

Climate Learning for African Agriculture: Working Paper No.7

Climate Learning and Knowledge Management within Uganda's Agricultural Research and Advisory Services

Margaret Najjingo Mangheni

Titus Kisauzi

Richard Miiro

Department of Extension and Innovation Studies,

Makerere University Uganda

mnmangheni@agric.mak.ac.ug

June 2013



UNIVERSITY
of
GREENWICH | Natural
Resources
Institute

Foreword

The project “Climate Learning for African Agriculture”, funded by the Climate and Development Knowledge Network, and led by the Natural Resources Institute (NRI) of the University of Greenwich, the African Forum for Agricultural Advisory Services (AFAAS) and the Forum for Agricultural Research in Africa (FARA), is very pleased to present this Working Paper on Uganda written by Dr Margaret Mangheni and her collaborators Richard Miiro and Titus Kisauzi. This study has involved extensive research at both the national level and in two case-study districts, Masindi and Nakosongola.

At a national level, Dr Mangheni finds a low level of harmonisation between climate and agriculture policies, for example between the National Adaptation Programme of Action and the Agricultural Technology and Agribusiness Advisory Services. At a district level, existing District Environment Policies are largely unknown to staff and climate change is seen more as an environmental issue than as an agricultural issue. A proliferation of projects is driven by the availability of donor funds, but communication between projects, and learning from them, is poor. The authors analyse this situation in terms of the constraints on *knowledge management* and make practical suggestions as to how this could be improved at all levels,

The CLAA project would like to thank Richard Lamboll and Dan Kisauzi for their support to the Ugandan case study and help in editing this Working Paper.

John Morton

Project Leader, Climate Learning for African Agriculture

and Professor of Development Anthropology

NRI, University of Greenwich

j.f.morton@gre.ac.uk

LIST OF ACRONYMS

AAS:	Agricultural Advisory Services
AASP:	Agricultural Advisory Service Provider
AEZs:	Agro-Ecological Zones
AFAAS:	Africa Forum for Agricultural Advisory Services
AFID:	Agency for Inter-regional Development
AFRI:	African Innovations Institute
ASDI:	Agency for Sustainable Development
AT Uganda:	Appropriate Technology Uganda
ATAAS:	Agricultural Technology and Agribusiness Advisory services
BTC:	Belgian Technical Cooperation
CAES:	College of Agricultural and Environmental Sciences
CAN-U:	Climate Change Action Network –Uganda
CBOs:	Community Based Organisation
CCU:	Climate Change Unit
CDM:	Clean Development Mechanism
CIM:	Centre for International Migration and Development
COP:	Conference of the Parties
COVAB:	College of Veterinary Medicine, Animal Resources and Bio-security
CSOs:	Community Service Organisations
DENIVA:	Development Network of Indigenous Voluntary Associations
DSIP:	Agriculture Sector Development Strategy and Investment Plan
EIA:	Environment Impact Assessment

FARA:	Forum for Agricultural Research in Africa
GCCA:	Global Climate Change Alliance
GHGs:	Green House Gases
ICPAC:	Climate Prediction and Applications Centre
ICRAF:	International Council for Research in Agroforestry
IGAD:	The Intergovernmental Authority on Development
IGAs:	Income Generating Activities
IPs:	Implementing Partners
KM:	Knowledge Management
KY:	Kyoto Protocol
MAAIF:	Ministry of Agriculture Animal Industry and Fisheries
MADIFA:	Masindi District Farmers' Association
MET:	National Meteorological and Hydrological Services
MFPED:	Ministry of Finance, Planning and Economic Development
MWLE:	Ministry of Water, Lands and Environment
NAADS:	National Agricultural Advisory Services
NADIFA:	Nakasongola District Farmers' Association
NAPA:	National Adaptation Programme of Action
NARO:	National Agricultural Research Organisation
NARS:	National Agricultural Research System
NDP:	National Development Plan
NGO:	Non-Governmental Organisation
NRM:	Natural Resources Management
RUFORUM:	Regional Universities Forum for capacity development in Agriculture

SLM:	Soil and Land Management
SNC:	Sub county NAADS Coordinator
START:	System for Analysis, Research, and Training
UBOS:	Uganda Bureau of Statistics
UNCCD:	United Nations Convention on the Control of Desertification
UNEP:	United Nations Environment Programme
UNFFE:	Uganda National Farmers' Federation
VEDCO:	Volunteer Efforts for Development Concerns
WMO:	World Meteorological Organisation
ZARDI:	Zonal Agricultural Research and Development Institute

EXECUTIVE SUMMARY

Introduction and methodology

The Uganda country study is part of a series of case studies carried out under a project entitled Climate Learning for African Agriculture, funded by the Climate and Knowledge Development Network. Uganda is a land-locked country in East Africa lying across the equator. It has equatorial climate with moderate temperatures and humid climatic conditions throughout the year. The climate is an important factor in Uganda's economy, which heavily relies on agriculture, for employment of over 70% of the population, for foreign exchange earnings, and as a source of local raw materials for industries. Considered one of the most vulnerable and least climate resilient countries, Uganda has already experienced increased frequency and intensity of extreme weather events such as droughts, heavy and erratic rains, floods, landslides in highland areas, and heat waves over the past several decades. Such instances have caused various stresses to the populace including reduced agricultural yields, destruction of property, increased soil erosion, more pressure on land, food insecurity, increased deforestation and increased disease incidences. In the future, yearly and monthly rainfall increases with less seasonality have been predicted, but increases in temperatures of between 1 °C and 2.3 °C by 2050 threaten productivity of key cash crops notably coffee and tea.

The study had two aims. First was to assess through a shared learning process for Sub-Saharan Africa as a whole and for selected case study countries, the extent to which agricultural research and advisory services (public, NGO, and commercial private sector) have incorporated climate considerations in their policies and operations. Secondly, the project sought to identify practical strategies for making agricultural knowledge management, and thus smallholder agricultural development in Africa, more climate-compatible. The country case studies were seen as collective learning processes with the objective of stimulating awareness and reflection in agricultural research and advisory services on how to manage agricultural knowledge in the face of climate change and increasing uncertainty. Specifically, the study assessed development and up-take of climate compatible development ideas and practices within agricultural research and advisory services in Uganda; identified factors driving and limiting uptake; and recommended future pathways for climate compatible agricultural knowledge management, as well as practical strategies for strengthening and re-orienting services.

The learning engagements were carried out in three phases. Phase 1 involved individual key informant interviews with key actors in research and advisory service organisations at national level while the 2nd phase involved district level learning workshops in 2 purposively selected districts Masindi and Nakasongola. At this interface, participants included farmer leaders, local level staff of research and advisory services, local government, private sector and NGO actors in agriculture and environment. The last phase constituted a national learning workshop involving

researchers and advisory service providers engaged in climate change initiatives in the organisations selected in phase 1 and 2.

The national context

The study found that awareness about climate change has tremendously increased in Uganda over the last 10 years resulting in numerous donor funded projects implemented by individuals and organisations. At national level, climate change has attained some level of priority reflecting urgency on the part of the Ugandan government to address the issue. The Climate Change Unit (CCU) under MWLE has been charged with implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol (KP). The National Development Plan has also been aligned to support this goal. A notable achievement has been the launching of the National Adaptation Programmes of Action in 2007 which highlighted nine priority projects. However, progress in its implementation is slow due to among other things limited funding and capacity. There are also questions pertaining to its content, formulation process, and inadequate awareness among key stakeholders.

The various policies and programmes guiding public agricultural extension and advisory services including the NDP (2010), DSIP 2010/11-2014/15, and ATAAS, point out the need to address climate change. However, lack of harmonisation of priorities in key policies such as ATAAS with the NAPA has led to disunity in implementation. Also, the existence of policy has not automatically led to translation of priorities into projects on the ground as the NAADS programme has not yet consciously addressed climate change issues. Unlike the NGOs, which were implementing specific climate change programmes, coupled with greater dynamism, the government extension arm has been slow in institutionalising climate change issues and thus forfeited its leadership role. Generally, research and extension institutions were still wanting in the area of developing policies and streamlining climate change issues. With regard to research, the National Agricultural Research policy had not yet been aligned with the national climate change strategic directions as it makes reference only to broad natural resource management without specific mention of climate change. However, the National Agricultural Research Organisation climate change policy formulation is underway with support from the Rockefeller Foundation. At Local Government level, the available District Environment Policies are little known and rarely referred to by staff and other stakeholders. Overall, climate change in many regards is still viewed by many at district level as an environmental and not an agricultural issue.

Nonetheless, a variety of projects related to climate change, of varying sizes, are being implemented at all levels, involving multiple actors, often in isolation. Most of these initiatives are covering limited areas over a brief period of time hence achieving limited impact. The fragmented efforts suffer from poor coordination resulting in duplication, and failure to

synergise for greater impact. Other perceived critical gaps include inadequate capacity, limited prioritisation of climate change in national and district budgets, concentration of most research on a few climate change issues, notably drought, to the neglect of others such as conservation agriculture and water management to control floods and landslides. The research conducted does not consciously respond to farmers' needs, and packaging and dissemination of information generated is through inappropriate channels such as academic papers and reports to donors, which are not readily accessible to local audiences. It is no wonder that there is limited translation of research results into action. In addition, there are inadequate up to date reliable early warning systems as well as poor coordination between zonal and national meteorological centres.

A major force behind the proliferation of such projects is the availability of donor funds. This may mean that climate change efforts are driven more by the international than the local agenda. The learning events facilitated during this project led stakeholders to the realisation of the problem of limited sharing across projects and organisations. It became evident that successful response to climate change will be a result of synergies between different players ranging from development partners, government, civil society (NGOs), private sector, to farmers. Therefore, to harness the individual and organisational efforts maximally, the different players must be well directed and coordinated through established policies and structural frameworks interlinked across the various levels, that is, national, regional, district and lower administrative units. This set-up will facilitate effective and efficient knowledge management to support adaptation and mitigation efforts at all levels. Existing institutions and stakeholder platforms such as the Climate Change Unit under the MWLE, AFAAS, district climate change platform (such as that of Nakasongola district), and CAN-U could be strengthened to take on the role of climate change knowledge management.

Effective climate change response hinges on an effective knowledge management system. While the study identified several initiatives related to knowledge management for climate change, notable constraints were identified. Barriers affecting researchers include resource constraints; uncondusive organisational policies; poor individual researcher attitudes towards information sharing; and lack of capacity. Resource barriers include costs for accessing academic journals and other information sources, computers, limited internet connectivity and lack of time. Regarding organisational policies, various donors have restrictions on sharing of information generated from research they have funded while a number of research organisations lack formalised knowledge management procedures and rewards for sharing information. Coupled to this was a prevalent lack of interest to share information on the part of individual researchers and inadequate expertise to package information targeted at various audiences.

The main constraints faced by farmers fall into three main categories, namely, deficiencies in the service providers who supply the information and the information itself; limited capacity of farmers; and inadequate resources. Advisory service providers lack up-to-date information on climate change due to weak or non-existent linkages with research and other information sources, such as platforms and networks for shared learning, and regular trainings. Districts lack clearly laid out knowledge management strategies that adequately support and reward advisory service providers to seek for and share new information.

Overall, leadership, coordination and long-term commitment will be vital in establishing functional and operational knowledge management systems at the different levels. A good knowledge management system for climate change should make adequate provisions for knowledge capture; a web-based content management system that integrates multimedia content, geographic/geospatial information, a metadata search engine, messaging and collaboration, and networking; capacity development; design and development of knowledge products; research, monitoring and evaluation; and a resource centre and repository. In addition, when the climate change knowledge management system is in place, it should be maintained as operational and functional. Beyond an organisational knowledge management system, a sectoral and thematic climate change knowledge management system, which links all the stakeholders involved in climate change, that is, central government, local governments, NGOs, civil society and the private sector is recommended. Finally, there is a need for consistent efforts to build capacity (in terms of facilities, skills and attitudes) of organisations and individual researchers, advisory service providers, farmers and other relevant actors to value, contribute to and utilise the knowledge management system.

TABLE OF CONTENTS

Foreword	ii
LIST OF ACRONYMS	iii
EXECUTIVE SUMMARY.....	vi
Introduction and methodology.....	vi
The national context	vii
TABLE OF CONTENTS	x
List of Boxes	xii
List of Figures	xii
List of Tables	xii
1. INTRODUCTION	1
1.1 Background and aims	1
1.2 Why climate compatible knowledge management?	2
1.3 Fieldwork methodology.....	2
1.4 Structure of the report	3
2. UGANDA AND THE CASE-STUDY DISTRICTS.....	4
2.1 Country profile.....	4
2.2 District profiles	5
2.2.1 Masindi district	5
2.2.2 Nakasongola district.....	5
2.3 The link between climate change and agriculture.....	6
2.4 Observed and projected climate change threats in Uganda	7
3. FINDINGS	10
3.1 Uganda’s national climate change policy framework.....	10
3.2 The status of integration of climate change into agricultural extension policies and strategies	13
3.3 The status of integration of climate change into agricultural research policies and strategies	16
3.4 The status of integration of climate change into local government policies and strategies	18

3.5	Climate change initiatives in Uganda.....	23
3.5.1	Knowledge management related initiatives at district level.....	27
3.5.2	Knowledge and information dissemination/sharing fora/strategies effective for reaching farmers, advisory service providers and policy makers.....	28
3.6	Overall assessment of climate change response by agricultural research and advisory services	32
4.	CONCLUSIONS AND RECOMMENDATIONS	34
4.1	Conclusions.....	34
4.2	Recommended future pathways for improved knowledge management	35
5.	REFERENCES	37
6.	ANNEXES.....	40
	Annex 1: Examples of national level climate change initiatives in research, advisory services and policy.....	40
	Annex 2: National and district level climate change initiatives in advisory services and policy	47
	Annex 3: Examples of climate change project profiles from Nakasongola district.....	52
	Annex 4: Lists of persons interviewed and workshop participants	54
	A. From AAS institutions/organisations	54
	B. From research institutions/organisations	54

List of Boxes

BOX 1: PERCEIVED WEATHER CHANGES IN MASINDI AND NAKASONGOLA DISTRICTS IN THE LAST 10 YEARS	8
BOX 2: PERCEIVED WEATHER CHANGE IMPACTS/EFFECTS IN MASINDI AND NAKASONGOLA DISTRICTS	9
BOX 3: DETAILS OF THE NDP'S RESOLUTIONS ON CLIMATE CHANGE.....	10
BOX 4: ROCKEFELLER FUNDED PROJECT TO DEVELOP A CLIMATE CHANGE RESEARCH POLICY FOR NARO	17
BOX 5: POLICY DIRECTIONS FOR AGRICULTURE - MASINDI AND NAKASONGOLA DISTRICTS.....	18
BOX 6: POLICY DIRECTIONS FOR CLIMATE CHANGE - MASINDI AND NAKASONGOLA DISTRICTS	20
BOX 7: OBJECTIVES OF THE PRODUCTION SECTOR PARTNERS' PLANNING WORKSHOP ON CLIMATE CHANGE - NAKASONGOLA DISTRICT	21
BOX 8: NAKASONGOLA DISTRICT PRIORITY AREAS FOR CLIMATE CHANGE AND AGRICULTURE RELATED SECTORS.....	22
BOX 9: POLICY ON ENVIRONMENTAL INFORMATION, EDUCATION, HUMAN RESOURCE DEVELOPMENT, RESEARCH, AND PUBLIC PARTICIPATION IN ENVIRONMENT MANAGEMENT - NAKASONGOLA DISTRICT	23
BOX 10: THEMATIC AREAS FOR CLIMATE CHANGE INITIATIVES AT NATIONAL AND REGIONAL LEVELS.....	24
BOX 11: THEMATIC AREAS FOR CLIMATE CHANGE INITIATIVES AT DISTRICT LEVEL.....	24
BOX 12: ASPECTS CRITICALLY MISSING IN CLIMATE CHANGE RESPONSE BY AGRICULTURAL RESEARCH AND EXTENSION SECTORS IN UGANDA	26
BOX 13: EXAMPLES OF KNOWLEDGE MANAGEMENT RELATED INITIATIVES IN MASINDI DISTRICT	27
BOX 14: RECOMMENDED MEDIA FOR CLIMATE CHANGE COMMUNICATION AMONG FARMERS, ADVISORY SERVICE PROVIDERS AND POLICY MAKERS	28
BOX 15: CONSTRAINTS IN ORGANISING, ACCESSING AND USING CLIMATE CHANGE KNOWLEDGE	29
BOX 16: SUGGESTED PRACTICAL STRATEGIES FOR IMPROVING THE PERFORMANCE OF THE KNOWLEDGE MANAGEMENT SYSTEM	31
BOX 17: FACTORS DRIVING AND LIMITING CLIMATE CHANGE RESPONSE IN RESEARCH AND ADVISORY SERVICES.....	33
BOX 18: STRUCTURE OF NATIONAL CLIMATE CHANGE FORUM	35
BOX 19: COMPONENTS OF A GOOD KNOWLEDGE MANAGEMENT SYSTEM FOR CLIMATE CHANGE	36

List of Figures

FIGURE 1: MAP OF UGANDA SHOWING STUDY DISTRICTS	4
FIGURE 2: EXISTENCE OF A CLIMATE CHANGE POLICY IN ORGANISATIONS REPRESENTED IN THE NATIONAL WORKSHOP.....	15

List of Tables

TABLE 1: NAPA PRIORITY PROJECTS AND THEIR ESTIMATED COSTS (US\$) FOR LIMITED AND COUNTRYWIDE INTERVENTIONS.....	12
---	----

1. INTRODUCTION

1.1 Background and aims

This country study was carried out under a project implemented by the Natural Resources Institute of the University of Greenwich, the Forum for Agricultural Research in Africa (FARA) and the African Forum for Agricultural Advisory Services (AFAAS) with funding from the Climate and Knowledge Development Network. The Climate Learning for African Agriculture project aims to: i) Assess through a shared learning process for Sub-Saharan Africa as a whole and for selected case study countries, the extent to which agricultural research and advisory services (public, NGO, and commercial private sector) have incorporated climate considerations in their policies and operations; ii) Identify practical strategies for making agricultural knowledge management, and thus smallholder agricultural development in Africa more climate compatible. The country case studies were seen as collective learning processes with the objective of stimulating awareness and reflection in agricultural research and advisory services on how to manage agricultural knowledge in the face of climate change and increasing uncertainty. A facilitator selected from the Uganda Forum for Agricultural Advisory Services, the country chapter of AFAAS, facilitated stakeholders in a collective learning process which aimed to improve access to information and understanding about Climate Compatible Development and agriculture. Specifically, the national facilitator carried out the following tasks:

- (i) Review of relevant secondary literature on observed and projected climate threats, adaptations options, and issues relating to climate mitigation through agriculture; the current organisation of agricultural research and advisory services; and the current state of incorporation of climate considerations by them.
- (ii) Development of study methodology and field work plan.
- (iii) Collection of primary data through field work.
- (iv) Documentation of the stakeholder engagement processes and analysis of the data to: (a) Assess development and up-take of Climate Compatible Development ideas and practices within agricultural research and advisory services in Uganda; (b) Identify factors driving and limiting uptake, future pathways for climate compatible agricultural knowledge management; practical strategies for strengthening and re-orienting services; and challenges and opportunities

1.2 Why climate compatible knowledge management?

Knowledge may be considered as a factor of production just like labour, land and financial resources because it is the intellectual capital of organisations. Knowledge management relates to ways of harnessing knowledge as a resource or capital, with emphasis on capturing and exchanging of information so as to contribute to learning and change within organisations and systems. People and learning are central in knowledge management, implying that sharing and applying knowledge ought to take place as people interact as stakeholder groups, and as communities of interest (Kibwika and Sseguya, 2011). According to OECD (2003), knowledge management is a broad collection of organisational practices relating to generating, capturing and disseminating know-how, and promoting knowledge sharing within an organisation. The goal of knowledge management is knowledge sharing and reuse (Flor, 2011). However, most knowledge management systems are designed to support data and information processing rather than knowledge management (Kibwika and Sseguya, 2011). According to Kibwika and Sseguya (2011), knowledge management in an agriculture-oriented organisation is composed of three main elements: stakeholders (value chain actors, others who are eligible or interested); soft resources (data, information); and the agricultural world (the space in which stakeholders interact to share and exchange). Thus, with respect to the agriculture-climate change context, these elements represent a knowledge management system where stakeholders interact spatially and temporally in light of generated climate-related information to address climate change issues. Knowledge management for climate change is imperative because climate change is inevitable and irreversible; and therefore a society or country needs to know how it can mitigate or adapt to climate change. Resilience is the result of knowing and acting on one's options or alternatives (Flor, 2011).

1.3 Fieldwork methodology

The field work consisted of a series of repeated engagements with stakeholders in collective learning events organised in three phases. Phase 1 involved individual key informant interviews with relevant major actors in research and advisory service organisations at national level. An inventory of climate change research and advisory service initiatives in the selected organisations was taken. Research organisations visited included; National Agricultural Research Organisation (NARO), Makerere University (College of Agricultural and Environmental Sciences, College of Veterinary Medicine, Animal Resources and Bio-security), and the African Innovations Institute (AfrII). Agricultural advisory services organisations included; National Agricultural Advisory Services (NAADS) Secretariat; Ministry of Agriculture Animal Industry and Fisheries (MAAIF); NGOs, including Appropriate Technology (AT) Uganda, World Vision, Sasakawa Global 2000, Volunteer Efforts for Development Concerns (VEDCO), Environment Alert, Kulika Charitable Trust (U), and Oxfam. Key informants interviewed included leaders of the organisations and staff involved in climate change initiatives.

Phase 2 involved district level learning workshops in Masindi and Nakasongola districts. These districts were selected in order to leverage resources from other ongoing projects or initiatives. Masindi district was already participating in a Rockefeller Foundation funded project on gender and climate change for which the national facilitator is a co-Principal Investigator. Nakasongola district local government had already taken steps to introduce shared learning and coordination among climate change actors. While the Masindi workshop was convened by the project, the Nakasongola workshop was convened by the district local government. We learnt that a workshop aimed at facilitating coordination and sharing among climate change actors in the district was to be convened during the duration of this project and requested to be invited as participant observers. Participants for both district workshops included farmer leaders, local-level staff of research and advisory services, local government, private sector and NGO actors in agriculture and environment.

Phase 3 was a national learning workshop involving researchers and advisory service providers engaged in climate change initiatives in the organisations selected in phase 1 and 2. The purpose of the learning workshop was to share and validate the findings from phase 1 and 2, and to collect stakeholders' collective views on how to manage agricultural knowledge in the face of climate change and increasing uncertainty. The learning workshops adopted a mix of plenary and group discussions.

1.4 Structure of the report

Following this introduction, the report is divided into three main sections. Section 2 profiles the case study site (Uganda and the selected districts on relevant parameters), while Section 3 presents the findings. Section 4 provides conclusions and recommendations.

2. UGANDA AND THE CASE-STUDY DISTRICTS

2.1 Country profile

Uganda is a land locked country in East Africa lying across the equator. It occupies 241, 038 km², of which 18% is open water and swamps. Altitude ranges from around 600m asl on the Albert Nile to 5,110m asl at the summit of Mount Rwenzori Peak, with an overall average of around 1,200m asl. Figure 1 shows the location of the study districts within Uganda.

Figure 1: Map of Uganda showing study districts



A-Nakasongola B-Masindi

The climate is equatorial, with moderate temperatures and humid climatic conditions throughout the year. It has two rainy seasons in a year, which merge into one long rainy season in the north. The first rainy season is from March to June, while the second season is from August to November. The rainfall levels range from 400 to 2200 mm per year. Uganda's climate can be broadly classified into a highland climate with cool temperatures and moderate rainfall; a savannah tropical climate including lake basin climate which has moderate average temperatures of 28 °C and high mean annual rainfall of over 1200mm; and a semi-arid climate which has relatively high average temperatures ranging from 26.3 °C to 29.0 °C and low mean annual rainfall ranging from 887 to 905 mm (NAPA, 2007). The agricultural sector is the main source of livelihood for up to 77% of Ugandans (UBOS, 2003). In addition to providing the bulk of employment, this predominantly rain-dependent agriculture is important for providing basic

food requirements, contributing to the country's foreign exchange earnings and providing a source of local raw materials for industries.

2.2 District profiles

2.2.1 Masindi district

Masindi district is located in the mid-west part of Uganda, about 130 miles from the capital city, Kampala. It borders Buliisa district in the north, Nakasongola district in the east, Hoima and Kiboga districts in the south and the south-east, and the Democratic Republic of Congo in the west. The total area of the district is about 5,000 km², of which about 1,000 km² is wetlands and rivers, 2,843 km² wildlife protected area, and 1,031 km² under forest reserve. The district is generally a plateau with an average altitude of 1,295 meters asl. The highest points include Kigulya at 1,510 metres asl in Miirya sub-county, Fumbya in Bwijanga, and Kaduku in Kigumba. To the west is an arm of the great Western Rift Valley. There are several features associated with Rift Valley formation such as sudden slopes and flat areas of the Murchison Falls conservation area. Masindi has a favourable climate, with a bimodal rainfall pattern and annual long-term average rainfall of 1,304 mm. The district has three main climatic zones according to rainfall levels: (i) high rainfall zones, which receive more than 1000 mm per annum - Budongo, Pakanyi, Karujubu and Nyangahya sub-counties; (ii) medium rainfall zones, receiving between 800 and 1,000 mm per annum - Kigumba, and Kiryandongo sub-counties, and Bigando and Isimba parishes in Miirya sub-county; and (iii) lower rainfall zones, receiving less than 800mm of rainfall per annum - Masindi Port and Kimengo sub-counties.

Major economic activities of the high and medium rainfall zones include: pit-sawing especially in Budongo Forest, and production of maize, cassava, sugar cane, tobacco and banana. The major activities carried out in the low rainfall zone are livestock production, fishing and cotton growing. The district has a population of about 506,800 people, with a life expectancy of about 45 years (Masindi LG, 2009).

2.2.2 Nakasongola district

Nakasongola District is located in central Uganda on the Bombo-Gulu Road around 114 km north of Kampala. It borders Apac district in the north, Lira in the north-east, Mukono in the East, Masindi District in the West and Luwero District in the South. The district covers an area of 3424 square kilometers, with a projected total population of about 156,500 by 2012 based on the 2002 census and a population growth rate of 2.3% (UBOS, 2003). The district comprises of three counties, namely: Kyabujingo County (Kakooge, Kalongo and Kalungi sub-counties), Buluuli County (Lwampanga, Wabinyonyi sub-counties and Nakasongola Town Council), and Budyebo County (Nakitoma, Nabiswera and Lwabiyata sub-counties). Nakasongola is one of Uganda's driest districts, receiving rainfall of between 600 mm and 1000 mm per annum, with a five-

month long dry season. The people of the district rely on its natural resources, especially Lake Kyoga, to meet their food and other livelihood needs. Being located in the “cattle corridor”, livestock production is a major source of livelihoods and only about one-third of the people are crop farmers (Nakasongola LG, 2009). Major food crops include cassava, maize, sweet potato, sorghum, banana, millet, while major cash crops include coffee and cotton. Nakasongola district has suffered considerably from soil degradation, leaving land bare. This is partly due to high stocking rates of livestock, the increasing number of pastoralists from other areas and migrants from neighboring districts who have occupied Central Forest Reserves and other open areas. Charcoal production is also a major commercial enterprise in the district since the 1990s (Nakasongola LG, 2009). With Nakasongola being considered as one of the poorest districts in Central Uganda (Nakasongola LG, 2009), in addition to the high level of soil and vegetation degradation and several climate conditions, there are indications that the climate could be getting worse. The district is arguably a climate change “hot spot” in the country.

2.3 The link between climate change and agriculture

The concept of climate change is often confused with climate variability and weather and, therefore, it is important to define these concepts. Weather is basically the way the atmosphere is behaving, popularly, in terms of temperature, humidity, precipitation, cloudiness, brightness, visibility, wind, and atmospheric pressure, in the short-term, from minutes to seasons. Climate is the description of the long-term pattern of weather, that is, the average weather for a particular region and time period, usually taken over 30-years. Climate change is defined by the UNFCCC as a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability over comparable time periods (although the Intergovernmental Panel on Climate Change adopts a broader definition without necessary attribution to human activity).

Four factors are primarily thought to be responsible for past episodes of climate change on the earth, including solar output variations, earth-sun geometry, volcanic eruption and atmospheric carbon dioxide variations (Pidwirny, 2006). In addition to natural variability, current research has attributed the unequivocal warming of the global climate system to increases in the concentration of the greenhouse gases (GHGs), predominantly carbon dioxide. Other GHGs include methane (CH₄), nitrous oxide (N₂O) and chlorofluorocarbons (CFCs). Global GHG emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004. The largest growth in GHG emissions between 1970 and 2004 has come from energy supply, transport and industry (IPCC, 2007). Global increases in CO₂ concentrations are due to fossil fuel use and land-use change such as deforestation (Pidwirny, 2006; IPCC, 2007). A report by Global Envision titled “Ugandan Forests in Danger” stressed that the country's forests were disappearing at an alarming rate of 2% per year, the highest in the

world, threatening extinction of Uganda's forests in 50 years (Global Envision, 2007). An increase in methane concentration is most likely due to agriculture, especially rice cultivation, as well as ruminant digestion and manure management associated with domestic livestock and fossil fuel use. Increase in nitrous oxide concentration is also primarily due to agriculture, produced by soil cultivation practices, especially the use of commercial and organic fertilisers, fossil fuel combustion, nitric acid production, and biomass burning (Pidwirny, 2006; IPCC, 2007).

Impacts related to global warming have included increased global average air and ocean temperatures, widespread melting of snow and ice, rising global average sea level, and increasing frequency and severity of extreme weather leading to flooding, droughts and hurricanes. As such, global warming presents a significant threat to livelihoods and ecosystems sustainability around the world given its potential to cause loss of human lives and property, and reduced agricultural productivity (Kareiva, 2005; Stern, 2006). It is apparent therefore that agriculture is both a cause and victim of climate change which makes it vital for countries to target the sector for effective climate change mitigation and adaptation.

2.4 Observed and projected climate change threats in Uganda

Uganda is regarded as one of the most vulnerable and least climate resilient countries due to poverty and low income diversity and over reliance on climate sensitive livelihoods (NDP, 2010). Participatory Rural Appraisals (PRA) conducted in 12 districts as part of the NAPA formulation process (NAPA, 2007) and a study on climate change and poverty in Uganda in Bundibugyo and Kasese districts (Oxfam, 2008) revealed increased frequency and intensity of extreme weather events such as droughts, heavy and erratic rains, floods, landslides in highland areas, and heat waves over the past several decades. The consequences include reduced performance of several crops, destruction of property, increased soil erosion, more pressure on land, food insecurity, increased deforestation, and increased disease incidences and poverty. Specifically, frequent droughts have resulted in lowering of the water table leading to drying of bore holes; while outbreaks of waterborne diseases were reported in flood affected areas. According to NAPA (2007), in the fragile ecosystem of the cattle corridor stretching from the northeast to the south west, the prolonged and severe drought of 1999/2000 caused severe water shortage, leading to loss of animals, low production of milk, food insecurity, increased food prices and generally negative effects on the economy.

Worse still, climate change models for the future project greater changes, implying greater calamitous consequences for life on earth (Stern, 2006; IPCC, 2007). For instance, climate change projection studies for Africa warn that by 2020, 75-250 million people will be exposed to increased water stress, while in some countries yields from rain-fed agriculture could be reduced by up to 50% (IPCC, 2007). Even with curbed GHG emissions, it is expected that changes will continue for some time (Stern, 2006; IPCC, 2007). In Uganda, it is predicted that

the yearly and monthly rainfall will increase and the yearly and monthly minimum and maximum temperatures will increase moderately by 2020 and progressively by 2050. The overall climate will become less seasonal in terms of variation through the year, with temperature in specific districts increasing by about 1 °C by 2020 and 2.3 °C by 2050 (Managua, 2011). The changes will have impacts on agricultural production and food security, with significant effects on employment levels, particularly in the agricultural sector where over 70% of the country's population is engaged (NDP, 2010). For instance, a 2 degree rise in temperature could lead to 85% shrinkage in the area suitable for growing Robusta coffee in Uganda (Oxfam, 2008) which poses a significant threat to the coffee industry which is a major foreign exchange earner (MAAIF, 2011). The changes also have implications for current tea growing areas, another of Uganda's key cash crops. Suitability of the current tea-growing areas in will decrease significantly by 2050, with in many cases no alternative of moving cultivation up the altitudinal gradient. Areas that retain some suitability will see decreases of between 20% - 40%, compared with today's suitability of 60% - 80% (Managua, 2011). Other predicted negative impacts will be on national security, life span and durability of infrastructure, and hydro-power production (NDP, 2010).

Perceived weather changes in the past 10 years by participants in the stakeholders' workshops conducted in the two districts as part of this project largely agreed with the studies cited above (see Boxes 1 and 2 below).

Box 1: Perceived weather changes in Masindi and Nakasongola districts in the last 10 years

Masindi	Nakasongola
<ul style="list-style-type: none"> • Uneven rainfall distribution • Erratic heavy rains • Unexpected rains in harvesting seasons • Long, dry spells • More frequent thunder/ lightning and hailstorms • Heavy and fast winds • Rise in temperature even in areas around forests • Disappearance of fog 	<ul style="list-style-type: none"> • Increased frequency of droughts • High temperatures (39-40 degrees Celsius) • Drastic seasonal changes

Source: District Stakeholders' Workshops

Box 2: Perceived weather change impacts/effects in Masindi and Nakasongola districts

Masindi	Nakasongola
<ul style="list-style-type: none"> • Silting of River Kafu due to intensified farming activities on river banks • Interruptions in fish farming and natural fishing due to reduced water in ponds and natural streams respectively • Emergence of new pests e.g. coffee tree borer and Napier stunt disease in pasture • Increased encroachment on forests and wet lands hence reduction of forest cover • Increased selling of molasses and brewing as income generating activities (IGAs) • Changes in planting seasons • Reduced incomes and food security due to increased seasonal failure • Increased cost of fuel-wood due to reduced supply • Increased incidences of wild animals attacks on humans as a result of encroaching on their natural habitats 	<ul style="list-style-type: none"> • Disappearance of some plant and livestock species • Food insecurity • Malnutrition • Limited livelihood options • Water scarcity • Reduced pastures • Reduced production (crop, livestock) • Increased pest and disease incidences • Emergency of evasive species e.g. acacia, which are better adapted to the changed climate

Source: District Stakeholders' Workshops

3. FINDINGS

3.1 Uganda's national climate change policy framework

Uganda, being party to the UNFCCC and Kyoto Protocol, is obliged to put in place appropriate mitigation and adaptation measures to address the cause and effects of climate change as well as undertake education and awareness programmes. As part of the national response, the Climate Change Unit (CCU) was created in 2008, directly under the office of the Permanent Secretary within the Ministry of Water, Lands and Environment. The main objective of the CCU is to strengthen Uganda's implementation of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol (KP). Partner funders of the CCU include the Belgian Technical Cooperation (BTC Uganda), UNDP, the Danish Embassy and Centre for International Migration and Development (CIM) (CCU, 2012).

Current priorities of the CCU include the following:

- Development of the technical capacity of the CCU, including increased numbers and skills of personnel as well as equipping the office;
- Development of a climate change policy and mainstreaming guidelines to facilitate harmonised national action;
- Development of climate change awareness raising materials and the associated strategic awareness creation at all levels (Centre, local governments and community levels);
- Piloting and rolling out NAPA implementation;
- Climate change related research.

The National Development Plan (NDP) (NDP 2010) emphasises the need for a statutory order to fast track integration of climate change into local legislation and relevant sector policies. In line with this, the NDP affirms its position to help in addressing the challenges of the climate change sector through four objectives, the strategies and interventions of which are summarised in Box 3.

Box 3: Details of the NDP's resolutions on climate change

Objective	Strategy	Intervention description
Objective 1 Develop national capacity for coordination and implementation of climate change adaptation and	Address legal and institutional frameworks necessary for the implementation of the UNFCCC	<ul style="list-style-type: none">• Domesticate and enforce the UNFCCC and its related protocols• Strengthen the capacity and mandate of the Climate Change Unit for effective coordination and streamlining roles and linkages with other stakeholders• Undertake sectoral studies and identify their role in

mitigation activities		<p>climate change action</p> <ul style="list-style-type: none"> • Develop national climate change policy to provide a conducive policy and regulatory framework
Objective 2 Climate proof development planning	Re-define climate change as a development issue	<ul style="list-style-type: none"> • Increase climate change awareness, training and education at all levels • Implement the NAPAs with a focus on building community and ecosystems' resilience to climate change impacts • Building capacity through institutional and manpower development • Strengthen weather and climate monitoring for improved data generation • Conduct climate change research (adaptation and mitigation) and technology development • Develop mainstreaming guidelines with a strategy to climate proof development initiatives at all levels of government
Objective 3 Promote a low carbon economic development path	Provide and promote incentives for clean development	<ul style="list-style-type: none"> • Intensify public education on the role of emissions in global warming • Develop and implement incentive mechanism for reduced or avoided emissions • Build capacity of the private sector to effectively participate in clean energy development initiatives • Reduce overheads for CDM project formulation and development
Objective 4 Meet the country's international climate change related obligations	Implement climate change conventions	<ul style="list-style-type: none"> • Follow up the commitments and obligations in the conventions • Implement COP decisions • Participate in Climate Change Fora

So far, Uganda has been successful in preparing its National Adaptation Programme of Action (NAPA), which was launched in 2007. Preparation of the NAPA, which was designed to address specific urgent and immediate problems faced by communities, was coordinated by the Ministry of Water, Lands and Environment (MWLE). The Uganda NAPA prioritised nine projects among which the community tree growing project ranked highest (see table 1).

Table 1: NAPA priority projects and their estimated costs (US\$) for limited and countrywide interventions

Project title	Limited area interventions	Countrywide area interventions
1. Community Tree Growing Project	3.2	5.5
2. Land Degradation Management Project	2.5	4.7
3. Strengthening Meteorological Services	4.2	6.5
4. Community Water and Sanitation Project	2.8	4.7
5. Water for Production Project	4.0	5.0
6. Drought Adaptation Project	2.0	3.0
7. Vectors, Pests and Disease Control Project	3.5	8.0
8. Indigenous Knowledge (IK) and Natural Resources Management Project	0.6	1.2
9. Climate Change and Development Planning Project	0.5	1.2
Total	23.3	39.8

Source: NAPA, 2007

Under the institutional framework for implementation, MWLE is the recipient of NAPA funds while line institutions are responsible to the Ministry for accountability and submission of audited reports as per guidelines of the Auditor General. However, although the CCU boasts of some achievements, particularly in establishing the institutional fabric to handle climate change adaptation and mitigation at the national level, progress is generally slow. According to the NDP(2010) and CCU(2012), the major constraints to desirable performance of the climate change sector generally include the following:

- Critical shortage of requisite expertise;
- Limited awareness at all levels about the causes of climate change and/or climate variability as well as their devastating impacts on socio-economic development plans and activities;
- Lack of policy, legislation, regulation and guidelines for mainstreaming climate change into development plans at all levels;
- Inadequate conceptualisation of the importance of weather and climate change information by strategic planners;
- Insufficient and unreliable scientific data, especially weather and climate data necessary for forecasting scientific phenomena;

- Inadequate institutional and financial resources;
- Weak institutional and coordination mechanisms;
- Inadequate staff capacity in mitigation issues especially on Greenhouse Gas Inventory systems, establishment of Grid Emission Factors in various sectors, clean technology transfer access and mobilisation skills, and preparation of Standardised Baselines;
- Limited access to equipment such as GPS, carbon measurement and monitoring kits as well as transport facilities;
- Limited funding to support priority mitigation demonstration actions for the country which have multiplier effects in the attainment of priority development goals for the country.

Findings from key informants in this study regarding perceptions about the NAPA by actors in the agricultural sector were mixed. Those acquainted with the NAPA felt that the content and methods used in its formulation were satisfactory. Shortcomings were, however, reported with regard to implementation. It was noted that so far, progress was slow and funds were inadequate. For instance, the budget for adaptation to drought, a strategy under NAPA, can hardly develop a comprehensive breeding programme for breeding new crop varieties well-adapted to drought and other climatic changes in the country. The budget (US\$5 million) set for promoting irrigation as an adaptation strategy to drought is also too small to address a myriad of irrigation investment needs in the country (Majaliwa *et al.* in RUFORUM, 2009). Still, others felt that the NAPA was quite generic, lacking specificity on activities and was yet to be incorporated into grassroots' activities. For instance, Majaliwa *et al.* in RUFORUM (2009) note that though the NAPA strategies include establishing community-based tree nurseries and enhancing the capacities of the local communities to enact and enforce byelaws, the NAPA does not specifically point out the kind of market incentives needed to make the project attractive to different players in communities. Experience in Niger, for instance, shows that when farmers are allowed to own trees and sell their products, incentive to plant trees increased. In addition, efforts to establish multi-purpose trees are more successful than promotion of single purpose trees (Majaliwa *et al.* in RUFORUM, 2009). It is noteworthy that only five out of eight of the key informants from the NGO and public sector consulted in this study were aware of the NAPA's existence, indicating the need for more publicity for and popularizing of the NAPA among the relevant stakeholders so as to focus national action.

3.2 The status of integration of climate change into agricultural extension policies and strategies

Agricultural extension is expected to play a key strategic role in agricultural transformation and poverty eradication through facilitation of increased access to research based information, agricultural technologies, improved practices and other agriculture-related services by farm

families. Uganda has a pluralistic decentralised extension system comprising of a range of extension service providers in the public, NGO, and private sector. Decentralisation of extension services under the Local government Act 1997 transferred responsibility for providing services to district local governments. The Ministry of Agriculture Animal Industry and Fisheries was left with the responsibilities of policy guidance, quality assurance, regulation, and monitoring of the sector. Policy documents guiding the public agricultural extension and advisory services include the NDP (2010), NAADS Act 2001, DSIP 2010/11-2014/15, and ATAAS (2011). NGO and private extension organisations are autonomous and are therefore guided by their respective policies, while influenced by government policies for extension.

The NDP 2010 as mentioned above suggests specific provisions for incorporating climate change into all sectors including the agricultural sector Development Strategy and Investment Plan (DSIP) 2010/11-2014/15, which mentions climate change as one of the key agricultural development challenges. It points out specific planned sub-programmes to address climate change impacts, namely, increased use of water for production; improved pest, vector and disease control; improved public education and communication around key agriculture and natural resource issues (MAAIF, 2010). Under DSIP, the largest sub-programmes are Agricultural Advisory Services, Agricultural Technology Development (Research), Value Addition, Pest and Disease Control and Regulatory Services. These five sub-programmes can therefore be deemed the priority areas. The Agricultural Technology and Agribusiness Advisory Services (ATAAS) programme jointly implemented by the National Agricultural Research Organisation (NARO) and the National Agricultural Advisory Services (NAADS) makes some provisions for climate change (see the ATAAS Project Implementation Manual, 2011). Sub-component 2.2: Sustainable Land Management is expected to produce the following outputs:

- Technology packages on integrated nutrient management and conservation agriculture developed and demonstrated for major agro-ecological zones (AEZs);
- Analytical tools, including simulation models, on land productivity and climate risk developed and applied;
- Advisory services to farmer groups on sustainable land management (SLM) technologies, small-scale irrigation, and water harvesting scaled up for major AEZs;
- Knowledge on SLM, land degradation and climate risks increasingly accessible to stakeholders and inform decision-making;
- SLM information system institutionalised in government planning;
- Vulnerability reduced through NRM monitoring and knowledge management.

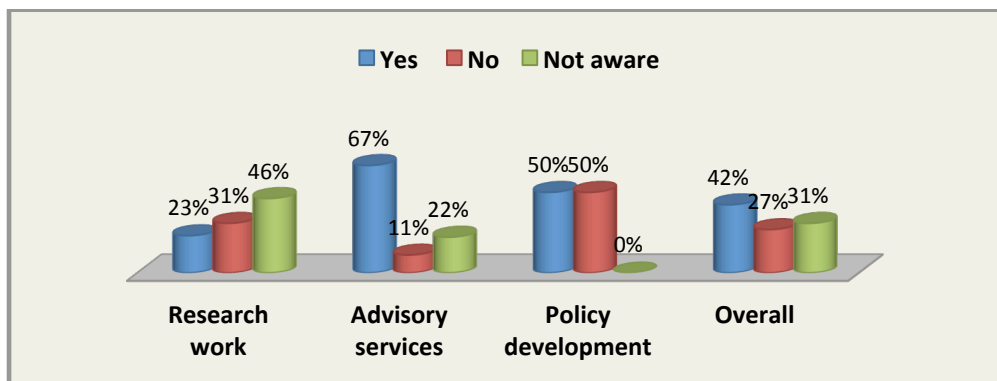
However, there seems not to have been deliberate systematic effort to harmonise the NAPA with ATAAS. Consequently, some of the relevant areas identified as priority by NAPA were left out of ATAAS. Notable omissions include documentation of indigenous knowledge on coping

strategies and promotion of community best practices of collaborative natural resource management, farm forestry, and weather and climate information (see NAPA, 2007 and ATAAS 2011). Additionally, implementation of ATAAS in general and sub-component 2.2 in particular is in its infancy.

Despite the integration of climate change in the ATAAS programme document, climate change issues have not yet been consciously addressed in the implementation of the programme by NAADS. For instance, an audit of the NAADS programme by the Uganda National Farmers Federation (UNFFE) raised concerns as to whether the programme had a strategy for assisting farmers with climate change adaptation technologies such as irrigation technologies in the case of droughts. The audit thus recommended that the programme include climate change adaptation technologies in its technology package (UNFFE, 2011). Field data from this study also revealed that the government agricultural extension programme has yet to provide the necessary leadership and institutionalise issues of climate change.

In contrast, NGOs which get direct funding from donors are to varying degrees ahead. The organisations represented in this study’s national workshop were at different levels of developing or adapting climate change policies. The workshop participants (50% from research organisations, 35% from advisory services and 15% from policy making/guiding organisations), reported that existence of climate change policies in the different organisations was generally low, with awareness of policies least amongst researchers (Figure 2). Thus, across all the institutions, especially research institutions, there is still need to develop and mainstream climate change policies.

Figure 2: Existence of a climate change policy in organisations represented in the national workshop



Over 66% of the existing policies noted were only in their early stages of development. This highlights the need to expedite the processes. Notably, the Ministry of Agriculture, Animal Industry and Fisheries (MAAIF) did not have a climate change policy of its own, as it was waiting

for the one being developed by the CCU under the Ministry of Water, Lands and Environment (MWLE). Participants in the national workshop suggested that the formulation process of the climate change policy by the CCU needed to be opened up to views/comments of relevant stakeholders prior to completion since none of those present were aware of the progress. Housing the climate change policy in the MWLE is partly a challenge in the sense that it reinforces the perception that climate change is more of an environmental rather than an agricultural issue.

3.3 The status of integration of climate change into agricultural research policies and strategies

The National Agricultural Research Policy (MAAIF, 2003) which guides agricultural research in Uganda has not been updated and harmonised with the national climate change strategic directions. Provisions therein remain at the broad natural resource management level, with no specific mention of climate change. While environmental issues are alluded to in a generic manner, with one of the guiding principles being mainstreaming of environmental concerns in all technology generation processes, there is no explicit mention of current and projected climate change impacts and mitigation and adaptation considerations. This is likely to compromise targeted responses by research. Targeting should, for instance, channel adequate research efforts in understanding and improving community coping strategies as well as harnessing new opportunities created by climate change. NAPA (2007) reports that yields of some crops such as potatoes with indeterminate growth habit may increase with increasing temperature provided these do not exceed optimum temperatures for crop development. This is an example of an opportunity that would benefit from further research. Indeed, as Majaliwa *et al.* in RUFORUM, 2009 note, there is need NARO and the extension services to be aligned with the NAPA in developing crop varieties and livestock breeds well-adapted to climate change.

NARO, under the Climate Smart for Rural Development Initiative, with support from the Rockefeller Foundation is in the process of developing a policy on climate change research. The project is titled Strengthening NARO's Capacity to Develop Climate Change Adaptation Interventions and Policy Recommendations that ensure their Adoption. The key objectives, activities and deliverables of the project are presented in Box 4.

Box 4: Rockefeller funded project to develop a climate change research policy for NARO

Key objectives

- Mainstream awareness and understanding of climate change adaptation concepts throughout NARO by working with management, researchers and implementers across the 15 units of NARO in order to prepare NARO to be a champion for climate change adaptation
- Deliver agro-meteorological data and analyses to customers, such as the National Meteorological and Hydrological Services (MET) and IGAD Climate Prediction and Applications Centre (ICPAC), to support regional climate risk management and adaptation research
- Capture demand of farmers and other stakeholders and translate their needs into the development of relevant interventions in order to increase uptake of effective climate change adaptation technologies
- Develop and present policy recommendations that address climate change adaptation at the organisational, local, national and regional levels in order to facilitate the passage of policies that promote food security and wellbeing for the region's population

Key activities

- Incorporate climate change adaptation issues into core research programmes and multi-stakeholder innovation platform.
- Use new and existing uptake pathways to disseminate information about climate change adaptation and to further disseminate information.
- Targeted human capacity development in agro-meteorology, climate science and modeling skills—using a train the trainer approach.
- Quantify and understand the risk caused by climate change to Ugandan Agricultural systems.
- Analyze data to prioritise agricultural adaptation to climate change research agenda.
- Document current state and subsequent needs of farmers, researchers and policy makers on climate change.
- Identify and prioritise critical gaps in demand and supply of climate change adaptation technologies.
- Develop a competitive grant scheme that funds field testing for climate change adaptation technologies
- Incorporate customer needs and gap analysis into creation of relevant climate change adaptation technologies.
- Assess success of technologies through field surveys and focus groups.
- Use empirical analysis to prioritise policy interventions on climate change adaptation.

Key deliverables

- Report showing how research programmes have incorporated climate change adaptation issues
- Report on Climate change information dissemination
- Report on Climate change human capacity development

- Report on the quantified climate risk
- Report on needs of researchers, farmers for Climate change incorporation
- Report on Gaps and priorities for the research
- Grant scheme in place with projects awarded and running
- Field reports on the success of the technologies
- Report on climate change mainstreaming levels of Policies
- Report on guidelines to mainstreaming climate change in policies
- Climate change research strategy
- Report on recommendations to develop climate change adaptation and mitigation policies

Source: <http://cenafrica.net/abstracts/strengthening-naro%E2%80%99s-capacity-to-develop-climate-change-adaptation-interventions-and-policy-recommendations-that-ensure-their-adoption/>

3.4 The status of integration of climate change into local government policies and strategies

At the Local Government (LG) level, direction on climate change in both Masindi and Nakasongola districts was provided by the District Environment Policies of the respective districts. The policies articulate the goals, objectives and strategies relating to various issues and sectors. Boxes 5 and 6 present the policy directions for Masindi and Nakasongola districts specific to agriculture and climate change, which have been in place since 2009. Both districts have more or less similar policy statements, objectives and strategies on agriculture and climate change, perhaps due to the technical assistance received in each district from the National Environmental Management Authority and its international partners UNEP and UNDP, although there are differences in the way they are being implemented by the respective districts. Despite both districts having environment policies posted online, in both workshops district staff were ignorant of their existence. The externally sponsored workshop organized by this project was reported to be the first of its kind in Masindi district to bring different stakeholders together to deliberate on climate change issues in agriculture. Technical staff at district level are not able to work on climate change in a joined-up way, or link their practice to relevant policy. In the absence of a systematic policy and programmatic focus on climate change by government, NGOs tend to adopt a short term project focus.

Box 5: Policy directions for agriculture - Masindi and Nakasongola districts

Masindi district

Policy statement: Increase the level of environment mainstreaming in the decision making undertaken in crop, livestock and fisheries extension, production and marketing in the District.

Objectives

1. To promote production practices in environment and natural resources that provide additional ecosystem services beyond their agro-ecosystems including promoting modern bee keeping in forest areas.
2. To promote sustainable livestock production practices in the district.
3. To promote traditional systems and adoption of new technologies that lead to sustainable production practices.

Strategies

1. Adopt practices of sustainable land management including among others agro-forestry, good agronomic practices, and organic farming practices.
2. Encourage vertical integration within agriculture among crop farmers, pastoralists and farmers diversification.
3. Training farmers on diversification of income opportunities through re-orienting farmer's production practices to alternatives.
4. Encourage the sustainable use of water for irrigation in agriculture.
5. Increase the availability of water points for the livestock keeping communities.

Nakasongola district

Policy statement: Increase the level of environment mainstreaming in the decision making undertaken in agricultural (crop livestock and fisheries) research, extension, production and marketing in the district.

Objectives

1. To increase sustainable agricultural production in the district to meet the food requirements of the people and their commercial and other livelihoods needs
2. To improve sustainable livestock production practices within the district
3. To co-ordinate, monitor, and regulate the movement of livestock in the district

Strategies

1. Adopt practices of sustainable land management so as to counter soil erosion, soil compaction and the loss of soil productivity observed within the district including among others agro-forestry, good cultural practices, and organic farming practices.
2. Encourage integration of production and marketing activities in the planning and activities of crop farmers, pastoralists and farmers' diversification.
3. Develop and implement a sustainable livestock production plan that considers the available forage and water resources in the District.
4. Improve information collection and sharing on livestock movements in, out and within the District.
5. Train farmers on diversification of income opportunities.
6. Encourage the use of sustainable irrigation for agriculture and increase water for production.

Box 6: Policy directions for climate change - Masindi and Nakasongola districts

Masindi district

Policy statement: To counter excessive climate change and provide a basis for increasing communities' ability to adapt to the risks and vulnerability associated with climate change.

Objectives

1. To reduce the vulnerability of the rural poor farmers and herdsmen to the severe weather regularly experienced in the District.
2. To increase the adaptation within the District to the severe climate conditions among the pastoral communities and farming communities.
3. To protect the integrity of the changing environment and the survival of biodiversity in the face of extreme shocks.

Strategies

1. Protect the land and water systems with permanent vegetation cover where possible especially in fragile areas.
2. Promote multi-crop and multi enterprise systems in order to diversify the coping strategies available to the people.
3. Establish and improve climate and hydrological recording, analysis and information sharing systems from local to district level and link them with national and global information.
4. Link climatic, hydrological, ecological and food production information in practical and sensible ways at local and district level and provide predictive services.
5. Increase knowledge and information provision and train communities on the livelihoods and land use opportunities available within the climate systems of the area.
6. Initiate activities for implementation of the climate change and desertification adaptation in the District, through operationalising the United Nations Convention on the Control of Desertification (UNCCD) and the United Nations Framework Convention on Climate Change (UNFCCC).

Nakasongola

Policy statement: To counter the excessive effects of climate variability and provide a basis for increasing the communities' ability to adapt to the vulnerability associated with climate change.

Objectives

1. To reduce the vulnerability of the farmers and herdsmen to the severe weather regularly experienced in the district.
2. To increase the adaptation within the district to the severe climate conditions among the pastoral and farming communities.

Strategies

3. Increase information, educate and train communities on the livelihoods and land use

opportunities available within the climate systems of the area.

4. Initiate activities for implementation of the climate change and desertification adaptation practices in the district, through operationalising the United Nations Convention on the Control of Desertification (UNCCD) and the United Nations Framework Convention on Climate Change (UNFCCC).
5. Involve all schools and communities in climate and food supply monitoring systems and in developing mitigation and coping strategies.

There were some differences in the way the policies were translated into day-to-day activities under the sectors concerned. For instance, in Masindi it was noted that there was inadequate technical capacity, particularly among agriculture staff and politicians, with capacity development efforts being disproportionately focused on personnel working in the environmental sector. As a case to support this point, the District NAADS Coordinator in Masindi had attended only one session of climate change awareness raising in a workshop organised for another purpose, while the District Environment Officer had had up to six trainings.

The situation in Nakasongola was different with the Production Department exhibiting greater capacity to provide leadership in climate change interventions in the district. For instance, under the initiative of the Nakasongola Production Sector, a half-day planning workshop on climate change was held on 12th March 2013. Participants included all organisations and local government staff involved in climate change work in the district (as well as the authors of the present study). The objectives of the workshop are displayed in Box 7.

Box 7: Objectives of the production sector partners' planning workshop on climate change - Nakasongola district

- To take stock of the different Climate Change interventions by location in Nakasongola district
- To disseminate the district priority areas with respect to climate change
- To initiate for a District Climate Change Forum
- To develop consensus on the key priority Climate Change interventions for Nakasongola district

Key outcomes of the workshop included: (1) Constitution of an interim committee to draft terms of reference, and structure of a District Climate Change Forum which would be responsible for coordinating climate change efforts in the district. The interim committee was charged to report to the Production Office in two weeks. (2) District climate change priorities in the various sectors were agreed upon through inter-departmental meetings. Box 8 shows the priorities specific to climate change and agricultural related sectors/departments.

Box 8: Nakasongola district priority areas for climate change and agriculture related sectors

Crop sector

- Food security
- Early warning systems (Forecast information, season planning etc)
- Promote dry land farming technologies
- Promote drought tolerant varieties
- Water for production (Irrigation)
- Strengthen pests & disease surveillance and control
- Promote conservation agriculture
- Value addition

Livestock sector

- Water for production. (valley tanks & dams)
- Pasture management & conservation (hay or silage)
- Strengthen disease surveillance and control
- Promote drought tolerant & yielding breeds
- Value addition
- Promote drought tolerant pastures

Forestry sector

- Promote bio-fuel plantations
- Afforestation & Re-forestation

(Individual & Institutions)

- Tree nursery establishment

Apiary sector

- Forage species inventory (nectar & pollen)
- Planting & Conservation of forage
- Promote beekeeping and value addition

Environment sector

- Strengthen Weather data collection & dissemination
- Promote energy saving technologies
- Promote rain water saving or harvesting technologies (Institutions & House hold levels)
- Research (Termites)
- Creation of a Climate Change Forum
- Clean Development Methods (Bio gas, Solar etc)
- Sustainable charcoal production
- Support periodic bio-mass inventories

Source: Nakasongola District Workshop

In addition, the Nakasongola District Environment Policy makes good provision for environmental information, education, human resource development, research, and public participation in environment management (Box 9). Thus, it should be the duty of the respective stakeholders to interpret the policy provisions in terms of priorities and adopt practical interventions suited to their unique contexts.

Box 9: Policy on environmental information, education, human resource development, research, and public participation in environment management - Nakasongola district

Policy statement: Ensure provision of appropriate and adequate environment information to the communities, other resource users and knowledge providers and users especially where lack of environmental awareness was repeatedly pointed out as a causal factor of other environmental problems.

Objectives

1. To collect, analyze, store, and disseminate on a continuous basis, reliable information relating to
2. Environmental management issues at the District. Such information will include: land maps, land use practices, status of natural resources, biodiversity, soil conservation, fuel wood supply and demand and pollution control.
3. To disseminate reliable information on a continuous basis through the District, Sub-Counties, parishes and villages.
4. To create a platform for sharing information experiences and feedback in such a way that allows the lessons to benefit the community and a wider audience.

Strategies

1. Train and strengthen the various institutions and structures that the district has set up to handle environmental management and for other district organs like the Council, the District Executive Committee, the Technical Planning Committee (DTPC) and Sister Sectors.
2. Regularly disseminate information and provide training to communities on environment and natural resources management.
3. Strengthen the various institutions structures in the district and at community level to develop a collection, analysis and storage system.
4. Develop an information feedback mechanism on environment and natural resources management.
5. Support initiatives that ensure that the approval of District and Sub-County development projects take into account the EIA provisions as a new strategy.
6. Regularly monitor and evaluate environmental and natural resource management activities.

3.5 Climate change initiatives in Uganda

There are various efforts at national and district levels aimed at addressing climate change issues. Research to strengthen resilience, adaptation, and mitigation efforts has among other things focused on assessing impact of climate change and adaptation; testing appropriate technologies such as indigenous tree species, agro-forestry, early maturing and drought tolerant/pest and diseases tolerant varieties; understanding the influence of social factors such as gender; and soil conservation and sustainable land management practices. Zonal meteorology stations have been established for collection of meteorological data, although

there were reported instances of such data being too insufficiently detailed and unreliable. On the other hand, agricultural advisory services are involved in promotion and dissemination of agro-forestry, especially fruit trees like mangoes, conservation farming/minimum tillage, appropriate technologies e.g. biogas technology to reduce pressure on environment, water pumps; dissemination of climate change related information to farmers; use of Private Public Partnerships for knowledge dissemination through radio and smart phones; and production of dissemination materials e.g. flyers, leaflets, radio programmes. A profile of the various projects and activities is presented in Annex 1 and 2. The initiatives are clustered into thematic areas in Boxes 10 and 11 below. It is noteworthy that most of these initiatives were covering small areas over a brief period of time hence achieving limited impact.

Box 10: Thematic areas for climate change initiatives at national and regional levels

Research	Advisory services	Policy development
<ul style="list-style-type: none"> • Strengthening resilience, adaptation and mitigation • Vulnerability assessment • Gender mainstreaming • Climate change impacts on livestock, agricultural sector, water and food security 	<ul style="list-style-type: none"> • Capturing and dissemination of climate information • Sensitisation and mobilisation of masses for appropriate action • Development of web-based sharing platform • Capacity building • Improvement of meteorology services • Technology development and transfer • Knowledge management • Promotion of complementary activities e.g. livelihood diversification 	<ul style="list-style-type: none"> • Mainstreaming carbon emission regulations • National climate change adaptation policy coordination and implementation • Vulnerability-based intervention targeting

Source: authors' summary of projects presented in Annex 1

Box 11: Thematic areas for climate change initiatives at district level

Advisory services	Policy development
<ul style="list-style-type: none"> • Environment conservation and community management • Promotion of tree planting and agro-forestry • Promotion of sustainable land use 	<ul style="list-style-type: none"> • Development of environment ordinances • Establishing environment committees • Budgeting for tree planting of government land

<ul style="list-style-type: none"> • Promotion of conservation agriculture – minimum tillage • Sensitisation and mobilisation of masses • Promotion of high yielding, drought, disease tolerant and early maturing varieties • Promotion of appropriate technology e.g. pumps and water harvesting tanks • Sensitisation and mobilisation for carbon trading • Promotion of alternative fuel options e.g. solar energy jerry cans, biogas, production of power from sugar waste • Dissemination of climate related information e.g. through radio and smart phones 	
---	--

Source: authors' summary of projects presented in Annex 2

The above climate change related efforts are in line with the nine NAPA priority projects (Table 1). However, despite the various efforts, there are some critical areas perceived by stakeholders to be missing. First, the ninth NAPA project area whose objective is to integrate climate change issues into development planning and implementation at all levels is particularly lagging behind, especially as this also calls for streamlining leadership and coordination of the key stakeholders and sectors. As can be noted, there is already a lot being done by many players of different kinds, albeit in a scattered and uncoordinated way. It is also common for several actors to be doing similar things.

For instance, DFID has already provided support for the Climate Change Action Network-Uganda (CAN-U), a national network comprising over 200 NGOs, private sector actors and academics, established with support from DFID. This network is an open space for climate change issues, which is intended to allow network member organisations, practitioners, researchers and policy makers to access credible, high quality information and to share experiences and lessons learnt about climate change with the community. It provides stakeholders with a common platform for sharing and learning and should bridge the knowledge gaps by bringing relevant knowledge to communities, individuals, NGOs, businesses, local and national government, regional and international community. However, its website (www.can.ug) is still very much a work in progress. Only four out of nine of the contacted organisations from public and NGO sectors were linked with the network. It is noteworthy that MAAIF and NAADS were not yet part of the network, despite the envisaged central role of government to provide leadership in development processes.

At the same time the United Nations Joint Programme on Climate Change in Uganda under the United Nations Development Assistance Framework (UNDAF) also has as one of its objectives the development of a web-based platform to share climate change adaptation and mitigation best practice. This raises the question of coordination, for maximum effectiveness and efficiency, between the different actors and their respective climate-related projects. It is hoped that the CCU's long awaited policy on climate change will provide useful guidance on this.

Agricultural research and extension stakeholders identified critical perceived gaps in climate change responses (Box 12). These included inadequate capacity to handle climate issues within agriculture, limited prioritisation of climate change in national and district budgets, and concentration of most research on a few climate change aspects notably drought to the neglect of others, such as conservation agriculture and water management to control floods and landslides. The research conducted does not consciously respond to farmers' needs and packaging and dissemination of information generated is through inappropriate channels, such as academic papers, which are not readily accessible to local audiences. It is no wonder that there is limited translation of research results into action. In addition, there are inadequate up-to-date and reliable early warning systems as well as poor coordination between zonal and national meteorological centres. Box 12 below lists the critical areas not adequately addressed in ongoing efforts as perceived by stakeholders who attended the national workshop.

Box 12: Aspects critically missing in climate change response by agricultural research and extension sectors in Uganda

Research	Advisory services
<ul style="list-style-type: none"> • Appropriate information packaging and dissemination • Integration of indigenous knowledge (IK) • Putting farmers first in climate change research initiatives • Prioritisation of climate change during budgeting • Research on water management, especially rainwater harvesting • Research on conservation agriculture • Coordination between zonal and national meteorology centers and other actors • Adequate capacity to handle climate change issues 	<ul style="list-style-type: none"> • Up-to-date early warning systems • Positive attitudes towards some improved technologies e.g. crop varieties leading to low adoption • Adequate capacity of technical personnel in climate change issues • Mainstreaming climate change concerns in AAS operations • Policy support in agricultural extension • Translation of research results into action

<ul style="list-style-type: none"> • Adequate and reliable evidence of real impact of climate change on agriculture in Uganda • Integration of climate change into institutional programmes 	
---	--

Source: National Stakeholders' Workshop

3.5.1 Knowledge management related initiatives at district level

This study identified several climate change knowledge management related initiatives with regard to collection, packaging, sharing, dissemination, learning, utilisation and updating being implemented by different actors in the districts of Masindi and Nakasongola. Box 13 shows examples of knowledge management related initiatives in Masindi district.

Box 13: Examples of knowledge management related initiatives in Masindi district

Initiative	Implementing organisation	Coverage
1. Collecting, packaging, and dissemination of information on improved agriculture technologies and weather forecasts to farmers through community knowledge workers via internet connected smart phones	Grameen Foundation	District-wide
2. Collection and dissemination of information on carbon trade	Ecotrust	District-wide
3. Handouts for training on knowledge dissemination	EADO and ICRAF	Kimengo municipality
4. Dissemination of information on community forest management through: sensitisation workshops, fact sheets given to farmers, radio shows and spot messages, audio and video CDs	CODECA	Pakanyi, Karujubu, Budongo, Bwijanga
5. Collection, packaging and dissemination of information via magazine and radio	<i>Wise Farmer</i> magazine and <i>Omulumimugezi</i> radio programme	Masindi and beyond
6. Collecting information from central research desk and farmers, packaging, producing and disseminating over radio; storage of information at central research desk and receiving feedback; sharing information in meetings	Farmer voice radio programme, featuring extension officers; community knowledge workers; NAADS coordinators	District-wide
7. Collecting information from newspapers weekly (Harvest money) and disseminating on sub county notice boards and in trainings	NAADS	District-wide
8. Collecting information from UNFE and FIT, packaging and disseminating through weekly	MADFA	Masindi, Buliisa,

radio talk shows; use of demonstrations and storage of information		Kyandongo
9. Collecting weather information from weather station in Masindi, packaging, storing and sending it to the National center in Entebbe	Meteorology department, Masindi district	

Source: Masindi District Workshop

3.5.2 Knowledge and information dissemination/sharing fora/strategies effective for reaching farmers, advisory service providers and policy makers

The radio was perceived as the most popular medium for extending information to farmers because of its superior coverage and accessibility by farmers. However, there are several other media that stakeholders considered appropriate for climate change information communication among farmers, advisory service providers and policy makers (see Box 14) although most of these are not in current usage.

Box 14: Recommended media for climate change communication among farmers, advisory service providers and policy makers

Farmers	Advisory service providers	Policy makers
<ul style="list-style-type: none"> • Radio (talk shows, spot messages) • Schools through school children • Church • Farmer groups • Magazines translated to local languages (e.g. <i>Omulimomugezi</i>) • Mobile phones • Community meetings and trainings 	<ul style="list-style-type: none"> • Mobile phones (SMS) • Workshops/meetings/seminars • Trainings/workshops • Print media e.g. magazines, newspapers, brochures • Internet (e-mail) • Smart phones as used by Grameen community knowledge workers 	<ul style="list-style-type: none"> • Print materials e.g. brochures and policy briefs • Radio • Use of phones • Meetings/workshops/seminars • Membership to Climate Change Committees (CCCs) at all levels

Source: National Stakeholders' Workshop

Various constraints hinder actors involved in the knowledge management system from organising, accessing, and acting on climate change knowledge effectively and efficiently (Box 15). Barriers affecting researchers can be categorised into resource constraints; unfavourable institutional policies; poor individual researcher attitudes towards information sharing; and lack of capacity. Resource barriers include costs of accessing academic journals and other information sources, computers, limited internet connectivity and lack of time. Regarding organisational policies, various donors have restrictions on sharing of information generated

from research they have funded, while a number of research organisations lack formalised knowledge management procedures and rewards for sharing information. Coupled to this was a lack of interest in sharing information on the part of individual researchers and inadequate expertise to package information targeted at various audiences.

The main constraints faced by farmers fall into three main categories, namely, deficiencies in the service providers who supply the information and the information itself; limited capacity of farmers; and inadequate resources. There is poor data management by service providers characterised by inappropriate packaging and untimely delivery of information. The information itself is sometimes unreliable and/ or conflicting. Farmer capacity to receive, process and use information is hindered by low education and illiteracy, limited access to information and communication technologies, poor reading culture even among those who are literate, low turn out for training meetings, and limited exposure. Advisory service providers lack up to date information on climate change due to weak or non-existent linkages with research and other information sources, such as platforms and networks for shared learning, and regular trainings. Districts lack clearly laid out knowledge management strategies that adequately support and reward advisory service providers to seek for and share new information.

These constraints need to be critically analyzed and appropriately addressed. Practical ways of addressing the constraints as suggested by stakeholders are presented in Box 16.

Box 15: Constraints in organising, accessing and using climate change knowledge

Researchers	Farmers	Advisory service providers	Local leaders/policy makers
<ul style="list-style-type: none"> • Costs involved in accessing e.g. subscribing to journals and other information sources • Authenticity of work not guaranteed • Lack of coordination among researchers • Donor restrictions to share information generated from some research • Lack of information processing 	<ul style="list-style-type: none"> • Language barrier since most information is in English which many do not understand • Limited access to information communication technology • Gender insensitivity of some information providers which disadvantages women • Conflicting information from different information sources • Untimely delivery of 	<ul style="list-style-type: none"> • Lack of up-to-date information and technologies • Low capacity to utilise the information • Lack of initiative to search for new information • Limited resources (human and financial) for accessing and disseminating information • Lack of 	<ul style="list-style-type: none"> • Poor culture of seeking information • Unfavorable political environment for sharing information (it is not valued and/or rewarded) • Limited access to credible sources of information • Lack of

<p>equipment</p> <ul style="list-style-type: none"> • Limited or lack of internet connectivity • Limited resources e.g. funds and time • Lack of interest to share/negative attitude towards sharing information • Lack of expertise in packaging information targeted at various audiences 	<p>information</p> <ul style="list-style-type: none"> • High illiteracy rates • Poor reading culture • Inappropriate information packaging • Poor data capture by service providers • Negative attitude towards /fear of new things • Low exposure • Dependency on men for information (specific to women) • Confinement to domestic work (specific to women) • Limited access to relevant information • Limited access to radio by some family members • Unreliability of information • Low turn up of farmers to meetings/trainings • Lack of awareness about what information exists and where to get it • Poor attitude towards educative programmes • Lack of money to regularly buy batteries for radio 	<p>network/platform to share</p> <ul style="list-style-type: none"> • Political interference and preferences • Weak research-extension interface • Unhealthy competition among service providers which hinders sharing • Lack of knowledge sharing strategy by districts • Limited sources of credible information • Limited facilitation to collect information e.g. from newspapers, magazines and internet • Irregular workshops/training • Lack of plan for capacity building • Work overload resulting from low ratio of service providers to farmers and engagement by multiple programmes/projects 	<p>information on climate change</p> <ul style="list-style-type: none"> • Low capacity of some leaders to correctly interpret and disseminate information • Poor networking and collaboration leading to poor coordination and mobilisation
---	--	--	---

Source: National Stakeholders' Workshop

Box 16: Suggested practical strategies for improving the performance of the knowledge management system

Strategy suggested by	Who to implement strategy
Agricultural researchers	
<ul style="list-style-type: none"> • Including a plan for disseminating research findings in research proposals and assigning it a budget in advance • Empowering the communication officers in LGs to handle knowledge management in districts • Use of appropriate and affordable media • Set up coordination platform/building synergies • Increase researchers' accessibility to authentic information e.g. via internet • Having one-stop centre for information • Having personnel responsible for appropriate packaging of information • Climate change policy should be clear on who is responsible for climate change information and communication • Having adequate government budgetary allocations to address climate change issues • Peer reviews • Dedicate staff and resources to information/knowledge management • Linking information sources • Developing incentives for sharing information/knowledge 	<p>Researchers and donors</p> <p>Government</p> <p>Researchers</p> <p>MAAIF/researchers</p> <p>CCU</p> <p>MFPED,CCU</p>
Advisory service providers	
<ul style="list-style-type: none"> • Harmonise technical and political roles • Involve community in information management • Strengthen linkages between extension and research • Build capacity for handling climate change information • Use of appropriate technology to pass information 	<p>Government</p> <p>NAADS and production office</p> <p>Government, researchers and advisory service providers</p>

<ul style="list-style-type: none"> • Providing good incentives for sharing and learning • Re-packaging information • Having climate change focal persons and forums/platforms at local, regional and national levels • Better facilitation of service providers • Existing community knowledge workers should be identified and co-opted as advisory service providers • Refresher trainings • Exposure tours 	<p>District focal person</p> <p>District Climate Change focal person</p>
Farmers	
<ul style="list-style-type: none"> • Simplify climate change messages • Mobilise and sensitise farmers • Make appropriate technologies available to facilitate quick information access and flow • Use most accessed and trusted communication channels e.g. churches • Sensitisation, exchange visits and agricultural shows 	<p>Advisory service providers</p> <p>Government</p> <p>District LG and NGOs</p>
Local leaders/policy makers	
<ul style="list-style-type: none"> • Sensitisation and exposure through workshops and study tours • Local leaders and policy makers should be members of the climate change committees 	<p>LGs, CSOs and private sector</p> <p>District climate change focal person</p>

Source: National Stakeholders' Workshop

3.6 Overall assessment of climate change response by agricultural research and advisory services

Awareness about climate change has increased tremendously in Uganda over the last 10 years. This is associated with numerous donor funded projects implemented by individuals and organisations. Most projects are implemented by academic and agricultural research organisations, followed by NGOs, probably due to the existing capacity and culture within these organisations to source donor funding. Government extension services and sub-national organisations such as Zonal Agricultural Research Organisations and district local governments were perceived to be lagging behind NGOs and other actors possibly for the same reasons. At the district level, the department of environment had more interventions and capacity in

climate change compared to agriculture departments. Despite the cross cutting nature of climate change, there seems to be inadequate collaboration across the environment and agriculture sectors with climate change being largely perceived at the district level to be an environmental rather than an agricultural issue. A key challenge is that the increased awareness and prominence accorded to climate change has created the interesting, and concerning, development that many problems in agriculture are wrongly attributed to climate change rather than other issues such as poor farming methods and population increase. This calls for more thorough climate change impact assessments as erroneous diagnosis of the root causes of agricultural problems will ultimately result in prescription of inappropriate solutions.

The main factors driving climate change response within the agricultural sector include availability of donor funding to which various organisations and individuals respond by writing project proposals. This may mean that climate change efforts are driven more by the international than the local or national agenda. Other drivers include international conventions and resultant government policies, climate change effects, increased awareness about the need to conserve nature, and the need to ensure food security and incomes through agriculture. Box 17 lists the drivers as identified in the national stakeholders’ workshop.

Box 17: Factors driving and limiting climate change response in research and advisory services

	Research	Advisory services
Driving factors	<ul style="list-style-type: none"> • Food security • Improved livelihoods (increased incomes) • Conservation of nature • Availability of funds/Donor funding/interests • Government policies e.g. DSIP • Climate change effects e.g. increased pests and diseases/emerging hazards and risks 	<ul style="list-style-type: none"> • Food security • Improved livelihoods (increased incomes) • Conservation of nature • Farmers’ demands/needs • Government funding • Government policies • Donor funding/interests
Limiting factors	<ul style="list-style-type: none"> • Inadequate funding • Lack of government commitment • Inadequate capacity • Limited implementation of policies • Perceiving climate change as largely an environmental issue and not an agricultural one 	<ul style="list-style-type: none"> • Lack of capacity in environment and natural resource issues • Lack of coordination between relevant sectors • Inadequate funding • Inadequate capacity of AASPs • Failure to implement policies

- Lack of relevant information (statistics)
- Limited funding at lower levels to facilitate community initiatives
- Short term conditional grants which do not ensure sustained service delivery

Source: National Stakeholders' Workshop

4. CONCLUSIONS AND RECOMMENDATIONS

4.1 Conclusions

This study aimed to assess, through a shared learning process among stakeholders, the extent to which agricultural research and advisory services (Public, NGO, and Commercial private sectors) have incorporated climate considerations in their policies and operations. It also sought to stimulate awareness and reflection in agricultural research and advisory services on how to manage agricultural knowledge in the face of climate change and increasing uncertainty; and identify practical strategies for making agricultural knowledge management, and thus smallholder agricultural development in Africa more climate compatible. The findings have revealed a generally high level of awareness about climate change in Uganda's agricultural research and advisory service organisations evidenced by presence of numerous donor funded projects. However, the level of intervention varied with type of organisation and location with more projects in research as compared to advisory services; NGOs as compared to government; and national as compared to district level. The level of climate change efforts was largely driven by donor funding and international conventions.

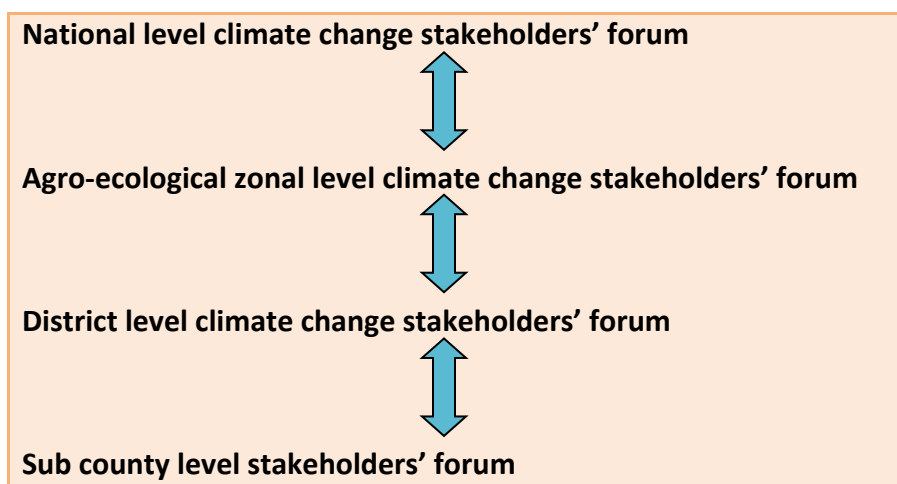
Despite the cross cutting nature of climate change, there seems to be inadequate collaboration between actors in the environment and agriculture sectors, with climate change being largely perceived at the district level to be an environmental rather than an agricultural issue. Interventions tend to be of a short-term project nature and there is limited sharing across projects and organisations. The stakeholder interactions during this project reinforced the realisation by stakeholders that successful response to climate change will be a result of synergies between different players ranging from development partners, government, civil society (NGOs), private sector, to farmers. Therefore, to maximise the organisational benefits, the different players must be well directed and coordinated through established policies and structures. This set-up will facilitate more effective and efficient knowledge management to support adaptation and mitigation efforts at all levels. Existing institutions and stakeholder platforms such as the Climate Unit under the MWLE, AFAAS, district climate change platform (such as that of Nakasongola district), and CAN-U could take on the role of climate change knowledge management.

4.2 Recommended future pathways for improved knowledge management

Participants at the district workshop in Masindi identified the need to form district-wide networks (or platforms, fora or committees) on climate change, with a wide membership. Members should include Local Government, farmers, farmer marketing organisations, NGOs and CBOs, the private sector, technical service providers, the National Forestry Authority, the Uganda Wildlife Authority, universities and research entities, and development partners. Following this, climate change focal persons should be designated at all levels in the district with appropriate facilitation. The forum should work towards harmonising activities of different actors in climate change so as to have a unified direction to specifically address climate change issues in agriculture. The committee at district level will constitute the Secretariat, led by the district focal person. Similarly, in Nakasongola district, it was agreed in a production sector partners' planning workshop on climate change that an interim committee drafts terms of reference, and develops a structure of a district climate change forum which would be responsible for coordinating climate change efforts in the district.

Participants at the national workshop were in agreement with the need to create a national platform for coordination and sharing on climate change by relevant stakeholders. The stakeholders should include researchers, advisory service providers, NGO partners, LGs, policy makers, and private sector partners. It was emphasised that key stakeholders in climate change at the different levels should regularly meet and share. One proposal was that actors at lower levels select from amongst themselves representatives to the higher level forums. MAAIF already has a climate change focal person and a committee. As to where the above forum should be hosted is still debatable. However, during the national workshop, there was general agreement that the national climate change platform could be housed by the already existing CCU in the MWLE. Irrespective of the host, the forum can take on the following structure from national, zonal, and lower levels at Local Government (Box 18).

Box 18: Structure of national climate change forum



Beside the face-to-face platforms for sharing, online platforms offer opportunities. Progress on this is already being made by the Climate Change Action Network Uganda (CAN-U) as discussed in Section 3.5 and it can be a great asset for wide sharing on climate change issues. As also stated in that section, there is need for co-ordination between the various stakeholders so as to avoid duplication of effort in the establishment of internet-based platforms (which in addition, should not overshadow physical interactions between stakeholders).

Overall, leadership, coordination and long-term commitment will be vital in establishing functional and operational knowledge management systems (see Box 19) at the different levels.

Box 19: Components of a good knowledge management system for climate change

- Knowledge capture;
- Web-based content management system (CMS) that integrates multimedia content, geographic/geospatial information, a metadata search engine, messaging and collaboration, and networking;
- Capacity development;
- Knowledge products design and development;
- Research/ M&E; and
- Resource center and repository.

Source: Flor (2011)

When the climate change knowledge management system is in place, it should be maintained as operational and functional. Beyond an organisational knowledge management system, a sectoral and thematic climate change knowledge management system, which links its users with all the stakeholders involved in climate change, that is, central government, local governments, NGOs, civil society, and the private sector is recommended.

5. REFERENCES

ATAAS (2011) Agriculture Technology and Agribusiness Advisory Services.

<http://www.worldbank.org/projects/P109224/agricultural-technology-agribusiness-advisory-services?lang=en>

CCU (2012) Climate Change Unit, Ministry of Water and Environment. <http://ccu.go.ug/>

Climate Change Action Network, Uganda. <http://www.can.ug>

Flor, A. G.(2011) DENR-GIZ Adaptation to Climate Change and Biodiversity Conservation Project - Knowledge Management for Climate Change: Strategic and M&E plans (2012-2016).

Department of Environment and Natural Resources, Quezon City.:

http://www.academia.edu/1111885/KNOWLEDGE_MANAGEMENT_FOR_CLIMATE_CHANGE_STRATEGIC_AND_M_and_E_PLANS_2012-2016

Global Envision (2007) *Ugandan Forests in Danger*.

<http://www.globalenvision.org/library/1/1537>

Grubinger, V. (no year) *Climate Change and Agriculture: Challenges and Opportunities for Outreach*. <http://www.climateandfarming.org/pdfs/FactSheets/Outreach.pdf>

NASA (no date) What's the Difference Between Weather and Climate?

http://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html

Ifeanyi-Obi, C.C., Etuk, U.R. and Jike-wai, O. (2012) Climate Change, Effects and Adaptation Strategies; Implication for Agricultural Extension System in Nigeria. *Greener Journal of Agricultural Sciences*, 2 (2): 053-060.

<http://www.gjournals.org/GJAS/GJAS%20Pdf/2012/March/GJAS1234%20ifeanyi-obi%20et%20al.pdf>

IPCC (2007). Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, Pachauri, R.K and Reisinger, A. (eds.)]. IPCC, Geneva, Switzerland, 104 pp.

Retrieved March 28, 2010, from

http://www.ipcc.ch/publications_and_data/publications_ipcc_fourth_assessment_report_synthesis_report.htm.

Kareiva, P. (2005) *Setting the Record Straight: Implications of Climate Change for the Nature Conservancy's Mission*. The Nature Conservancy.

<http://www.eldis.org/cf/rdr/?doc=44566&em=230909c=clim>

Kibwika, P. & H. Sseguya (2011). Concept and Learning for the African Forum for Agricultural Advisory Services (AFAAS).

MAAIF (2003) The National Agricultural Research Policy. Entebbe, Uganda: Ministry of Agriculture, Animal Industry and Fisheries.

MAAIF (2010) *Agriculture for Food and Income Security - Agriculture Sector Development Strategy and Investment Plan: 2010/11-2014/15*. Ministry of Agriculture, Animal Industry & Fisheries, Republic of Uganda.

[http://agriculture.go.ug/userfiles/Agricultural%20Sector%20Development%20Strategy%20and%20Investment%20Plan\(2\).pdf](http://agriculture.go.ug/userfiles/Agricultural%20Sector%20Development%20Strategy%20and%20Investment%20Plan(2).pdf)

MAAIF. (2011) *Statistical Abstract*, Agricultural Planning Department, Ministry of Agriculture, Animal Industries and Fisheries, Republic of Uganda.

<http://www.agriculture.go.ug/userfiles/Statistical%20Abstract%202011.pdf>.

Majaliwa, M., Nkonya, E., Place, F., Pender, J., & Lubega, P. (2009) Sustainable Land Management Approaches to Mitigate and Reduce Vulnerability to Climate Change in Sub-Saharan Africa: The case of Uganda. In RUFORUM, 2009 (see below).

Managua, C. (2011) *Future Climate Scenarios for Uganda's Tea Growing Areas*.

http://dapa.ciat.cgiar.org/wp-content/uploads/2011/07/Future-Climate-Scenarios-for-Uganda-Tea-2011-07-19_.pdf.

Masindi LG (2009) District Environment Policy, Masindi District Local Government. Available at www.nema-ug.org/district_policies/Masindi_District_Env_Policy.pdf

Nakasongola LG (2009). District Environment Policy, Nakasongola District Local Government.

NAPA (2007) *Climate Change: Uganda National Adaptation Programme of Action*.

Environmental Alert, GEF, UNEP and Republic of Uganda.

<http://unfccc.int/resource/docs/napa/uga01.pdf> .

NDP (2010). National Development Plan, the Republic of Uganda.

http://npa.ug/docs/NDP_April_2010-Prot.pdf.

Oxfam. (2008). *Turning Up the Heat: Climate Change and Poverty in Uganda*.

<http://oxfamilibrary.openrepository.com/oxfam/bitstream/10546/112505/1/turning-up-heat-climate-change-poverty-uganda-170708-en.pdf>

Pidwirny, M. (2006). *Fundamentals of Physical Geography*, 2nd Edition: Available at <http://www.physicalgeography.net/fundamentals/7y.html>

Rockefeller Foundation (No year). An abstract of the Rockefeller Foundation supported Project under the Climate Smart for Rural Development Initiative - Strengthening NARO's Capacity to Develop Climate Change Adaptation Interventions and Policy Recommendations that ensure their Adoption. Available: <http://cenafrica.net/wp-content/uploads/2011/05/National-Agricultural-Research-Institute-NARO.pdf>

RUFORUM (2009) Climate Change and Transboundary Animal Diseases (CC&TAD): Engaging Universities in Training, Research and Outreach in Support of Policy and Adaptation in Sub-Saharan Africa.

Stern, N. (2006). *Stern Review on the Economics of Climate Change*. Retrieved from http://webarchive.nationalarchives.gov.uk/+/http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/stern_review_report.cfm

UBOS. (2003). *Uganda National Household Survey 2002/2003, Report on the Labour Force Survey*. The Uganda Bureau of Statistics. <http://www.ubos.org/onlinefiles/uploads/ubos/pdf%20documents/labour%20report0203.pdf>

Ugandadish.org/nakasongola, available at www.ugandadish.org/nakasongola.doc

UNDP. (2013) Environment Mainstreaming and Developing Sustainable Land Management in the Cattle Corridor of Uganda <https://secure725.websitewelcome.com/~undpor/index.php/environment-mainstreaming-and-developing-sustainable-land-management-in-the-cattle-corridor-of-uganda>.

UNFFE. (2011). Farmers' Fireplace Conversations. Action Research to Audit Effectiveness of NAADS and Proposals for Reform: The NAADS that farmers want. <http://www.esfim.org/wp-content/uploads/Progress-Report-on-NAADS-and-proposals-for-Reform-UNFFE-fnl.pdf> (<http://webcache.googleusercontent.com/search?q=cache:rTVvyOCV6EsJ:www.esfim.org/wp-content/uploads/Progress-Report-on-NAADS-and-proposals-for-Reform-UNFFE-fnl.pdf+&cd=1&hl=en&ct=clnk&client=firefox-a>).

(All websites current at 30.06.13)

6. ANNEXES

Annex 1: Examples of national level climate change initiatives in research, advisory services and policy

Initiative/project title	Objectives	Project partners	Funders
Research			
1. Strengthening East African Resilience and Climate Change adaptation capacity through training, research and policy interventions	- Strengthen capacity building and research and development activities on climate change adaptation	Rockefeller Foundation, Nairobi in collaboration with Makerere University	Rockefeller Foundation
2. United Nations Joint Programme on Climate Change	- Support research in vulnerability assessment and development of climate change research agenda	FAO, WFP, OCHA, UNDP, UNFPA, UN HABITAT & UNEP	
3. Gender Dimensions of Climate Change Adaptation in Uganda		Department of Extension & Innovation Studies, Makerere University	supported by RUFORUM
4. The impacts of Climate variability on Food & Health security in the Uganda Cattle Corridor		Department of Geography, Geo-Informatics & Climatic Sciences, Makerere University	IDRC
5. Climate Change, Adaptation & Effects in Agricultural sector and its effects on water		COVAB, Makerere University	
6. Household Food Production – Impact of Climate variability on Food Security		COVAB, Makerere University	

7. Interplay between Food Insecurity and Problem animals around protected areas: Role of Climate change		COVAB, Makerere University	
8. Farmer Voice Radio (FVR)		Makerere University	
9. Participatory testing of Improved drought tolerant varieties		CIAT/ PABRA	
10. ARCC Climate Change Vulnerability study in Uganda (conducted for USAID)		AT Uganda Ltd	
11. Mitigation and Adaptation Strategies; Climate Change Adaptation Innovations		NARO/ NARL	
12. Selection of appropriate trees for vegetation restoration, Control of bush fires, Rain water harvesting, Variety adoptive research		Nabuin ZARDI	
13. Evaluation of Water efficient Maize in the West Nile Agro-ecological zone 14. Evaluation of early maturing and high yielding Sorghum varieties		Abi ZARDI	

<p>in the West Nile Agro-ecological zone</p>			
<p>15. Adaptation & Agro-forestry Technologies in South Western Agro- ecological zone of Uganda</p>		<p>Mbarara Institute (MBAZARDI)</p>	
<p>16. Adaptation to the impact of climate change and variability on food and health security in the cattle corridor of Uganda.</p>	<ul style="list-style-type: none"> - Understand how climate is changing or varying in the cattle corridor using detailed climate analyzing and modeling research. - Determine farmers response to the risks of climate change and how effective are their efforts - Identify ways to help communities build resilience and adapt to climate change 	<p>African Innovations Institute</p> <p>Natural Resources Institute (UK)</p>	<p>IDRC</p>
<p>17. Integrated Management of Water for Livelihood and Food security under varying and changing climatic conditions - Water productivity project</p>		<p>Kenya, Eriteria, Rwanda, Madagascar, Ethiopia</p>	<p>World Bank</p>
<p>18. Knowledge assessments on climate change and urban/peri-urban agriculture in Kampala city, Uganda</p>	<ul style="list-style-type: none"> - Collect and synthesise knowledge on the state of urban and peri-urban agriculture in Kampala city with particular emphasis on climatic environmental change - Identify where insufficient knowledge exists and highlight where additional research and assessment efforts are needed; - Provide relevant information that informs decision-making and policy formulation concerning agriculture and climate-aware development planning in Kampala city 	<p>Makerere University,</p> <p>The National Agricultural Research Organisation (NARO) and</p> <p>The Uganda Centre for Sustainable Urban Agriculture (UCSUA).</p>	<p>European Commission , UNEP, and USAID.</p> <p>WMO, UNEP, START</p>

	<ul style="list-style-type: none"> - Identify scientists/technical persons who can undertake assessments and create communities of practice around urban food production and climate change. 		
19. Improving integrated production and pest management of rice for climate change adaptations in Uganda	<ul style="list-style-type: none"> - To screen rice germplasm for resistance to pests and diseases - To identify water management practices that reduce greenhouse gases emissions - To assess the effects of disposable rice residues on green house gases emissions 	<p>Kyambogo University</p> <p>Makerere University</p> <p>National Crop Resources Research Institute</p>	The Rockefeller Foundation
20. Effect of drought on the productivity and persistence of forage plants in agro-pastoral systems in Uganda	<ul style="list-style-type: none"> - To assess farmers' knowledge on pasture adaptability as well as the short term effects of drought and identify indigenous drought tolerant species in the area. - To screen forages for their phenotypic characteristics and determine their productivity and persistence. - To identify the chemical composition and nutritive value of the ten best performing forage legumes. 	<p>Makerere University College of Agricultural and Environmental Sciences</p> <p>KazoDryland Husbandry Pastoralists Association</p>	The Rockefeller Foundation
21. Selecting indigenous trees for climate mitigation in Africa	<ul style="list-style-type: none"> - To identify tree species preferred by farmers and located on their farms - To determine their capacity to sequester carbon 	<p>Makerere University College of Agricultural and Environmental Sciences,</p> <p>National Agricultural Research Organisation</p>	The Rockefeller Foundation
22. Strengthening climate change adaptation and resilience among small holder farmers: the case of Mayuge district in Uganda	<ul style="list-style-type: none"> - To estimate carbon sequestered in woody biomass on farm in Uganda so as to quantify the contribution of small scale dominated farming landscapes towards Carbon sequestration 	<p>Makerere University College of Agricultural and Environmental Sciences,</p> <p>Uganda Carbon Bureau, National Forestry Authority</p>	The Rockefeller Foundation
23. Adapting to climate change in Uganda's	<ul style="list-style-type: none"> - Determine the extent of agricultural vulnerability of BufumboMontane agro-ecological 	Makerere University College of Agricultural and Environmental	The Rockefeller

agricultural production and natural resources management systems	<p>zone to climate change and variability.</p> <ul style="list-style-type: none"> - Analyse the indicators of agricultural vulnerability in BufumboMontane agro-ecological zone due to climate change and variability between 1980 & 2011. - To assess adaptation measures to the impacts of climate change and variability on the selected agro-enterprises with in BufumboMontane agro-ecological zone between 1980-2011 	Sciences,	Foundation
24. Community Resilience and Climate Change	<ul style="list-style-type: none"> - Assess resilience of rural communities to climate change and variability in Uganda - identify their coping practices/strategy - to the challenge brought by climate change and variability 	<p>Makerere University, College of Agricultural and Environmental Sciences</p> <p>University of Siegen, Centre for International Capacity Development, Germany</p>	
25. Gendered patterns in climate change adaptation options, information sources and channels among rural farmers in Masindi district	<ul style="list-style-type: none"> - Determine gendered perceptions of climate change, risks and adaptation options among farmers - Determine farmers' gendered differences in climate change adaptation sources and channels - Identify the gendered constraints in accessing and utilising the information, and technologies from the sources - To disseminate findings of the research work using ICTs, mobile telephony and radio 	Makerere University College of Agricultural and Environmental Sciences, Grameen Foundation - SOS	The Rockefeller Foundation
26. Enhancing adaptation to climate change effects through optimised production of selected indigenous fruit	<ul style="list-style-type: none"> - To identify preferred Indigenous Fruit Trees and how they are being incorporated in the available fruit tree agro-forestry technologies and farmers coping strategies to climate change variability - 	<p>Makerere University College of Agricultural and Environmental Sciences</p> <p>National University of Rwanda</p>	Lake Victoria Research Initiative (VicRes)

<p>trees for food and nutrition security in the Lake Victoria Basin, Eastern Africa.</p>	<ul style="list-style-type: none"> - To develop appropriate propagation techniques for selected IFTs on station - - Assess the traditional knowledge, perceptions on the contribution of IFTs to climate change adaptation as well as the socio-economic factors influencing adoption levels of fruit tree agro-forestry technologies 	<p>Rwanda Agriculture Board</p>	
<p>27. Assessment of the Impact of Climate Change and Climate Variability on Crop Production in Uganda</p>	<ul style="list-style-type: none"> - The goal is to contribute to understanding the effect of the climate change on crop production in - Uganda 		<p>Global Change SysTem for Analysis, Research and Training (START)/US National Science Foundation (NFS)</p>
<p>28. Drought Tolerant Maize for Africa (DTMA)</p>	<ul style="list-style-type: none"> - Technology development (drought tolerant hybrids and OPUs) - Technology delivery (seed systems) - Enhancing impact-targeting, value chains, policy, impact assessment. 		<p>BMFG and USAID</p>
<p>29. Constructive Agricultural productive systems Research-East Africa</p>	<ul style="list-style-type: none"> - Research approaches for field trials, soil quality GHG emissions, crop growth and yield and socio-economic parameters - Opportunity for active "spill over" to maize systems in Kenya and Uganda based on research with very similar goals and objectives to F+F - Capacity building and student training 		
<p>30. Strengthening Universities' Capacities for Mitigating Climate Change Induced Water Vulnerabilities in</p>		<p>Regional Universities Forum for Capacity Building in Agriculture University of Natural Resources and Life Sciences, Vienna (BOKU), Centre for Development Research</p>	

East Africa		(CDR, Egerton University, Horizont3000, Participatory Ecological Land Use Management (PELUM) Partner Countries: Uganda, Kenya	
31. Adaptation to climate change through integrated nutrient and water management			
32. Climate change, agriculture and food security		CAES Makerere University	
33. Projected impacts of Climate Change on Agricultural Productivity and Food Security in Kasese District, Rwenzori Highlands		Makerere University Institute of Environment and Natural Resources.	
34. Sustainable Land Management Approaches to Mitigate and Reduce Vulnerability to Climate Change in Sub-Saharan Africa: The case of Uganda.		Makerere University Institute of Environment and Natural Resources.	

Annex 2: National and district level climate change initiatives in advisory services and policy

Initiative/project title	Objectives	Project partners	Funders
National level			
Advisory services			
1. NAADS natural resources strategy	<ul style="list-style-type: none"> - Support capacity development for quality data collection and information dissemination for improved climate change awareness 	NAADS	From a basket fund with resources from GoU, IDA, GEF, EU & IFAD
2. United Nations Joint Programme on Climate Change in Uganda under the United Nations Development Assistance Framework (UNDAF)	<ul style="list-style-type: none"> - National climate change sensitisation campaign - Development of a web based platform to share climate change adaptation and mitigation best practice - Delivery of training in targeted districts - Delivering training and sensitisation in targeted districts - Develop Automatic Weather Stations (AWS) - Implement complementary activities e.g. Integrated Watershed Management 	FAO, WFP, OCHA, UNDP, UNFPA, UN HABITAT & UNEP	FAO, WFP, OCHA, UNDP, UNFPA, UN HABITAT & UNEP (Over \$28m)
3. Technology Innovations and Transfer	<ul style="list-style-type: none"> - Assessment of Uganda's technology needs 	Implemented by UNDP and coordinated by the	GEF

	and technology transfer barriers	Department of Meteorology	
4. Africa Climate Change Resilience Alliance (ACCRA)		Department of Meteorology, Ministry of Water and Environment	
5. Climate Change and Livelihood Development		Department of Meteorology, Ministry of Water and Environment	
6. NRI/ AFAAS/ FARA Climate Change Learning		AFAAS	
7. AFAAS Climate Change Knowledge Management Initiatives		AFAAS	
8. Africa Adapt		AFAAS	
9. IDRC – Africa Innovations Institute – Food Security & Nutrition		AFAAS	
10. Climate Change adaptation programme: in Pader under Comic Relief, in Moyo under Climate Change Network, in Lira under Norad	<ul style="list-style-type: none"> - Promotion of tree-based enterprises and drought resistant crops e.g. sorghum - Promotion of energy efficient stoves - Tree planting - Documenting farmers’ practices in mitigation and adaptation - Tree planting in communities and schools - Promotion of irrigation pump technology and drought tolerant crops e.g. sorghum, millet and others 	VEDCO	

Policy making			
1. CCDARE Project		Ministry of Agriculture, Animal Industry and Fisheries	
2. NAPA (National Adaptation Programme of Actions) in Bundibugyo, Pallisa, Apac and Nakasongola		Climate Change Unit, Ministry of Water and Environment	
3. National Climate Change Policy, Coordination and Implementation		Climate Change Unit, Ministry of Water and Environment	
4. UNDR – Low Emissions Capacity Building Project		European Union	
5. Climate Change agricultural vulnerability assessment		USAID	
District level			
Advisory services			
1. Conserving the border swamp (KiraKyakyukira) between Hoima and Masindi aimed at mitigating climate change		NEMA, CARE, CODECA and WWF	
2. Community management of forests outside the central reserve and collaborative forest management		Ecotrust, CODECA, CARE, NFA	
3. Promotion of tree planting e.g. on hilltops		NFA, UPDF, Ecotrust, DLG (DFS), LLG, BAT, FBOs, Hoima Catholic diocese	
4. Sustainable land use advisory services		District extension workers	
5. Farmer voice radio (on BBS radio station): a two-year project involved in mobilisation and sensitisation of farmers and recording success stories in regard to climate change and dissemination of information		Partnership between NAADS and Grameen since 2011	
6. Mobilisation and sensitisation of farmers on climate change and how to overcome it		NAADS	

<p>7. Promotion of agro-forestry through distribution of seedlings of fruit trees e.g. mango and citrus, and apiculture</p> <p>8. Provision of high yielding, drought and disease resistant/early maturing varieties</p> <p>9. Dissemination of research findings aimed at addressing climate change in the crop and livestock sectors</p> <p>10. Provision of appropriate technologies e.g. water pumps and water harvesting tanks to farmers' to cope with climate change effects</p> <p>11. Provision of information on timely planting and reduction of postharvest losses in face of climate change</p>			
<p>12. Omulimiomugezi/Wise farmer magazine and radio programme used to mobilise and sensitise farmers on rainwater harvesting, agro-forestry, soil, water and conservation</p>			
<p>13. Mobilisation and sensitisation on radio talk shows weekly; demonstration of sustainable agriculture in communities; distribution of drought resistant and early maturing crop varieties, especially maize</p>			
<p>14. Promotion/demonstration of conservation farming, especially minimum (zero) tillage</p>			
<p>15. Mobilisation and sensitisation of communities on carbon trading in indigenous tree species and promotion of solar energy jerry cans</p>			
<p>16. Sensitisation meetings on</p>			

environment e.g. tree planting, disadvantages of cutting trees			
17. Provision of climate related information, especially weather forecasts via radio (Masindi Broadcasting Service (MBS), sponsored by the LG			
18. Promotion of biogas for lighting and cooking to relieve pressure on the environment			
19. Production of power from sugarcane waste and treatment of waste before disposal			
Policy making			
1. Environment ordinance to mitigate climate change		District council, MDLG, WWF	
2. Establishment of environment committees at district and lower levels		District council	
3. Annual budgeting for tree planting on government land in parishes on rotational basis in all sub counties		LG	
4. Ensuring that local contractors provide environmental restoration plans prior to construction so as to conserve the environment		LG	

Annex 3: Examples of climate change project profiles from Nakasongola district

Agency for Inter-regional Development (AFID)

FID, funded by UNDP (US\$ 20,000) through SLM unit under MAAIF is promoting hay making in Nabiswera sub county in Nakasongola district among agro pastoralists for dry season feeding. Previous research by AFID funded by ASARECA revealed that during severe drought women and children had to wake as early as 4:00 am to graze cattle before the morning dew could disappear. The project thus came in to relieve women and children of the burden.

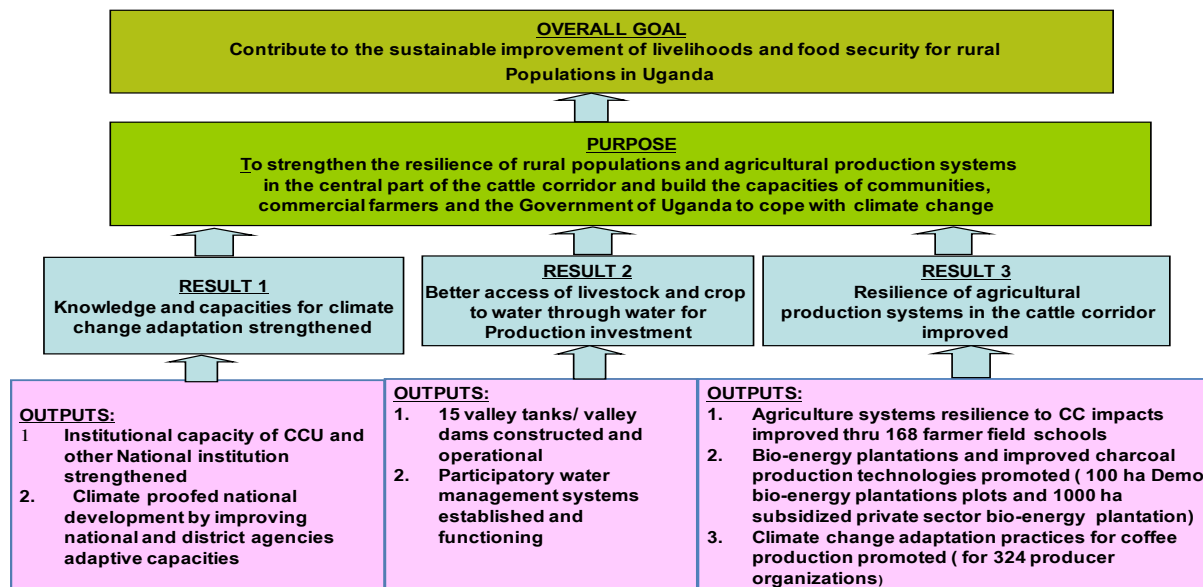
An upcoming project of AFID is up-scaling of feed conservation and packaging among agro-pastoralists in Nabiswera, Nakitoma, and Wabinyonyi sub counties with funding from ASARECA. NARO-BUZARDI is an implementing partner. Key activities/results will include:

- Establishing community based early warning systems
- Resource monitoring
- Improved herd management to minimise losses during drought
- Pasture management
- Improved feed conservation and packaging
- Value addition capacity building
- Soil and water conservation

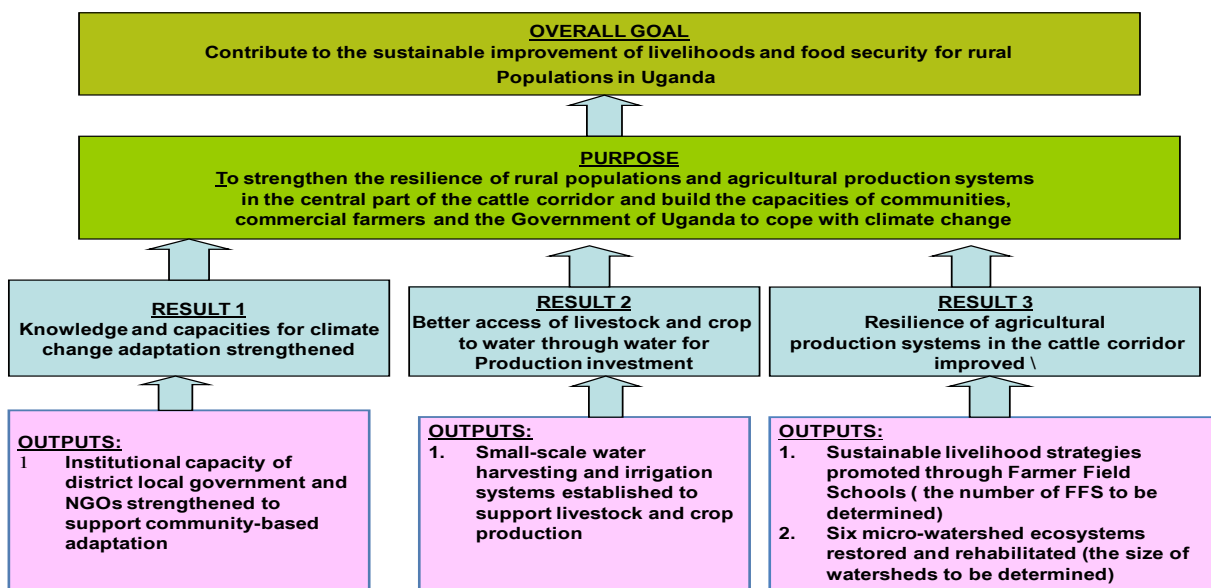
Global Climate Change Alliance (GCCA) – Uganda: Agriculture Adaptation to Climate Change, supported by EU, with funding from Republic of Ireland

Implementing agency	Partners	Duration	Coverage	Budget
FAO	<ul style="list-style-type: none"> - MWE (CCU, water for production, LG) - MAAIF 	2012-2016	Cattle corridor (Nakasongola, Nakaseke, Luwero, Kiboga, Mubende and Ssembabuledisricks)	€ 11m

I. GCCA Project Framework (EU/ Irish Government Funds)



II GCCA Project Framework (Belgian funds (3 million Euro – under discussion))



Annex 4: Lists of persons interviewed and workshop participants

A. From AAS institutions/organisations

Name	Institution
1. HakuzaAnnunciata (Senior economist)	MAAIF
2. Charles Aben (Zonal Coordinator, Eastern Uganda)	NAADS
3. Margaret Barihaihi, (National Programme Coordinator)	African Climate Change Resilience Alliance (ACCRA), World Vision
4. Anthony Wolimbwa (Research and Capacity Development Officer)	Climate Action Network-Uganda (CAN-U)-
5. Dr. Rita Laker-Ojok (Executive Director)	AT Uganda
6. Mr. Hillary RugemaSemana (Theme Coordinator, Crop Productivity Enhancement and Extension)	Sasakawa Global 2000
7. Nancy Phoebe Rapando (Programmes Director)	VEDCO
8. Akankiza Samson Mpiira (Senior Programme Officer, Food Security & Enterprise Development)	Environmental Alert
9. Mrs. Harriet NdagireSsempebwa (Assistant Community Development Coordinator (training))	Kulika Charitable Trust

B. From research institutions/organisations

Name	Institution
1. Professor E.N. Sabiiti	Production Department, College of Agricultural and Environmental Sciences, Makerere University
2. Professor M.M. Tenywa	Production Department, College of Agricultural and Environmental Sciences, Makerere University
3. Professor David Kabasa	College of Veterinary and Biomedical Sciences, Makerere University
4. Professor Jacob Agea	Department of Extension & Innovation Studies, College of Agricultural and Environmental Sciences, Makerere University
5. Assoc. Prof. Majaliwa-	College of Agricultural and Environmental Sciences, Makerere

Mwanjalolo	University
6. Dr. AsumanSengooba	College of Veterinary and Biomedical Sciences, Makerere University
7. Dr. LukmanMulumba	Production Department, College of Agricultural and Environmental Sciences
8. Dr. Prossylsubikal	Department of Extension & Innovation Studies, College of Agricultural and Environmental Sciences, Makerere University
9. Dr. Constantine Katongole	Production Department, College of Agricultural and Environmental Sciences
10. Dr. Evelyn Komutunga,	National Agricultural Research Laboratories (NARL) - Kawanda
11. Dr. Moses Osiru	Regional Universities FORUM
12. Dr. HezronMugakaProgramme	Natural Resource Management and Biodiversity – ASARECA



This document is an output from a project funded by the UK Department for International Development (DFID) and the Netherlands Directorate-General for International Cooperation (DGIS) for the benefit of developing countries. However, the views expressed and information contained in it are not necessarily those of or endorsed by DFID, DGIS or the entities managing the delivery of the Climate and Development Knowledge Network, which can accept no responsibility or liability for such views, completeness or accuracy of the information or for any reliance placed on them.