios representing low, mid, and high levels of emissions and concentrations (RCP2.6, RCP4.5, and RCP8.5). Generally, rainfall is projected to increase over East Africa under all future scenarios except for the June–September (JJAS) period in 2020. Mean annual maximum surface temperature projections increase 1.0°C to 2.0°C over most of the EAC by 2030. The projected warming will be greatest in March–May (MAM) and JJAS and least in October–December (OND). If no mitigating actions are taken, maximum daily temperatures are expected to increase 2.5°C to 3.5°C by 2050. Projections also indicate that East Africa can expect that rainfall and temperature events will become more extreme, episodic, and intense.

KEY FINDINGS

Energy and transportation are key sectors for economic and social development. Without energy, countries cannot eradicate extreme poverty or attain sustainable development. At the same time, increased energy use contributes to greenhouse gas emissions, which exacerbates global warming. Transport is also a driver of social and economic development because it enables citizens access to health care, education, and employment, and unlocks growth potential for cities and countries.

Energy demand is increasing in East Africa and the trend will most likely continue, driven primarily by economic growth and rising populations. At the current 2–3 percent annual rate, population in the region will double in the next 10 years, putting immense pressure on hydropower and biomass, which already struggle to meet demand.

ELECTRICITY

Figure 1. The EAC is highly dependent on hydropower

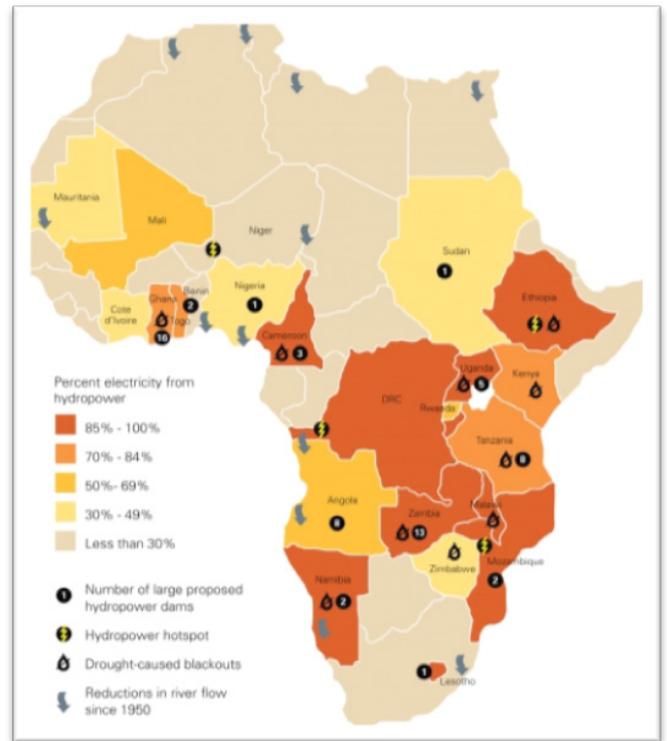
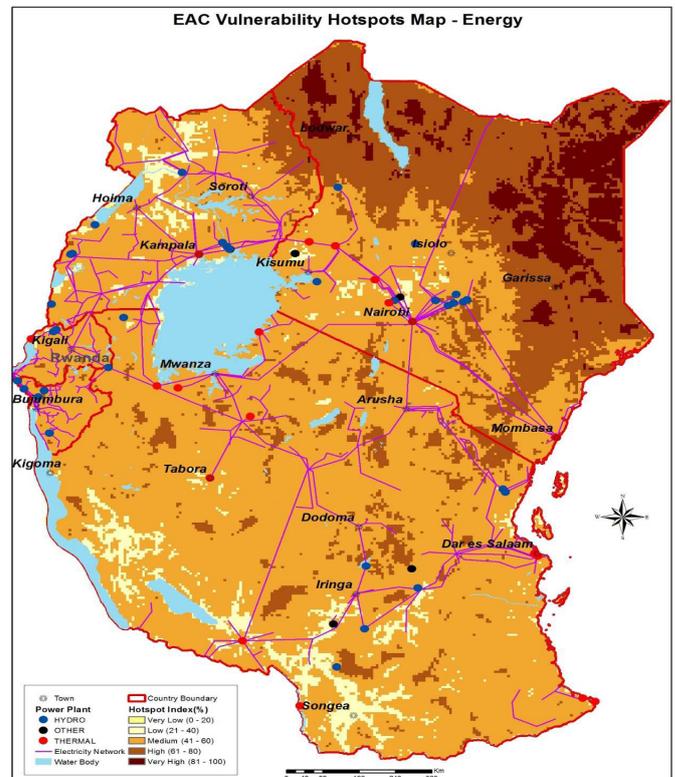


Figure 2. Declining rainfall will be a factor in regional vulnerability



All five EAC Partner States have low access to electricity and high dependence on hydropower. However, power generation is generally increasing and the EAC Partner States have developed Power Master Plans to increase generation and diversify power sources to include geothermal, natural gas, wind, solar, and coal.

Hydropower accounts for 35–90 percent of energy produced in the five EAC countries (Figure 1), which has both advantages and disadvantages. During prolonged dry spells and drought, water levels can be too low to produce the level of energy required by an ever-growing population. Heavy rains that lead to flooding may improve power availability and water storage to sustain power generation levels. On the other hand, excessive runoff can increase siltation, which can damage equipment and disrupt or destroy transmission lines. In recent years, varying water levels due to changes in rainfall and temperature patterns have significantly affected power generation, leading to increased power rationing. Some of the worst-affected areas are served by the Kidatu and Nyumba ya Mungu dams in Tanzania and the Masinga dam in Kenya (Figure 2).

While hydropower provides a sizable share of commercial power generation, biomass is the major source of household energy throughout the region. Biomass accounts for 80–90 percent of household energy used, with firewood and charcoal the most consumed products. This energy source is subject to pressure from deforestation and changes in climate patterns. Prolonged droughts in the region have affected both biomass availability and regeneration. In addition, extreme temperatures can and have led to bush fires, which destroy biomass reserves. The rate of regeneration is generally low in the region due to the observed declining trend in rainfall.

Energy demand is increasing in East Africa and the trend will most likely continue, driven primarily by economic growth and rising populations. At the current 2–3 percent annual rate, population in the region will double in the next 10 years, putting immense pressure on hydropower and biomass, which already struggle to meet demand.

Climate change and variability present increasing challenges for energy production and transmission. A decline in rainfall levels by approximately 10 millimeters per year and a continued rise in temperature by more than 2.50°C over the next 30 years will lead to increased surface water loss from dams through increased evaporation. Exacerbated by declining rainfall trends this could result in reduced or more intermittent ability to generate hydropower.

TRANSPORTATION

The transport sector in East Africa has three broad categories: surface transport, water transport, and air transport. Most people rely on surface transport, including road, rail, and pedestrian travel. In East Africa, major lakes—Lake Victoria (Kenya, Uganda, and Tanzania), Lake Tanganyika (Tanzania and Burundi,) and Lake Kivu (Rwanda)—are important travel and trade routes. Lake Victoria is the principal commercial waterway and train ferries operated by the railway companies of Uganda and Tanzania serve ports around the lake. Air travel accounts for the smallest share of the sector and regional integration is low. Air travel is most important in Kenya and Tanzania, though it is growing in Rwanda.

Transport infrastructure has improved tremendously across the EAC in recent years. Major projects such as the Standard Gauge Railway are meant to open East Africa markets to Central Africa. Rwanda, Tanzania, and Uganda are planning a railway that will improve linkages among the EAC countries. Kenya is already planning for Phase 2 of the railway, which will link Mombasa to Rwanda, South Sudan, and Uganda. Improving seaports in Tanzania and Kenya will enable the growth of the region by increasing import and export markets. Growth in the region's economy has been attributed to the growth of infrastructure, especially for the construction industry, which is linked to transport. As road and rail transport have been improving, water transport on Lake Victoria has been declining.

The vulnerabilities of the transport sector to climate change are many and varied. Extreme events such as high rains and floods lead to destruction of infrastructure such as road washouts and damage to lake piers. High temperatures, such as those projected for the future, can cause buckling of roadways and runways, as well as reduction in water levels in rivers and lakes, which affects navigation. Precipitation, temperatures, and wind play a significant role in Lake Victoria maritime transport and safety. Most shipping accidents on the lake have been attributed to hazardous weather conditions and water currents. An estimated 5,000 people a year drown in maritime accidents on the lake.

The impacts of climate change on the transport sector have negative impacts on other sectors of the economy. While East Africa has a well-structured roadway, the condition of most rural roads makes it difficult to travel or move goods, particularly during the wet season. The state of infrastructure and the ability to bounce back also directly affects other sectors driving the economy of the EAC states. For instance, Kenya's National Climate Change Action Plan 2013/2017 notes that the trade, industry, agriculture, health, transport, energy, and

education sectors, among others, depend on infrastructure to function optimally. The East African Climate Change Master Plan (2011) acknowledges that the infrastructure in the EAC is generally “poor and underdeveloped” and hence unable to cope, adjust, or bounce back in the face of climate extremes. As a result, disaster risk is

increased, resulting in adverse effects on the economy. Climate-related extreme events, especially on the roads to the Indian Ocean ports, have in the past seriously affected export/import subsector. All of these issues will likely continue and perhaps worsen under future climate scenarios.

PROPOSED POLICY ACTIONS

East Africa regional and national stakeholders have proposed the following actions to address the impacts of climate change on the energy and infrastructure.

1. Develop an all-encompassing Specific, Measurable, Achievable, Relevant and Time-Bound (SMART) regional renewable energy policy that reviews and harmonizes existing strategies.
2. Research and invest in alternative energy, including the establishment of regional standards and setting up an internationally-accredited energy laboratory.
3. Develop incentives and funding framework for regional energy project incubation and start-ups.
4. Develop and promote community-based biomass reduction and efficient best practice models for the region.



PHOTO: NAIROBITECH



EAST AFRICAN COMMUNITY



USAID
FROM THE AMERICAN PEOPLE

East African Community
EAC Close
Afrika Mashariki Road
P.O. Box 1096, Arusha
United Republic of Tanzania
Email: eac@eachq.org