FACT SHEET

FEBRUARY 2018

CLIMATE CHANGE VULNERABILITY AND ADAPTATION IN EAST AFRICA

AGRICULTURE AND FOOD SECURITY

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 related to agriculture and food security, 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.

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

Primary agricultural production (crops and livestock) is important to the economies of the EAC Partner States, contributing 25–40 percent to the GDP of the five countries (Table 1) and employing about 80 percent of mostly the rural population. The sector provides foreign exchange earnings from major exports such as cotton, sugarcane, coffee, and tea and provides raw materials for agro-processing industries. It is also essential to food security. However, the contribution of the sector to GDP has declined in four of the five countries and was stable in Tanzania. This is due to its increasing vulnerability to climate variability and change trends that result in declines in its agricultural productivity. In part, this is because the region's agriculture is heavily dependent on rain-fed smallholder farms. However, productivity has also been depressed by insufficient decision/policy support information systems, and exacerbated by under-investment by EAC Member States in the sector to spur sustainable agricultural production in tandem with its rapidly increasing food consumption demands.

Table 1. Agriculture Sector Share of GDP (percent)

Subsector	Burundi	Kenya	Rwanda	Tanzania	Uganda
Agriculture	34	29	32	25	23
Livestock	9	9	10	8	8
Fisheries	1.0	0.8	3.0	1.3	2.6

Food security, is more than food production, it includes access to nutritional food and in many of the EAC Partner States is severely compromised by climate change and climate variability, with majority small-scale farmers being the most affected. The 2015 UN-FAO ***State of Global Food Security*** reports that 124 million East Africans are undernourished-which is 70 to 80 percent of its total population. Most of those who are frequently food insecure, and becoming chronically food insecure, live in the pastoral and marginal agro-pastoral areas of Burundi, northeastern Uganda, and in northern, southern and eastern Kenya. Rwanda and Tanzania experience similar food insecurity but it is less intense and less frequent.

Surface temperatures in the EAC have been increasing over the past five decades. Analysis of historical surface temperature trends in Nairobi and its environs shows steady warming of more than 2.50°C over 50 years. This is well above IPCC predictions and above the thresholds captured in the 2015 Paris Agreement. The consistent warming trends, coupled with the declining rainfall rates of 20–100 millimeters per decade (1981–2016), have resulted in adverse conditions for the agriculture and livestock sectors in arid and semi-arid lands and marginal agricultural areas in the region.

Although farmers in the region have developed several adaptation options to cope with current climate variability, such as soil and water conservation, water harvesting, and soil and plant nutrient management, those adaptations may not be sufficient for future changes of climate. Rain-fed agriculture accounts for approximately 80 percent of subsistence food production and is dominated by smallholder farmers. Most parts of the region already face semi-arid conditions that make agriculture challenging. Smallholder farmers have limited or no resources to improve their agricultural production systems, making them extremely sensitive to climatic variability and declining rainfall trends, exacerbated by hotter-than-normal farming conditions.

The drying trends have even more severely affected the pastoral areas, which typically receive the lowest rainfall

amounts, with direct negative impact on their rangeland resources, in terms of both pasture and surface water, resulting in poor livestock conditions, productivity and low market prices. Pastoralist communities already are threatened by recurring drought, which can push their only source of livelihood to the brink of collapse.

Meanwhile, marginal agricultural zones have been adversely affected by declining rainfall trends that are causing the shrinking of maize growing zones, especially over northeastern Tanzania and the bordering regions of southern, southeastern, and central lowlands of Kenya. The southwestern regions of Uganda and northern Rwanda are also showing signs of continued decline in maize yield, associated with declining seasonal rainfall amounts and increasing temperatures, as shown in the EAC map of declining vegetation trends across pastoral and marginal agricultural livelihoods.

A 1.5°C warming by the 2030s, the minimum projected by the VIA scenario exercise, could lead to about 40 percent of present maize cropping areas being no longer suitable for current cultivars. Under warming of less than 2°C by the 2050s, total crop production could be reduced by 10 percent. For higher levels of warming yields could decrease by 15–20 percent across all crops and regions. Heat and drought would also result in severe losses of livestock and associated impacts on rural communities.

Shrinking of maize growing areas due to exceptional warming and drying trends in eastern and central marginal agricultural areas Increasing burden to feed chronically food insecure population with additional projected increase of 5–6 million people every year under challenging climatic conditions.

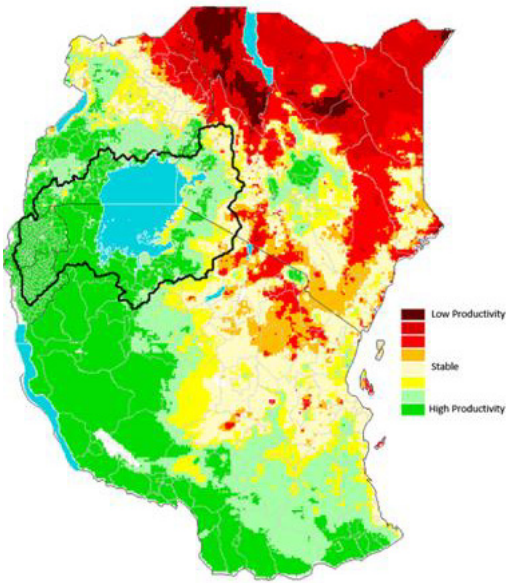

Figure 1: Declining vegetation conditions in pastoral and marginal agricultural areas in EAC Partner States.

High inter-seasonal rainfall variability, reduction of arable land, shifts in agro-ecological zones, and increasing natural resources-based conflicts can be expected in the future.

The EAC's current low yields of maize (1.6 tons/ha), dry beans (2 tons/ha), cassava (8.3 tons/ha), and sorghum (1 ton/ha), and export crops like tea (1.5–3 tons/ha) and coffee will decline even further. Climate change–related loss of pasture and unfavorable breeding temperatures will affect livestock and fish. The current average dairy cattle productivity of 410 kg/animal is already well below the global 2,197 kg/animal and could decline even more.

Current warming trends of more than +2°C above optimal levels for livestock (10–30°C) are expected to result in lower livestock feed intake by 3–5 percent and poor livestock health, with adverse impacts on overall milk and beef production. The current warming and drying trends have negatively affected the quantity and quality of pastures, fodder crops and grains, water availability, and severity and distribution of diseases and parasites.

Fisheries will also be affected by climate change. The fisheries subsector significantly contributes to employment in the EAC, with an estimated 600,000 jobs in direct employment, mainly fishermen, and nearly 2.5 million jobs for people engaged in fish handling and cleaning, transport, net gear manufacture, trade, and processing, as well as boat builders and repairers, and others. The Lake Victoria produces and estimated 1 million tons of fish per year, two thirds of it from the Tanzanian part of lake. The catch is dominated by three fish species, but since 2006, the large fishes, including Nile perch and Nile tilapia, have been declining. Whether this current decline is due to overfishing or to environmental changes in the aquatic system is unclear, but warmer-than-normal surface water temperatures and variability in rainfall patterns could affect fish physiological processes, thereby affecting spawning, survival of juveniles, and recruitment into the exploitable phase of population size, production, and yield. Under the projected future conditions, fish populations could decline and their distribution could change.

Overall vulnerability in agriculture to projected climate change is expected to increase under the most likely (RCP4.5) and worst-case scenarios (RCP 8.5) for the next 20–50 years (2030, 2050, and 2070). There is therefore increased likelihood that more EAC agricultural lands will become more vulnerable and unsuitable for growing long-cycle staple foods, especially maize. Under these scenarios, with a rapidly increasing population of 5–6 million every year and declining agricultural productivity in the region, the burden of responding to humanitarian food insecurity crises is likely to increase by more than 4 percent, with recurrent severe droughts. EAC Partner States will be required to invest heavily in agriculture, from applied research to scaling up viable options to mitigate current and foreseen food insecurity crisis in the region.

PROPOSED POLICY ACTIONS

For the agriculture sector to remain economically sustainable and meet the ever increasing EAC food demands, more rationalized investment in agriculture is required. Governments must meet their 10 percent commitment (agreed under the Maputo Declaration) and other stakeholders, such as the private sector, need to contribute.

Strengthen regional and national early warning systems to be more responsive to users' needs.

- Improve agro-climatic data observations in vulnerable areas.
- Train national meteorological services and climate information users in the skills necessary to provide required climate products and services.
- Support climate information network platforms and protocols for sharing and exchanging data, products, and information.
- Enhance and strengthen private sector participation in early warning systems in the region through public-private partnerships to improve early warning systems.

Promote a climate-smart agriculture (CSA) approach and risk management programs.

- Scale-up weather insurance index for crops and livestock.
- Promote small-scale irrigation, water harvesting, and post-harvest management technologies across the entire value chain through public-private partnerships.
- Promote drought-tolerant and early maturing crops, forage, and livestock breeds through public-private partnerships and seed companies.
- Build the evidence base to promote CSA, including conducting a cost-benefit analysis and participatory evaluation of CSA best practices in the region.

Support and strengthen agricultural value chains through public-private partnerships.

- Strengthen farmers' associations, organizations, and cooperatives for collective action in mitigating climate change vulnerabilities.
- Develop and support management information systems for meteorological services that collect and disseminate useful weather and climate information.
- Develop and support agro-climate advisories and decision support tools for the entire value chain by connecting farmers to climate service providers for timely seasonal forecasting and weather updates.

Harmonize and coordinate climate change initiatives for optimal use of limited resources.

- Develop platform for harmonizing and coordinating all climate change initiatives.
- Establish an appropriate monitoring and evaluation system to track all climate change initiatives, studies, and research and development within the LVB.

Natural disaster and risk management

- Operationalize the Disaster Risk Reduction and Management Fund/establishment of reserve fund for climate change disaster management
- Strengthen response mechanisms for natural disasters caused by climate change and build the capacity of local, national, and regional organizations to respond to natural disasters
- Establish community-based disaster management approaches and mechanisms

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