

Research Application Summary

**Climate change adaptation strategies in the semi-arid region of Uganda**

Majaliwa, J.G.M.<sup>1</sup>, Mukwaya, P.<sup>2</sup> & Isubikalu, P.<sup>3</sup>

<sup>1</sup>Makerere University, Institute of Environment and Natural Resources, P. O. Box 7062, Kampala, Uganda

<sup>2</sup>Makerere University, Department of Geography, P. O. Box 7062 Kampala, Uganda

<sup>3</sup>Makerere University, Faculty of Agriculture, Department of Extension, P. O. Box 7062, Kampala, Uganda

Corresponding author: majaliwam@hotmail.com, majaliwam@muienr.mak.ac.ug

**Abstract**

This project documented the major climate change shocks, community adaptations and coping strategies in semi-arid areas of Uganda. The study adopted both qualitative and quantitative research approaches. The study was conducted in four districts namely Nakasongola, Rakai, Soroti and Kiruhura. Seven hundred households were subjected to semi-structured interviews. In addition, field observations, Remote Sensing, GIS and modeling techniques were used capture the trends of bio-physical (land-use/cover; carbon stock) and socio-economic parameters. Results indicated that drought, war, foot and mouth disease; and long drought spells, strong winds, increased pests and diseases especially termites, and increased frequency of floods are among the shocks faced by pastoralists and cultivators respectively. In addition, cultivators were facing a number of challenges including fuel wood scarcity, inadequate pasture, inadequate technical knowledge, inadequate tools and materials, and lack of income. Farmers perceived training and formation of farmer associations, use of pesticides, use of soil and water conservation practices and saving part of the income as major coping strategies. There is need for sensitization for diversification of livelihoods, community participation in joint climate change mitigation and adaptation strategies and strengthen community institutions for regeneration of drylands.

Key words: Climate change, drylands, energy, participation, Uganda

**Résumé**

Ce projet a documenté les chocs majeurs du changement climatique, les stratégies d'adaptation et de faire face de la communauté dans les régions semi-arides de l'Ouganda. L'étude a adopté à la fois les approches de recherche qualitative et quantitative. L'étude a été menée dans quatre districts à savoir Nakasongola, Rakai, Soroti et Kiruhura. Sept cent ménages ont été soumis à des entretiens semi-structurés. En plus, les observations de terrain, la télédétection, le SIG et des

techniques de modélisation ont été utilisées pour reproduire les tendances des paramètres bio-physiques (utilisation de terre/couverture; stock de carbone) et les paramètres socio-économiques. Les résultats ont indiqué que la sécheresse, la guerre, la fièvre aphteuse, et des périodes de sécheresse longue, des vents forts, le nombre croissant des parasites et des maladies spécialement les termites, et la fréquence accrue des inondations sont parmi les chocs auxquels sont confrontés respectivement, les éleveurs et les cultivateurs. En outre, les cultivateurs ont été confrontés à un certain nombre de défis, notamment la rareté du bois de chauffage, les pâturages insuffisants, l'insuffisance des connaissances techniques, des outils et le matériel insuffisants ainsi que le manque de revenu. Les agriculteurs ont pensé la formation et l'organisation des associations d'agriculteurs, l'utilisation de pesticides, l'utilisation des pratiques de conservation de l'eau et des sols et les économies d'une partie des revenus comme grandes stratégies d'adaptation. Il est nécessaire pour la sensibilisation à la diversification des moyens de subsistance, la participation de la communauté dans l'atténuation du changement climatique et des stratégies communes d'adaptation et de renforcer les institutions communautaires pour la régénération des terres arides.

Mots clés: Changement climatique, terres arides, énergie, participation, Ouganda

## Background

Climatic changes in Uganda have affected the livelihoods of many people in various ways, but most significantly farmers (Kabassa, 2008), who largely rely on rain fed agriculture and other natural resources. Most of the General Circulation Models (GCMs) predict mean annual temperatures increment of 0.7°C and 1.5°C by the year 2020 in Sub-Saharan Africa. This is likely to increase the severity and frequency of droughts and heat waves in the region (Hulme *et al.*, 2001; Goulden, 2006; Cline, 2007; Christensen *et al.*, 2007). This increment will result into significant impacts on natural resources. According to Christensen *et al.* (2007) rainfall is likely to increase by 7% on average across the diverse agro-ecological zones of East Africa. Such changes will have greater impact in humid tropical areas like the Lake Victoria Basin of eastern Africa. Climate change models predict rainfall increase in the Lake Victoria Basin and to decrease in arid and semi-arid areas such as the northern region (Hulme *et al.*, 2001; Cline, 2007; Christensen *et al.*, 2007).

Farmers have taken steps to respond to the climatic changes and variability. The most common adaptation strategies in SSA

are changing the types of crop and migrating to other areas. Empirical evidence has shown that sustainable land and water management (SLWM) practices enhance adaptation to climate change (Smith *et al.*, 2008; Cooper *et al.*, 2009). However, there is limited evidence that farmers have used SLWM as an adaptation strategy in Uganda.

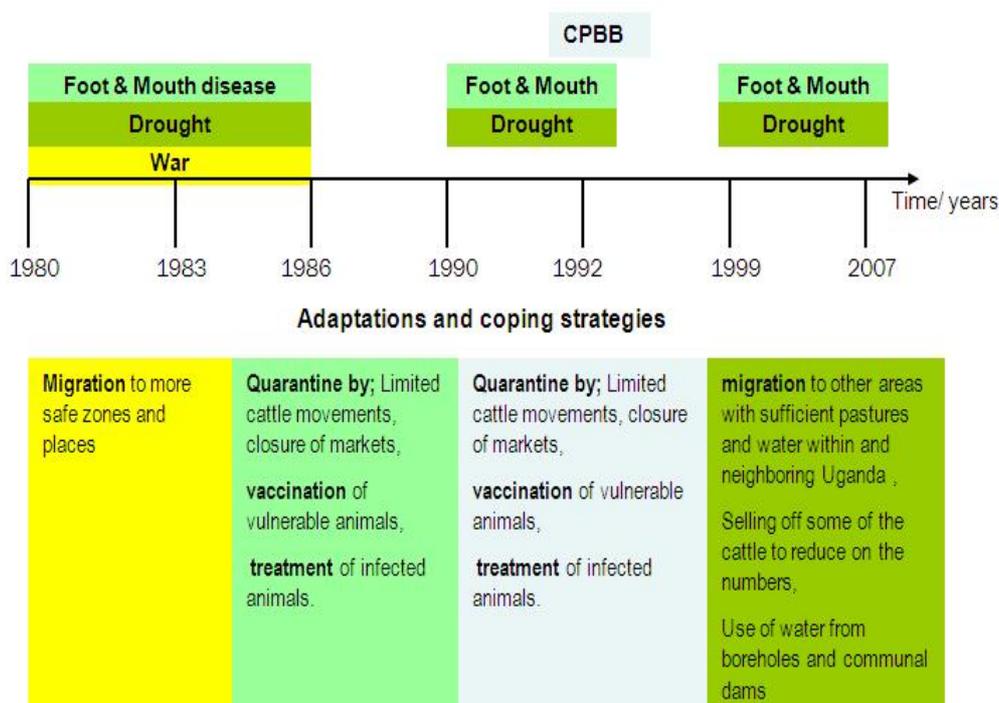
This study aimed at documenting climate change adaptation responses; challenges faced by farmers in responding to climate change and variability and generate context-specific recommendations in order to improve food security and economic prospects while conserving the environment.

### **Study Description**

The study was conducted in four districts (Nakasongola, Kiruhura, Rakai and Soroti) situated in the semi-arid regions of Uganda. Assessment of major climatic shocks, coping strategies and mapping of the mobility paths of the pastoralists was conducted in Kiruhura and Nakasongola located in south western and central Uganda, respectively. A total of 60 adult pastoralists were randomly selected in the different sub-counties of these districts. Farmers' perception on climate change, their adaptive responses or coping strategies and challenges they face in crop production was conducted in Rakai and Soroti districts located in central and Eastern Uganda respectively. Data were obtained through semi-structured interview, focus group discussions, field observations and modeling. Structured questionnaires were administered to a total of 700 households across the four districts. GIS and Remote sensing techniques were used to map the movement of pastoralists, to determine the trend in land-use/cover and carbon stock from 1973 to 2010.

### **Research Application**

Findings indicated that pastoralists and cultivators have experienced different sets of climatic shocks for the last 50 years. Pastoralists reported prolonged drought, war and foot and mouth disease was the predominant climatic shocks (Fig. 1). Their major responses were migration, quarantine, vaccination and treatment of cattle. Long drought spell and strong winds, increased floods, inadequate pasture, increased pests and diseases especially termites are the major shocks related to climate change faced by cultivators. They believe that compared to the 1980s rainfall patterns, rainfall has become erratic and its amount has significantly reduced. Inadequate technical knowledge, inadequate tools and materials, and lack of income were among the challenges hindering their capacity to respond to the climate related shocks.



**Figure 1.** The major climatic shocks experienced by pastoralists (western Uganda) in the last 3 decades.

In addition, fuelwood scarcity is on the increased since 1980 with demographic pressure and subsequent horizontal expansion of agricultural land. Households consequently responded by using Lorena stove version, and few of them have started planting woodlots of Pine and eucalyptus.

These results can be used to:

- develop context specific climate change adaptation and mitigation strategies
- plan for resources to adapt: socially, technologically and financially; and promote innovation in responding to climate change posed challenges.

### Acknowledgement

We thank RUFORUM and Agricultural Innovations for Dryland Africa (AIDA-EU Project) for providing the funds for this study.

### References

- Christensen, J.C. 2007. Regional Climate Projections. Climate Change 2007: The Scientific Basis. IPCC Fourth Assessment Report. Cambridge University Press, 2007.
- Kabassa, J. 2008. Weather, Climate and Climate Change in national development sub-sector paper. Consultancy report

- submitted to the Ministry of Water, Land and Environment, Kampala Uganda.
- Smith, P., Martino, D., Cai, Z., Gwary, D., Janzen, H., Kumar, P., McCARL, B., Ogle, S., O'Mara, F., Rice, C., Scholes, B., Sirontenko, O., Howden, M., McAllister, T., Pan, G., Romanenkov, V., Schneider, U., Towprayoon, S., Wattenbach, M. and Smith, J. 2008. Greenhouse gas mitigation in agriculture. *Philosophical Transactions of the Royal Society B* 363 (1492):789-813.
- Cline, W. 2007. Country-level climate projections. Global warming and agriculture: Impacts estimates by country. Washington, DC: Peterson Institute.
- Cooper, P., Rao, K.P.C., Singh, P., Dimes, J., Traore, P. and Twomlow, S. 2009. Farming with current and future climate risk: Advancing a 'Hypothesis of Hope' for rainfed agriculture in the semi-arid tropics, Draft Mimeo, ICRISAT, Nairobi, Kenya.
- Goulden, M. 2008. Building resilience to climate change in lake fisheries and lake-shore populations in Uganda. Policy briefing note. Tyndall Centre for Climate Change Research, University of East Anglia, UK (Forthcoming).
- Goulden, M. 2006. Livelihood diversification, social capital and resilience to climate change variability amongst natural resource dependent societies in Uganda. PhD Thesis, School of Environmental Sciences, University of East Anglia.