



# POLICY BRIEF

CLIMATE CHANGE, THE ENVIRONMENT AND HUMAN WELFARE:  
LESSONS LEARNED FROM THE LAKE KYOGA CATCHMENT AREA



## Are we overlooking climate change?

Changes in climate are already threatening Uganda's ecosystems and the livelihoods that depend on them (Hepworth and Goulden, 2008). Between 1991 and 2000, for instance, seven droughts were experienced (OXFAM, 2008). The main impacts of a 1.5 °C temperature rise and of more extreme and/or more frequent occurrences of climatic incidents will be on food security, the quantity and quality of water and other natural resources, human health, settlements and infrastructure.

Vulnerability to climate change in Uganda is high due to heavy reliance on climate-dependant resources such as rainfed agriculture, natural disasters and poverty. At the same time, adaptive and mitigation capacity is low due to shortages of economic resources and technology. Further, Uganda's vulnerability to climate change is likely to increase (MAAIF, 2008).

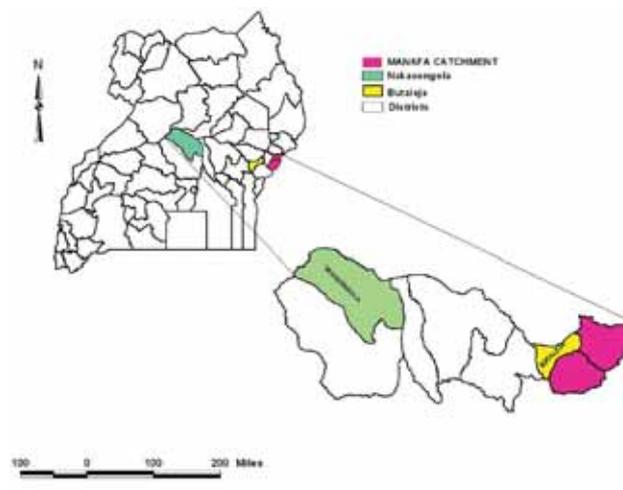
Climate is a valuable but neglected environmental resource (UNDP, 2005). Intact and robust ecosystems are critical for managing climate change. This policy brief highlights some climate change issues and provides recommendations on how to improve mitigation and adaptation measures and thus reduce vulnerability. It draws from an integrated ecosystem assessment (IEA) pilot study on the Lake Kyoga catchment area in Uganda (Box 1).

## What are the possible impacts of climate change?

Most of the impacts of climate change are expected to be negative. The following phenomena have already

### Box 1: The case study areas

An integrated ecosystem assessment (IEA) pilot study for Uganda was carried out in the Lake Kyoga catchment as part of the Millennium Ecosystem Assessment to provide information on linkages between changes in ecosystems, ecosystem services and human well-being. The Lake Kyoga catchment is an important focal area for Uganda because of its importance in the Nile Basin and the significant differences in human welfare indicators such as health, poverty, food security and others. The study was carried out in 2008 in Nakasongola, Bududa and Butaleja Districts.



occurred and will be exacerbated by climate change in the Lake Kyoga catchment:

1. Food insecurity
2. Landslides and soil erosion
3. Water shortages and quality changes
4. Energy insecurity
5. Biodiversity loss
6. Climate-related disasters
7. Conflict due to resource scarcity and forced migration
8. Disease pattern shifts.

### 1. Food insecurity

Climate change is already affecting food security in the country through reduced production of major food crops as a result of increased occurrence of droughts and floods. This is likely to worsen the food security situation, especially in the dryland areas such as the cattle corridor. Some districts, in the cattle corridor, including Nakasongola, are already net importers of food. During the dry season, forage for livestock is also scarce. The increasing temperatures, especially during droughts, together with other ecosystem changes, such as deforestation, could also explain the increase in crop pests, such as termites in Nakasongola.

Other areas may experience changes in crop potential and an increase in pests and diseases depending on the changing weather patterns. Current temperatures and rainfall allow growing of coffee in most parts of Uganda, including Bududa District, where it has historically been an important cash crop. Climate change models indicate that an increase of 2 °C could have a significant negative impact on coffee-growing areas (MFPED, 2004). Further, this could have implications for other commercial crops that are grown, such as paddy rice and cotton in Butaleja.

## 2. Landslides and soil erosion

Studies in Mt. Elgon Region indicate that landslides are exacerbated by extremes of climate, including the heavy rainfall, (Knapen et al., 2005). They complicate water management issues and lead to soil erosion, loss of arable land, food shortages and loss of infrastructure and human lives. Poverty limits efforts to contain the landslides. For instance, smallholders in Bududa working individually have no institutions or resources to embark on large infrastructure developments such as embankments and terraces to control erosion.



*Landslides and soil erosion*

Soil erosion is an emerging problem in many highland areas in Uganda. In Bududa, population pressure and reduction in land availability have forced farmers to move further up the mountain slopes. In 2001, 85 percent of the total area of Mt Elgon was exposed to soil erosion (NEMA, 2000). Research shows that about half the soil lost in a landslide ends up in the stream network (Knapen et al., 2005). This is evident in the siltation of Manafwa River as it flows through Bududa and Butaleja Districts and in the brown colour of the water during rainy seasons. This soil material can cause damming of rivers, resulting in major damage to property and other infrastructure, siltation and pollution of streams.

It is estimated that soil erosion alone accounts for over 80 percent of the annual cost of environmental degradation in Uganda, representing about US\$300 million per year. In 2003, soil nutrient loss was estimated at US\$625 million per year (Yaron et al., 2003).

## 3. Water shortages and quality changes

Climate change is likely to affect both the availability and the quality of water, which in turn impacts on livelihoods. Rainfall is the primary source of Lake Kyoga's water. Increased temperature, seasonal shifts and possible reduced rainfall, especially in the dry seasons, are increasingly leading to scarcity of water resources for human and livestock consumption. This is already evident in the districts in the cattle corridor including Nakasongola. Pastoral and other dryland livelihoods are being negatively affected. Water quality is also degenerating through siltation and pollution.

## 4. Energy insecurity

Forests, woodlands and wooded grasslands play an important role in climate regulation, but woody vegetation cover is declining. Most energy in the Lake Kyoga catchment area is obtained from woody biomass, which puts forests under tremendous pressure. In Nakasongola, 91 percent of households indicated that they used only wood fuel for energy. This excessive dependence on biomass has resulted in land degradation and has led to a decrease in forest and vegetation cover (Kayanja and Byarugaba, 2001), with impacts on climate regulation and on the carbon sequestration capacity. Contributing to these pressures is the very limited use of energy alternatives. This is likely to remain a nation-wide challenge, since over 90 percent of national energy demand is derived from biomass, and trees are still expected to contribute as much as 75 percent by 2015 (MFPED, 2004).

In 2006, the falling water levels, due to prolonged droughts, reduced the country's capacity to generate hydro-electric power from Kiira and the Owen Falls Dam in Jinja. The power shortages had severe negative consequences on all sectors of the economy, reducing the country's economic growth and revenue collection.

## 5. Biodiversity loss

The Mt. Elgon Region including Bududa District is of national importance with respect to biodiversity. The abundance of forest and wildlife resources has brought the National Forestry Authority and the Uganda Wildlife Authority together in the joint management of these resources.

The warming of mountainous areas drastically affects wildlife species. For instance, the mountain gorilla is under threat as are the Rwenzori leopard and the Rwenzori Red Duiker, since they usually live at altitudes above 3,000 m at colder climates (MWE, 2007). Unique species of chameleon found on the mountains are also under threat, including the three-horned chameleon, whose range is shifting upwards as a result of rising temperatures. The dwindling of wildlife will affect tourism, a leading foreign exchange earner for Uganda.

Climate-related events are having significant short- and long-term effects on the lakes, wetlands, rivers and other types of ecosystems, which in turn are impacting on the constituent biodiversity. For instance, in the dryland areas such as Nakasongola, flooding due to climate-related events has impacted negatively on lakeshore biodiversity, including the wetlands, and shrunk the fish breeding grounds.

## 6. Climate-related disasters

Large-scale atmospheric events such as El Niño and La Niña have been identified as the principal causes of climate-related disasters (WWAP, 2006). These climatic

events result in droughts, floods, landslides, wind storms and hailstorms, and contribute to well over 70 percent of natural disasters in Uganda (WWAP, 2006). After the El Niño rains of 1997/98, the level of Lake Kyoga rose and dislodged the papyrus bed, the floating sudds and water hyacinth mats. The weeds accumulated and blocked the outlet of the lake. Within one year, the water level had risen to over 2 m and flooded an area of about 580 km<sup>2</sup>. The floods displaced populations, destroyed infrastructure, caused disease and some deaths, and paralyzed the socio-economic activities of the region. To date, the outlet of the lake is still partly blocked by the papyrus and hyacinth (ILM, 2004). In Nakasongola, the revenue lost by people displaced by the floods was estimated at 13 percent of their annual revenue. In addition, roads, houses and crops and farmland were flooded and destroyed (NDC, 2004).

### 7. Conflict due to natural resource scarcity and forced migration

There are already conflicts over access to water in Nakasongola and access to wetlands in Butaleja. As the quantity of water reduces seasonally and as inequitable access rights become more contentious, conflicts are expected to become more frequent and more widespread.

### 8. Disease pattern shifts

Water-borne diseases including cholera and other diarrhoeal diseases are expected to increase with the increase of flooding incidents. According to the Climate Change, Uganda National Adaptation Programmes of Action report, temperature rise has resulted in an increase in infectious diseases. Malaria increased throughout the country and has reached epidemic proportions in south-west Uganda, where temperatures have risen by 0.3 °C in a decade. The highlands, which were malaria-free, are now invaded by the disease. People living in the highlands have not developed immunity from malaria and are therefore more susceptible to it. The report noted an increase in malaria cases of 43 percent in Ntungamo District, 51 percent in Kabale District and 135 percent in Mbarara District. In the semi-arid areas, tick-borne diseases have become rampant due to higher temperatures. The tsetse fly belt has expanded, while meningitis and eye infections have increased.

Food insecurity makes people more vulnerable to disease and stunts children's growth, and in worst case scenarios, cause malnutrition and famine. Longer dry seasons could increase the incidence and severity of respiratory diseases. Increased work loads in coping with climate change impacts could cause stress and ill health.

## What are the key policy issues related to climate change?

Although there is some acknowledgement that climate change is occurring, and there are proposals for small-scale piloting of adaptation strategies (MWE, 2007) and a Disaster Preparedness and Management Strategy, there is no comprehensive national strategy for reducing and coping with its impacts. It is unclear which agencies are responsible for responding to the threats posed by climate change or how they should develop a coordinated response. The fundamental principle underlying the strategy is that the costs of responding to disasters far exceed those of disaster prevention and risk reduction activities. Hepworth and Goulden refer to "confused mandates, dysfunctional arrangements for inter-agency working, and weak institutional and professional incentives for pro-active action" (2008: 4). There are gaps in basic information including time series rainfall and hydrological data for much of the country.

The key policy issues are summarized in Box 2.

### Box 2. Key policy issues related to climate change

1. Inadequate data on climate, hydrology, land use and ecosystem impacts
2. No national strategy for mitigation or adaptation
3. Unclear and weak institutional arrangements for coordination action

## What are the options for better adaptation to, and mitigation of the effects of, climate change?

The following are some of the responses and recommendations to date for dealing with the challenges:

### 1. Inadequate data on climate, hydrology and ecosystem impacts

- Monitor and measure the situation and trends:
  - Re-establish or set up local weather and water level and quality data collection and monitoring centres according to agro-ecological zoning in each district.
  - Improve accuracy of information by training and equipping local monitors to collect and analyse data for local application.
  - Use sustainable information and communication technology (ICT) at all stages to improve the mutual exchange of information between the collection sites and the national government levels.

- Ensure that collection, interpretation and use of the data are accurate and timely:
  - Involve local farmers, pastoralists, extension workers, schools and other actors in collecting, summarizing and interpreting hydrological, meteorological and impact data on crop yields, ecosystem changes etc. to inform local early warning systems.
  - Integrate meteorology, hydrology and climate change education into the formal primary and secondary school systems using local, national and global data.
- Make effective the formally established collaborative mechanisms between the government institutions responsible for climate, hydrological and ecosystem data.

## 2. National strategy for mitigation and adaptation

- Develop and implement a comprehensive national mitigation and adaptation plan, including the following:
  - Design strategies to restore the integrity of the ecosystems including land use planning, energy alternatives to reduce impacts on woody vegetation cover, and participatory research to select species and varieties that can adapt to changing temperatures, seasons and extreme events.
  - Mix local and traditional knowledge with state-of-the-art technologies and equipment.
  - Encourage civil society involvement in data collection, investigation and experimentation with responses, advocacy and information exchange.
  - Consider public-private sector involvement.
  - Support local community opportunities for carbon trading, energy trading and payments for ecosystem service (PES) provision.
  - Invest in climate-disaster risk reduction, including national and local capacities to minimize the damage caused by natural hazards by preparing for, and responding rapidly and effectively to, extreme events.
  - Request and use global funding to implement the strategy.

## 3. Unclear and weak institutional arrangements for coordination

- Clarify institutional roles, using legal instruments where necessary.
- Strengthen institutional capacities to collaborate.
- Strengthen and enforce the implementation of environmental laws.
- Devise effective means for donor collaboration.

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