FACT SHEET

FEBRUARY 2018

CLIMATE CHANGE VULNERABILITY AND ADAPTATION IN EAST AFRICA

TERRESTRIAL ECOSYSTEMS, FORESTRY, WILDLIFE AND TOURISM

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 on terrestrial ecosystems, forestry, wildlife, and tourism, 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

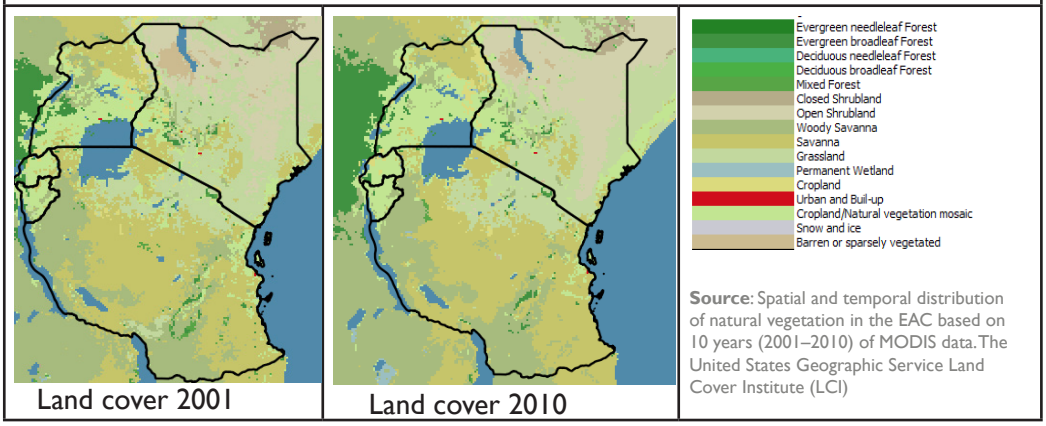
Terrestrial ecosystems include a variety of landscapes and forests, as well as the wildlife they support, govern, maintain, and moderate essential ecological processes. They support food production, human health, and other aspects of survival and sustainable development, including tourism. Terrestrial ecosystems, like other ecosystems, are affected by climate change and human pressures, the impacts of which are already depleting vegetation, forests, and wildlife populations. The negative effects are already evident. For example, according to IPCC 2007 fourth assessment report, 25–40 percent of mammal species in East Africa's national parks have become endangered. Losses due to climate change interacting with anthropogenic land use changes and deforestation have irreversible consequences for biodiversity, wildlife-based tourism, and other resources.

ECOSYSTEMS AND FORESTS

Changes in terrestrial ecosystems are already being detected in the EAC region, particularly in the Lake Victoria Basin (LVB). Analysis of satellite-based vegetation imagery from 2001-2009 shows that the area under woody savanna has increased, while natural vegetation- especially forests, shrub lands, and grasslands- has declined in all five East African Partner States. Analysis of rainfall trends between 1984 and 2014 shows that rainfall on the southeastern side of the LVB, which includes the Mara-Serengeti Ecosystem, is more variable compared to other parts of the basin. This could have negative impacts on the growing cycle and alter vegetation cover, which affect wildlife habitat and livestock pasture, leading to increased competition between species. Changes in grasslands and marine ecosystems also are noticeable with effects on pastoralism and fisheries.

Climate change interacts with human drivers, such as deforestation (Figure 1) to threaten the region's forests. These forests are not only critical habitat for wildlife, they also provide ecosystem services, such as energy, food, timber, and non-timber forest products that have social and economic value to the region, its countries, and the world. While climate change and variability will affect the growth and distribution of vegetation, the impacts of combined anthropogenic drivers, such as human population growth and land use changes, may have more far-reaching consequence for terrestrial ecosystems.

Figure 1. Deforestation is already evident in much of the EAC



Source: Spatial and temporal distribution of natural vegetation in the EAC based on 10 years (2001–2010) of MODIS data.The United States Geographic Service Land Cover Institute (LCI)

WILDLIFE

Figure 2. Wildebeest migration is strongly correlated with seasonal rainfall

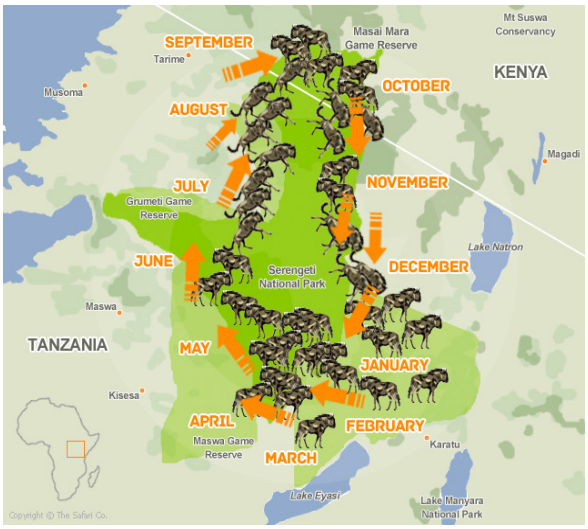
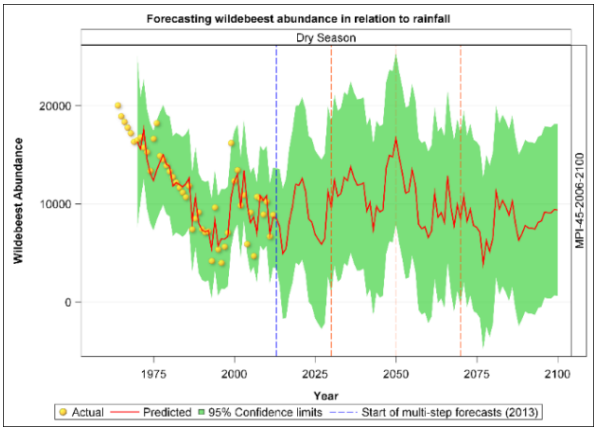
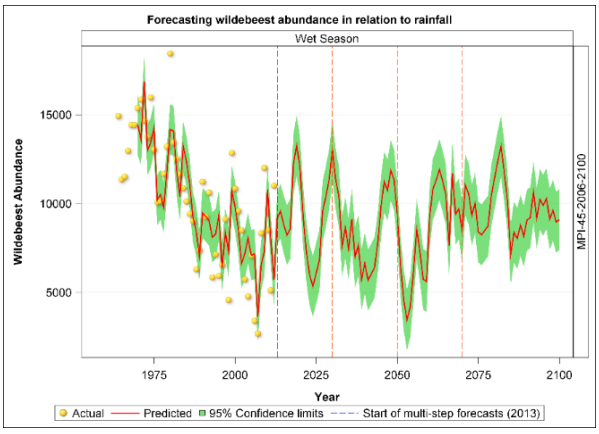


Figure 3. Forecast population changes for wildebeest under RCP4.5





Wildlife populations in the renowned Serengeti ecosystem have remained stable for many species, including for the wildebeest, with its numbers remaining relatively stable at about 1.3 million. But the ecosystem is under pressure and wildlife populations are declining in some areas for some species. For example, the population of Thomson's gazelles in Serengeti National Park declined by almost two-thirds over 13 years between the 1970s and 1985 due to predation, interspecies competition, and disease. Declines have also been reported for rhinoceros, elephants, wild dogs, and roan antelope because of poaching and infection with transmissible diseases, such as distemper and rabies. Among the major reasons for this decline is encroaching farmland and livestock grazing that are reducing wildlife habitats and corridors. These human activities are increasing poaching and human-wildlife conflicts. Future drying and warming trends are likely to further constrain rangeland resources and further increase those conflicts.

Changes in hydrological cycles have been shown to affect the availability, patterns, and distribution of endemic plant and animal species. Increased wildlife losses in East Africa may be due to climate variability and change, which affects forage and its availability, adversely affecting herd sizes. For that reason, human encroachment on migration corridors is of special concern because it will prevent wildlife from seeking other habitats when their own are affected by climate change.

The VIA terrestrial team conducted a study of wildebeest populations for the Ngorongoro ecosystem for both the wet and dry seasons to determine the impact on their populations. The analyses illustrate oscillatory dynamics with extended periods of population increase followed by extended periods of persistent population decline. The projected wildebeest trajectories suggest that the population will continue to fluctuate widely between 5,000 and 15,000 animals under all the scenarios and seasons. It is only under the best case scenarios (low emissions, or RCP2.6) that the dry season population increases beyond 20,000 animals between 2070 and 2090 (Figures 2 and 3).

HOTSPOTS

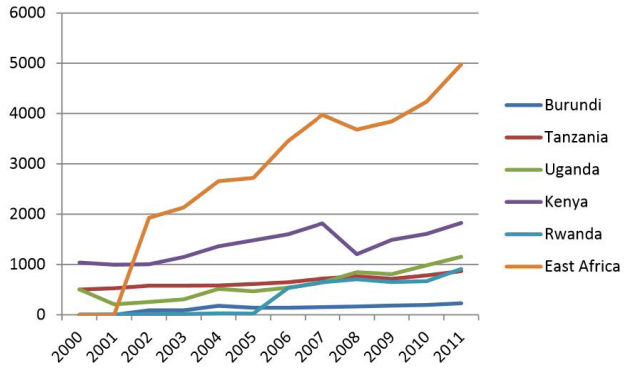
The VIA identified three ecological hotspots in the EAC region: Mara-Serengeti Ecosystem (Kenya and Tanzania), Nyungwe-Kibira Ecosystem (Rwanda and Burundi), and Mount Elgon Ecosystem (Kenya and Uganda). The region also has several biodiversity significant areas (BSAs) with at least 1,500 endemic, native vascular plant species and have already lost at least 70 percent of their primary, native vegetation. Rwanda's climate hotspots include the Akagera Park and Rugezi Swamp, where current increased temperature, recurrent droughts and high evapotranspiration has already resulted in reduction of water levels of lakes and rivers. The La Niña drought of 1999–2000 resulted in the drying of the Gabiro–Akagera valley within the Akagera National Park, affecting the distribution of wildlife.

Based on the projections for future climate change, several forested hotspots are projected to have low rainfall and high temperatures in the future (2030, 2050, and 2070). These hotspots include the Kilombero Valley Flood Plain, a Ramsar site in Tanzania, with a diversity of quality habitats with unique levels of biodiversity of

international importance; Mount Kenya, Lake Nakuru, and Meru National Park in Kenya; Volcanoes National Park in Rwanda; and Mgahinga Gorilla National Park in Uganda. Future climate change could exacerbate existing anthropogenic pressures on these important biodiversity sites.

TOURISM

Figure 4: Tourism is a major generator of foreign revenue in the EAC



Tourism is an important economic sector in the EAC region. In Kenya, Uganda, and Tanzania, the tourism sector is a major foreign exchange earner and much of the sector is based on their spectacular wildlife and is managed within protected areas (Figure 4). These protected areas are mainly in the arid and semi-arid areas that are sensitive to climate change and are characterized by low and erratic rainfall patterns as well as high evapotranspiration rates.

Tourism is highly vulnerable to current climatic trends, which have already led to shifts in wildlife preferences and migration patterns from important tourist destinations such as Serengeti and Mara to less important areas. Under a changing and variable climate, such changes would likely continue. In the long run, this would affect tourism revenues. Fire risk is also a serious threat to tourism, since frequent fires may result in a loss of the region's endemic biodiversity. Recent prolonged droughts (2000/01, 2010/11, and 2016/17) resulted in the rapid depletion of rangeland resources (pasture and surface water) and change of vegetation and ecological zones, thus affecting the distribution of wildlife in some of these areas.

PROPOSED POLICY ACTIONS

1. Apply a climate lens across key transboundary ecosystems, especially biologically significant areas, such as Mara-Serengeti, Mount Elgon, Sango Bay-Minziro, Nyungwe-Kibera, and Greater Virunga-Volcanos.
2. Analyze options for mitigation and adaptation for various regional and national governments, the private sector, and local communities.
3. Prepare a regional approach in the LVB to address community-based climate change impacts on wildlife, forests, and tourism.
4. Develop climate change information hubs in the EAC and LVB Commission secretariats.

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