



# Climate Profiles and Climate Change Vulnerability of the Mbale Region of Uganda: Policy Brief

TACC – Mbale Project, UNDP Uganda,  
May 2013

## Key Messages

- There are strong signals of seasonal weather change in the Mbale region. The last decade (2001-2010) has been warmer and wetter than the 1961-1990 period. There has been an overall increase in temperature, particularly in the dry season. For example, mean temperature for February, which is the hottest and driest month in Mbale, has increased by 1.1°C. Annual rainfall totals have increased slightly, but the distribution has changed, as the first rains are now delayed from March to late April or even May.
- Temperatures are projected to rise over the period from the 2020s to the 2050s. Higher rainfall is projected for the 2020s, though this is projected to subsequently decline in the 2050s.
- Collection of weather data in the Mbale Region is poor and needs to be augmented to at least one standard weather station in each of its three districts.
- There is a high level / degree of uncertainty over projections of future climate, but the threats of climate change to livelihoods are real and immediate. Acting now, even when climate data available is limited is vital, as waiting until better data is collected and analyses perfected is not an option.
- Whereas the projections are for increased rainfall to the 2020s, this is likely to be associated with increasing frequency of extremes of rainfall, causing damage to property and life.
- Increase in weather data collection and the provision of weather information (e.g. warnings of extreme events) to decision makers and the communities are vital.
- With more than 590 people per km<sup>2</sup>, the Mbale region is the most densely populated part of Uganda. The high density of population and cultivation on very steep slopes combine to increase the vulnerability of the people of the region to the increasingly frequent extreme weather events, as well as the impacts of medium- to longer-term climate change
- To increase the region's resilience to the impacts of climate change, it is important to strengthen the banana-coffee production system on which communities rely for both their livelihoods and incomes, through better soil and water conservation interventions. Value addition to the crops produced and awareness creation of the likely dangers of cultivation on steep slopes are also vital.

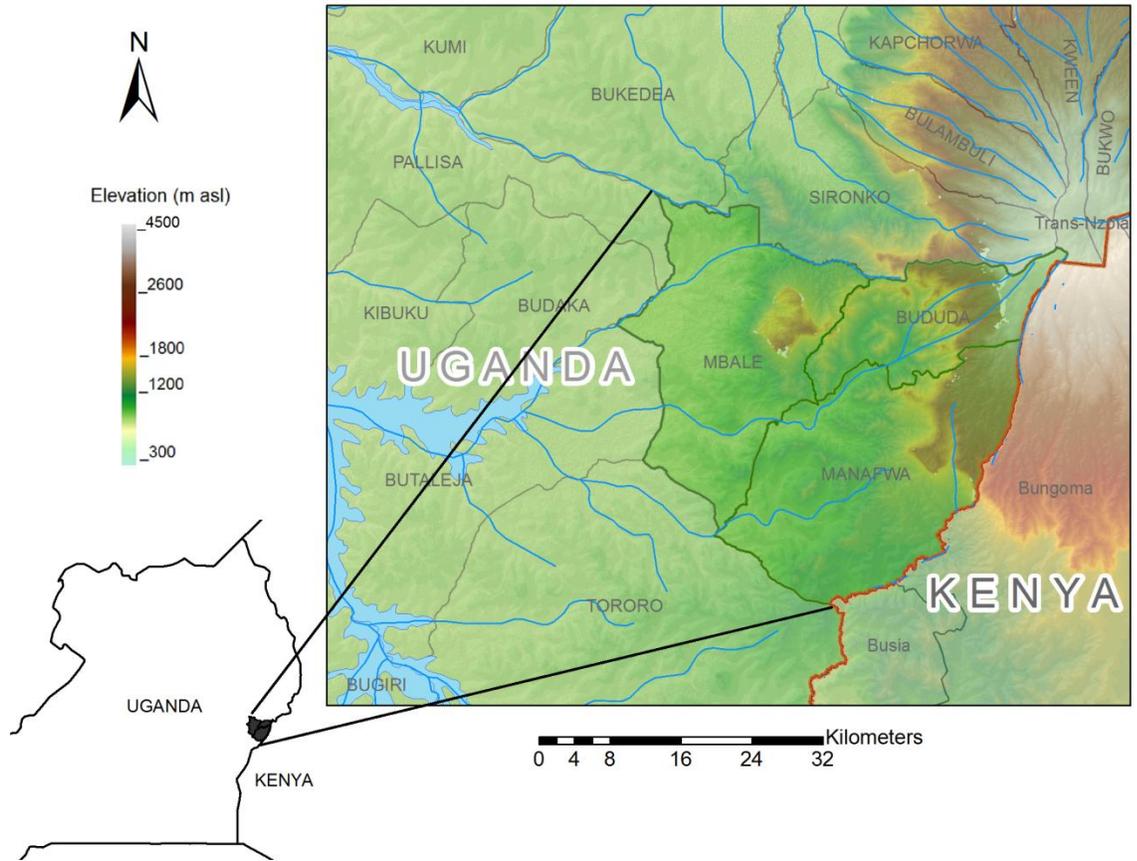
## Introduction

The Mbale region has been seriously affected by incidences of extreme weather events in the last few decades. For example, landslides triggered by extreme rainfall events over the mountainous area have killed hundreds of people and displaced thousands, with significant loss of property and other sources of livelihoods. This region, the most highly populated part of Uganda, is characterized by fertile soils and the majority of the people derive their livelihoods from agriculture. However, steep slopes are cultivated and inhabited. Changes in weather and climate will significantly affect people and livelihoods in the Mbale region. Thus, concerted efforts are needed to help the people of Mbale cope with the climate change over the 21<sup>st</sup> century.

The Territorial Approach to Climate Change (TACC) project for the Mbale region of Uganda, or the TACC-Mbale project, is being implemented by the United Nations Development Programme - UNDP and benefits from financial support from the Danish Embassy, DFID and UNDP, as well as from technical support provided by the Welsh Government. The TACC-Mbale project is one of the pilots for the Global Initiative, "Down to Earth: Territorial Approach to Climate Change". The Global initiative is a collaborative effort involving the United Nations Development Programme (UNDP), the United Nations Environment Programme (UNEP) and eight associations of regions around the world. This global initiative aims at supporting sub-national governments to identify and develop projects, which can meet local needs, while building both climate resilience and the infrastructure needed for low-carbon growth. <http://undp.adaptationlearning.net/tacc>; [http://undp.adaptationlearning.net/tacc\\_uganda](http://undp.adaptationlearning.net/tacc_uganda) <http://undp.adaptationlearning.net/tacc>

One of the constraints to climate change studies for the Mbale region is the limit on weather data collected. There is an urgent need to improve collection of weather data in the region. Weather stations have in the past been normally located in urban areas, however, to provide useful information, weather stations need to be strategically distributed across the region to adequately represent low and high elevation areas. Improvement of weather data collection should go hand-in-hand with promoting awareness and building capacity among the Mbale region stakeholders, particularly local governments, technical officers and education establishments about the need to and the appropriate methods for collecting weather data.

Helping people adapt to climate change requires a good understanding of weather and climate trends, as well as vulnerability to the predicted change. Before even planning interventions to deal with climate change and its impacts, a key step is to ensure that recording of weather events adequately covers all parts of this unique region, the low as well as the high elevation areas. The people need to be assisted to become more aware of the need to implement better farming methods, including soil and water conservation technologies, the win-win-win benefits of improved techniques and the dangers of the status quo.



**Location of the Mbale region (Bududa, Manafwa and Mbale Districts)**

### Observed and Projected Changes in the Mbale Region Climate

Weather records indicate that the temperature in the Mbale region has been increasing, particularly in the dry season. In the last decade alone, mean temperatures for February, which is the warmest month, have increased by about 1°C above the long-term average (1961-1990). The onset of the first rains in the traditional long rainy season is now delayed by more than 4 weeks in some years. There has also been an increase in rainfall received from September to November, providing an opportunity for farmers to make maximum use of the once shorter rains.

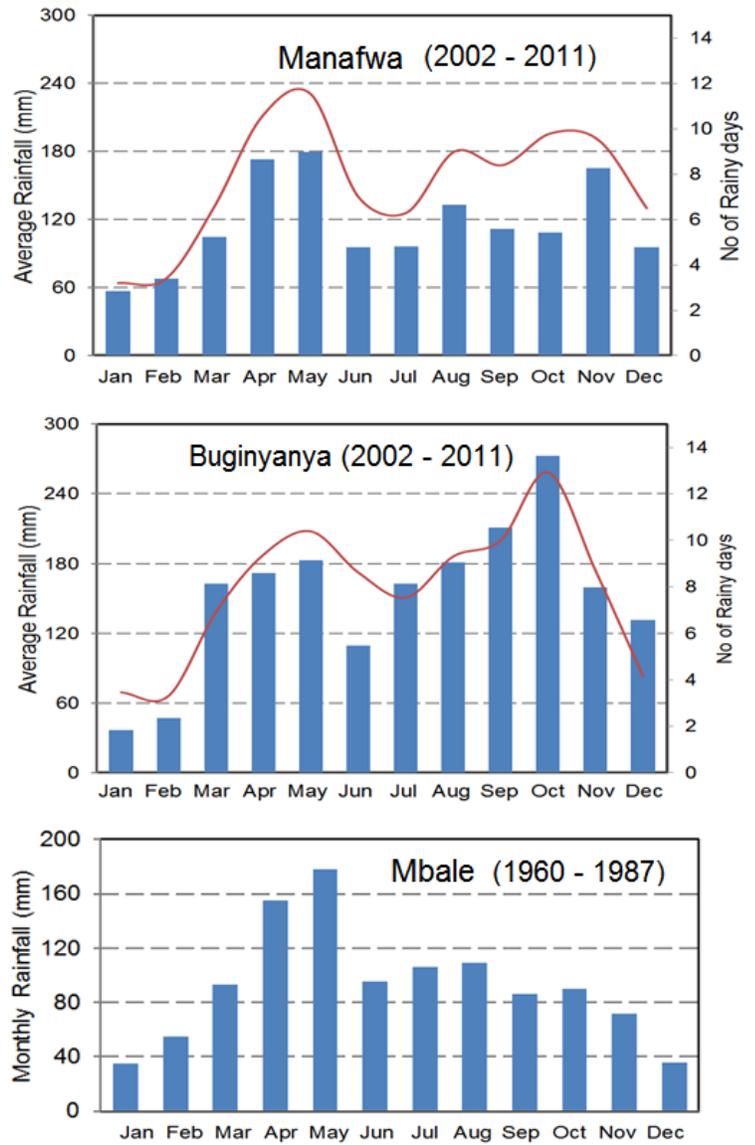
Rainfall in the Mbale region is mainly bimodal, with the first rain season occurring from late March to June and the second from September to November. Over the 15 years, there has been a clear shift from April to May as the wettest month and the onset of the first rains is sometimes delayed until April. The other trend has been towards more rainfall during the previously “shorter” rains period of September to November. Temperature increases have been noticeable in February, which is the warmest month of the year. The implication of increasing temperatures during the driest period of the year point to the likely increase in water stress over the dry season.

There is general agreement from all global circulation model projections for a general increase in temperature over the next 30 years. Similarly the same period is projected to have more rainfall than the 1961-1990 period. Additionally, more rainfall is expected in the rain seasons, with the dry seasons projected to be becoming drier than the baseline.

There remain considerable uncertainty in climate change projections and climate change impacts. However, responding to climate change impacts does not have to wait for more accurate projections of climate; already observed changes in temperature and rainfall for the Mbale region in recent decade (2000-2011) are comparable to what was projected for the 2010-2039 period.

**Risk and vulnerability to climate change**

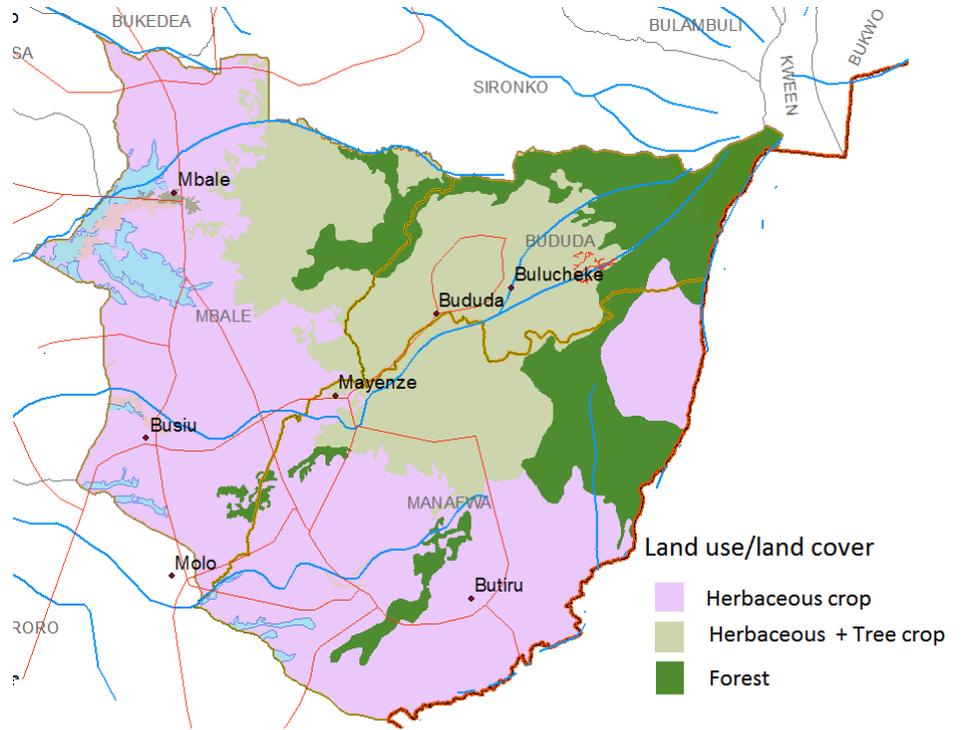
The biophysical attributes of the Mbale region, such as the clay soils and hilly terrain, make it vulnerable to the effects of climate change, particularly to accelerated soil erosion and landslides. However, the same attributes also make this region unique, with the fertile soils and cool temperature making the growing of arabica coffee possible. Arabica coffee together with bananas is the source of livelihoods for the majority of people. Changes in climate will threaten coffee growing in two major ways; increased temperatures will affect the yield and quality of coffee, in addition to making conditions favourable for coffee pests, most important of which is the coffee berry borer. Better methods of cultivation, also improved soil and water management can enhance the adaptation of the coffee agroecosystem to climate change. These techniques include terraces, mulching and increased agroforestry.



Monthly rainfall at three locations in the Mbale region of Uganda

The landscape in the Mbale region is very fragile, hilly and nearly all cultivated with very few remnant patches of natural vegetation. This increases the vulnerability of the area to erosion, which washes away the fertile soil, leading to flooding in the valleys, which affect crop production and the road network. An increase in temperature has been associated with an increase in the incidence of malaria, particularly in the high elevation areas that had always been known to be free of malaria -carrying mosquitoes.

The vulnerability of the Mbale region is exacerbated by the high population of the region. With more than 500 people per km<sup>2</sup>, the Mbale region is the most densely populated part of Uganda. Stakeholders emphasized that methods of controlling population growth are required if the region is to cope with climate change.



Landuse /cover in the three districts of the Mbale Region

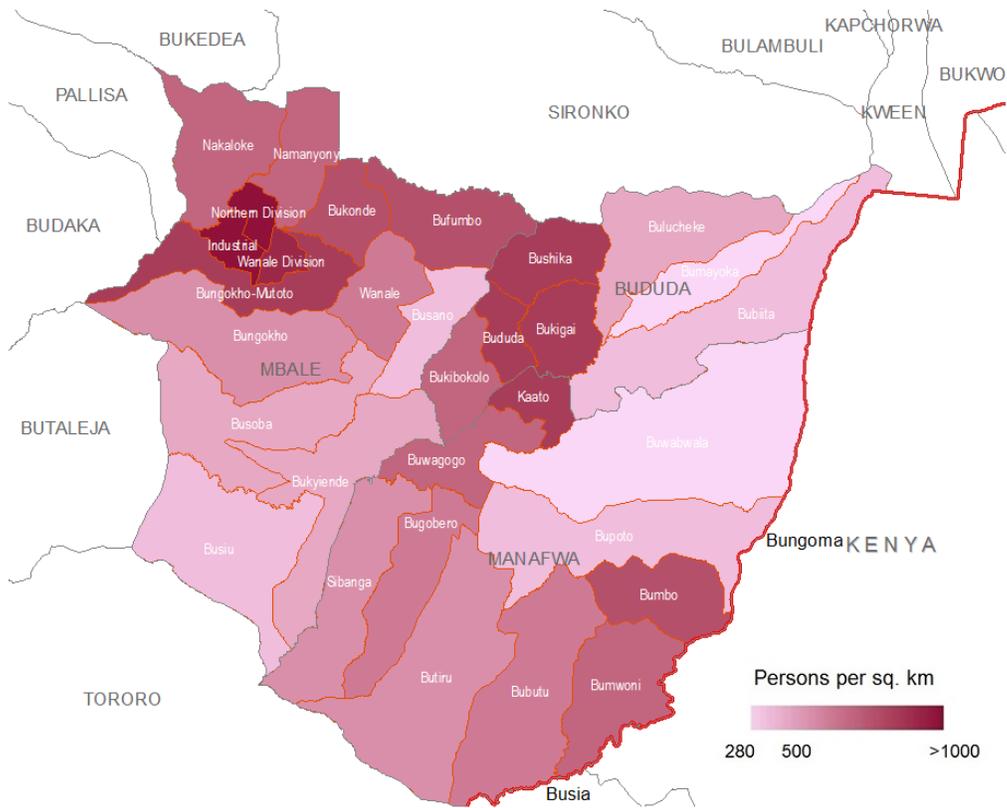
**Need to improve information sources and flows to enhance adaptive capacity**

One of the constraints to climate change studies for the Mbale region is the limit on weather data collected. There is an urgent need to improve collection of weather data in the region. Weather stations have in the past been normally located in urban areas, however, to provide useful information, weather stations need to be strategically distributed across the region to adequately represent low and high elevation areas. Improvement of weather data collection should go hand-in-hand with promoting awareness and building capacity among the Mbale region stakeholders, particularly local governments, technical officers and education establishments about the need to and the appropriate methods for collecting weather data.

As was the case for most of the country, there was a relatively good coverage of weather stations in the Mbale region for most of the 20<sup>th</sup> century (up to about 1980s). However today, most of these stations are no longer operational. It is recommended that it is most preferable that at least one fully functioning weather station is set-up within each of the districts. In addition, given the wide range of elevations in these areas, Bududa and Manafwa could each operate two weather stations, one located in the mid elevation and another in the high elevation areas. These stations should preferably record at minimum, rainfall, temperature, wind velocity and relative humidity.

Improved information flows and management are important in successfully dealing with climate change, particularly including information about climate trends and projected impacts. Adaptive management of resources is vital, necessitating changing the techniques and methods of responding to climate change in response to changes in climate that are underway.

Improved information flows are important to support increased adaptive capacity. This involves not only opening up communication channels between technical staff and local communities, but also facilitating the flow of information along those channels for example through ensuring that information is translated so it can be accessed and understood by all members of the community (e.g. weather forecast and warnings of extreme weather events).



Population density in the Mbale Region based on 2010 estimates

**Conclusions**

Vulnerability to climate change is a function of exposure, sensitivity and adaptive capacity of the environment and society to deal with the risks of climate change. Whereas exposure and sensitivity cannot be easily changed, reducing vulnerability to climate change in the Mbale region will mostly be through enhancing adaptive capacity. Enhancing climate change adaptive capacity of the environment and the people of Mbale region requires an increase in the tree cover, coupled with a reduction in the excessive cutting of trees on farms and clearing of forests, the strengthening the banana-coffee system and encouraging use of minimum tillage / conservation agriculture for crop growing. The high density of the human population of the Mbale region means that already most locations are supporting people beyond the carrying capacity. Regulations are needed to control settlements and cultivation on steep slopes, because both increase the risk of landslides and rates of soil erosion.

Enhancing climate change adaptive capacity of the people of Mbale region will require that the literacy of the society is improved and that the society is aware of how human activities are contributing to and increasing vulnerability to climate change. People need to be supported to secure viable alternative sources of livelihoods and with opportunities to participate in decision-making affecting their region. Notably, the multinational companies dealing in coffee should also be participating to help local coffee cooperatives plan targeted interventions to deal with the impacts of climate change.

The Mbale region is a major producer of banana and arabica coffee in Uganda. The two crops are produced on the same piece of land in an intercrop system. The banana and coffee system is more productive than monocultures of either crop. This system should be made more resilient to the impacts of climate change by emphasizing the use of shade trees such as *Cordia milleni* and *Albizia* species and the use of other sustainable soil and water management techniques such as mulching and minimum tillage. Shade-grown coffee has been shown to be more resistant to attacks by the coffee berry borer. Farmers should be encouraged to actively implement other soil and water conservation / sustainable land management technologies.

Developing climate change mitigation and adaptation plans needs to build upon development interventions that have been or are currently underway in the Mbale region. This will help in consolidating achievements and build on lessons, making use of information from existing or recent climate change adaptation interventions. A good example is the Mt. Elgon Regional Ecosystem Conservation Programme (MERECP). The goal of MERECP was integrated ecosystem conservation and management of natural resources and biodiversity and enhanced well-being to people and the environment.

Act even when data available is limited. Waiting until data collection and analysis are perfect is not an option.

**Further information**

UNDP country office for Uganda (Ms. Rebecca Nanjala, Project Manager - [rebecca.nanjala@undp.org](mailto:rebecca.nanjala@undp.org))

Source: TACC-Mbale Project Office Consultancy Report - Developing Climate Profiles and Assessment of Risk and Vulnerability to Climate Change in the Mbale Region of Uganda, prepared by Michael Mbogga ([michael.mbogga@gmail.com](mailto:michael.mbogga@gmail.com))