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Advancing climate change adaptation in Uganda's agricultural programming for sustainable development: Key milestones and constraints

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Climate change remains a crucial threat to sustainable development, particularly to the farming communities, which are more vulnerable to climate impacts. Uganda has made commendable steps in building an institutional framework for addressing climate change. However, the framework remains scattered in several documents making it difficult to track and conceptualize. This paper provides a one-stop center for understanding how effectively climate change is institutionalized in the agricultural sector and identifies the critical issues for future actions towards effective mainstreaming of climate change in agricultural programming. Findings in this paper are based on data collected through document review and a case study of Bududa district, representing the local governance of climate change adaptation mainstreaming. The paper observes that significant steps have been taken to mainstream climate change adaptation in agricultural programming, but adoption of adaptation measures will necessitate robust institutionalization of agricultural insurance as a climate change adaptation strategy particularly in the context of the rural, resource-constrained farming communities which are also more vulnerable to climate change hazards. Secondly, effective mainstreaming of climate change adaptation in agricultural programming in local governments will necessitate increased budget support from the central government towards addressing the critical institutional capacity gaps which hinder climate change adaptation programming and implementation of adaptation measures in local governments of Uganda.

Key words: Climate change adaptation, agricultural programming, institutional frameworks for adaptation, Uganda regulatory frameworks for adaptation.

INTRODUCTION

Global and regional context of climate change adaptation

Climate change remains a global issue associated with extreme conditions like floods and droughts, which constrain development, particularly in emerging and developing economies (UNDP, 2018). There is a long history of the world's commitment to addressing climate change reflected in the climate change discourse and the key milestones. These include the 1979 first World Climate Conference held in Geneva, the 1985 United Nations Environmental Program on greenhouse emissions, the 1988 Intergovernmental Panel on Climate (IPCC) established by United Nations Environmental

Program, the 1994 United Nations Framework Convention on Climate Change (UNFCC), the 2005 Kyoto Protocol, the 2006 Asia-Pacific Partnership for Clean Development, the 2007-Stern report highlighting the economic rationale and implication for climate change published and the thirteenth conference of parties in Bali, which drew a roadmap towards Copenhagen. Key stakeholders at all levels including local leaders, government, development partners, civil society, policy makers, political leaders, private sector, academia, research institutions, cultural and faith-based leaders and communities have weighed in climate change issues (Environmental Alert, 2010).

The African sub-regional initiatives demonstrate commitment by governments and civil society towards addressing climate change. Such initiatives include the African Ministers Conference on Environment (AMCEN) held towards building a common position and voice as Africa, which is taken in the global discussion and negotiations on climate change; the Pan African Climate Justice Alliance (PACJA) a network of African CSOs which advocate for climate justice and influence the African position on climate change; the East African Community Climate Change Policy responding to the increasing threats of the impacts of climate change to the development of set targets and goals in the region (Environmental Alert, 2010).

There is a general consensus that climate change is here to stay and is predicted to worsen. What matters is the degree to which systems can adapt to ensure they survive and sustain a high degree of performance. Consequently, development and research approaches to the problem of climate change are getting more focused to climate change adaptation. This is based on the general notion that climate change poses adverse impacts which in the absence of effective adaptation mechanisms, affects systems' performance (Adger, 2010; IPCC, 2007; Isoard et al., 2008; Smit and Wandel, 2006).

Uganda's Climate change vulnerability and impact

Uganda is a landlocked nation with substantial natural resources, including fertile soil and regular rainfall conducive for farming. The country is mainly agrarian, depending on primary production and natural resources. The agricultural sector remains a significant contributor to GDP (24%), export revenues (about 48%), and a source of livelihood for over 70% of the population (Uganda Irrigation Master Plan, 2010). However, Uganda is highly vulnerable to climate change (Thornton et al., 2006). Uganda carbon (CO_2) emissions is on the rise. Available statistics indicate that CO_2 increased by 7.8% (4,407.73 metric tons) from 2012 to 2013, by 8.32% (4,774.43 metric tons) from 2013 to 2014 and by 11.9% (5,342.82 metric tons) from 2014 to 2015 (Macro Trends, 2020). In fact, the total GHG emission is estimated to increase from 3.2 million mt CO_2 in the base year (2000) to 24.9 million mt CO_2 by the year 2035 and could double by 2090 (MWE, 2014). Due to the rising carbon (CO_2) emissions, human-induced climate change in Uganda has been predicted to increase average temperatures by up to 1.5°C in the next 20 years and by up to 4.3°C by the 2080s. Such changes bear a detrimental impact on the country's natural resource base, agricultural production, and productivity potential and ultimately curtail sustainable development (MWE, 2015b). Consequently, addressing the climate change issue is critical to the realization of the country's development aspirations.

Floods and landslides remain among the major climate change risks in Uganda (USAID, 2013). The ministerial statement by members of the Parliamentary Forum on Disaster Risk Reduction and Mitigation in partnership with the Civil Society Budget Advocacy Group and OXFAM, Uganda's National Humanitarian Actors (LNHAs) on floods paint a picture of the intensity, frequencies and adverse impacts of foods in Uganda between the period 2015 and 2018. According to the statement, Uganda is not flood-resistant and experiences catastrophic floods annually. In July 2015, River Nyamwamba, in Kasese district, western Uganda, burst its banks for the fourth time in just over three years. In August 2017, heavy rain caused a river to overflow, causing flooding in the town of Elegu in Amuru district, which depleted the economic livelihoods of 3000 households. In September 2017, about fifteen (15) people died and eight (8) others remained missing after heavy rain triggered floods and landslides in the district of Rubanda. In addition, a short period of torrential rain in March 2018 caused severe flash floods in Mbarara district, western Uganda. Notably, the poor rural farmers remain more vulnerable with minimal or no adaptation. Such shocks deplete economic assets such as crops, livestock, and property (OXFAM, 2018).

The impact of climate change to agriculture productivity and growth is quite evident. Significant crop losses were reported at the farm level in 2016 and attributed to climate-related shocks. The growth of the agricultural sector is reported to have declined from 3.8 to 1.5% between the period 2004 and 2015. The impact of climate change to the declining performance of Uganda's agriculture has also been underscored by the UNFCCC report (MWE, 2015b). In fact, climate-induced yield losses are predicted to increase to a range of 50 to 75% by 2050. The potential impact of climate change on the economy cannot be overemphasized given that the

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affected agricultural produce, such as coffee, accounts for 18% of Uganda's export earnings. Similar impacts are felt on tea and cotton.

According to the Uganda climate change vulnerability assessment report (2013), more vulnerable households are those with the lower proportion of able-bodied (working) members; less educated; headed by females; less likely to sell a portion of their crops or livestock; less access to loans; and minimal participation in community groups (USAID, 2013). The most affected sub-counties include Bukigai, Nalwanza, Buwali Bukalasi, Bubiita, Bulucheke, Bushiyi, Bushiribo, Bushika, and Bududa town council being more vulnerable (Irish Aid, 2016). The communities face difficulties adapting despite the availability of a range of adaptation options, including the use of climate-smart farming practices and technologies such as shifting planting dates, crop rotation, mixed farming, mixed cropping regimes, soil and water conservation and migration as the long-term strategy (USAID, 2013).

Climate change adaptation is inevitable. It is costly, but though not to the extent of the cost of none-adaptation. For example, the economic assessment of the impacts of climate change in Uganda estimates the cost of climate change adaptation at 3.2% of total government revenues (excluding grants). The cost of no adaptation is 24 to 46 times greater. Thus, in the absence of adaptation actions, climate factors could compromise the Uganda Vision 2040 target of an 8% annual growth rate (MWE, 2015a). A vicious circle could be evidenced in the absence of effective climate change adaptation. Slow economic growth and increased poverty in the face of limited climate change adaptation will mean reduced low adaption capacity and limited adaptation.

The Government of Uganda has demonstrated commitment to addressing the climate change problem through climate change policies, strategies, action plans, structures, and programs. However, the framework remains scattered in several documents making it difficult to track and conceptualize. Consequently, it is imperative to consolidate the framework and understand how effectively climate change is addressed in the agricultural sector and identify the critical issues for future actions into framing and advancing the climate change agenda in the context of the agricultural sector. Against this background, this paper addressed the following questions:

(1) How is climate change mainstreamed in Uganda's development programming?
(2) How is climate change adaptation mainstreamed in the regulatory environment for climate change adaptation in the agricultural sector?
(3) How is the implementation of climate change adaptation structured in the context of the agricultural sector?
(4) What gaps prevail in the institutional terrain for the advancement of climate change adaption in the agricultural sector?

METHODOLOGY

Findings in this paper are based on data collected through document review and findings of a qualitative case study of Bududa district, representing the local governance of climate change adaptation mainstreaming. A critical review of documents highlighting the context of climate change and the adaptation framework in Uganda in the context of the agricultural sector was done. Categorically, the relevant documents accessed and reviewed included climate change policies, plans and adaptation framework at national and district levels.

A qualitative case study of Bududa district was undertaken to understand how climate change adaptation is mainstreamed in the agricultural sector programming. Bududa district is located in the eastern region of Uganda and is most vulnerable to climate change shock of floods and landslides in the country. It lies between the longitudes of 340 16' 18" and 340 32' 6.69" East, and latitudes 000 58' 45.63" to 10 7' 22.07". The district lies at an average of 1800 m above sea level on the slopes of Mt. Elgon with most vegetation (40%) tropical forests followed by alpine vegetation towards the mountain summit (Figure 1).

The district experiences a bimodal type of rainfall with the highest in the first season of March to June and the second normally light, from September to November. The average rainfall is 1800 mm per annum, highly supportive of intensive agriculture, which forms the backbone of the district economy. The district has a total population of 211,683 and 44,861 households, of which 96.8% is rural (Uganda Bureau Of Statistics, 2014). Most households are poor (33%), and 86% depend on subsistence farming for a livelihood. Due to the high amount of rainfall averaging at 91.2 mm, the steep slopes and valleys are vulnerable to hazardous landslides, which are recurrently characterized by high intensity and severe impacts on agriculture and rural livelihoods of the farming communities (Figure 2).

According to the district multi-hazard, risk, and vulnerability profile (UNDP, 2018), Bududa district is highly vulnerable to landslides, and floods reported as the major disasters in the area. There is a high likeliness of occurrence of floods and landslides estimated at 0.3 and 0.2.

Face-to-face interviews were applied to collect qualitative data from 12 key informants. The key informants were selected using purposive sampling with care taken to represent the most relevant stakeholders across diverse categories of key informants or organizations. Consequently, the analysis was able to tap into the diversity of stakeholders in mainstreaming climate change adaptation, particularly in local governments and in the agricultural sector. The stakeholders included: Political leaders-Local Council V and Local Council III officials, Technocrats in administration units, sub-county officials and agricultural extension workers. Environment and Natural Resources Officers, Technical Committees (District Technical Planning Committee, District Environmental Committees, Disaster Management Committees and Environmental Committees) and Local NGOs and CBOs-Red Cross, Shelters International.

The politicians LCV and LCIII officials oversee implementation of government programs, climate change adaptation inclusive. The technocrats agricultural extension officers manage implementation on agricultural programs, including those related to climate change adaptation. The Environment and Natural Resources officers manage the environmental and natural resource function or programs. The disaster management committees at district and sub-county levels support the implementation of climate change programs. Non-Governmental Organizations (NGOs) and Community Based Organizations implement climate change

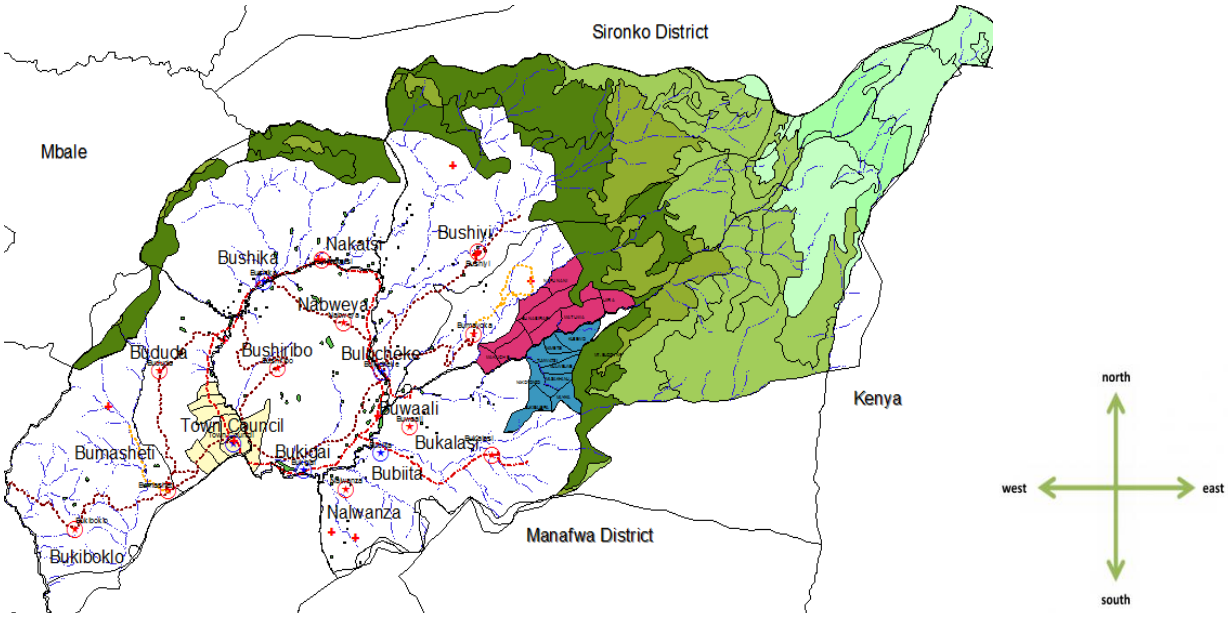

Figure 1. Map of Bududa district.
Source: www.gou.go.ug.

programs and project interventions as well as support the local government climate change structures in functions like planning for and evaluation of climate change interventions.

The interviews were standardized using an interview guide, which was designed with open-ended questions. This ensured the probing of respondents to gain a deeper understanding of the issues under study, as supported by Creswell (2014). The data was analyzed using content analysis.

FINDINGS AND DISCUSSION

The institutional framework for climate change in Uganda

The regulatory environment for climate change

Uganda has made commendable steps in building an institutional framework for addressing climate change. Uganda ratified the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol demonstrating a commitment to the adoption and implementation of policies and measures designed to mitigate climate change and adapt to its impacts. Uganda is also a member of the East African Community and therefore bound by the EAC climate change policy, which urges partner states to develop consistent national policies to ensure harmonized action. This demonstrates commitment and obligation to develop and implement strategies at local and national levels to contribute to the overall goal of combating climate change. This leverages the current national framework to address climate change and its impacts.

At the country level, addressing climate change is flagged off in the country's National Development agenda; vision 2040 and the National Development Plan 2015-2020 (GOU, 2012). This framework is the blueprint for long-term development towards the realization of sustainable economic and social development. The development agenda identifies agriculture among the sectors which are likely to be more affected by climate change impacts and consequently provides for the integration of climate change adaptation measures in agriculture programming at sectoral and local government levels. The development agenda provides strategies for management of climate change, including addressing the legal and institutional frameworks necessary for the implementation of the UNFCCC; multi-stakeholder involvement in tackling the climate change issue; ensuring adequate resources for effective implementation of the committed strategies, mainstreaming climate change adaptation in agricultural programs and projects, including the National Agricultural Advisory Services, among others.

In 2015, the National Climate Change Policy (NCCP) was developed to ensure a harmonized and coordinated approach towards a climate-resilient and low-carbon development path for sustainable development in Uganda. The NCCP sets to address key concerns of climate change adaptation and mitigation, giving priority to adaptation over mitigation. It provides a clearly defined pathway for dealing with the challenges of climate change within the socio-economic context of Uganda.

Uganda's NCCP provides for a decentralized framework for the implementation of the climate change agenda. The local governments are to address climate change

Figure 2. Water run-offs after heavy rainfall on steep slopes of Bududa district.
Source: www.gou.go.ug.

as an urgent issue of district interests as it is at the national level (MWE, 2015a). The policy charges district local governments with the role of implementing climate change programs at all levels of local governance. This framework is entrenched in the legislative framework of decentralization as provided by the local government statute of 1993, the 1995 Constitution, the Local Government Act 1997 and the NCCP 2015, devolves the responsibility for providing services from central ministries to the district level (MWE, 2015b).

In 2016, the National Adaptation Plan (NAP) framework was developed with adaptation strategies contextualized into different agro-ecological zones. A Budget Circular Call (BCC) was issued by the Ministry of Finance, Planning and Economic Development (MoFPED), requiring the mandatory mainstreaming of climate change into all sectoral budget framework papers and district local government plans, starting with the fiscal year of 2017/2018 (FAO, 2011, 2016). In 2018, the Uganda National Climate Change Communication Strategy (UNCCCS) 2017-2021 was developed. The strategy outlines a comprehensive action plan that should be followed while communicating about climate change issues in Uganda. It addresses existing gaps in communication, coordination, and dissemination of climate change adaptation and mitigation information (FAO, 2016).

Uganda's Land Use Policy 2011 recognizes the impact of climate change, especially in exacerbating the already degraded, fragile natural ecosystem. Through the policy, the government intends to address climate change mitigation and adaptation by (a) mainstreaming sustainable management of the environment and natural resources in its plans and programs; (b) putting in place climatic change adaptation strategies to reduce the impact on people and the economy and (c) developing a framework for compliance with all international climate change commitments. These activities are expected to be spearheaded by the Ministry of Lands, Housing and Urban Development (MLHUD). However, most of the Local Governments rarely plan for climate change adaptation, and where these plans exist, they are hardly monitored, implemented or evaluated as required by the national policy framework on climate change adaptation (Sridharan et al, 2019).

Climate change management and implementation structures

Management and implementation of the climate change agenda engage structures at national and local levels. A summary of the structures is outlined in Table 1.

The Ministry of Water and Environment is the national coordinating body for climate change issues in Uganda. It manages the implementation of climate change adaptation and mitigation interventions. It is supported by five ministries, the MOFPED finances and monitors climate change implementation interventions funded through the ministry. MAAIF manages the implementation of climate change adaptation interventions related to agriculture since the sector is among the most vulnerable to climate change shocks. Under the decentralized model of governance in Uganda, the MOLG provides oversight to climate change programs within the local governments, Bududa district inclusive. NARO is a mother research organization that conducts research, develops, disseminates and supports the adoption of modern agricultural technologies, including those which are climate-smart or climate-resistant. The Ministry of Lands, Housing and Urban Development (MLHUD) implements and oversees interventions towards the soil and

Table 1. Management and implementation of the climate change agenda: key structures.

Category of research participants	Institution/Unit where paricipants were selected
Stakeholders in subsidiary ministries and supporting institutions	Ministry of Water and Environment (MOWE) Ministry of Finance Planning and Economic Development (MOFPED) Ministry of Agriculture Animal Industry and Fisheries (MAAIF) Ministry of Local Government (MOLG) Ministry of Lands, Housing and Urban Development (MLHUD) National Agriculture Research Organization (NARO)
Lead Government Departments' staff	MWE Climate change unit Climate change policy committee, The Climate Change Task Force of MAAIF Climate Change Policy Committee
Supporting International Development Agencies	Food Agriculture Organization (FAO) United States Agency for International Development (USAID) United Nations Development Program (UNDP) Federal Department of International Development (DFID)
Local Government climate change stakeholders	Political leaders – Local Council V, Local Council III Chairperson Technocrats Chief Administrative (CAO), Sub-county Chiefs & Agricultural Extension Officers (AEOs), Environment and Natural Resources Officer Technical Committees (District Technical Planning Committee, District Environmental Committee, Disaster Management Committees & Environmental Committees)
	Local NGOs and CBOs- Red Cross, Shelters International, Office of the Prime Minister (OPM)

environmental conservation in the sectors of land management and urban development.

The key international development agencies which have mainstreamed climate change adaptation into their Uganda country programs include UNDP, FAO, USAID, and DFID. For example, UNDP coordinates inter-agency responses to climate change adaptation. Funds from the Global Environmental Facility (GEF) are channeled through UNDP. The agency also pioneered and supported the implementation of the climate change National Adaptation Policy Actions (NAPA). It also takes the lead on the implementation of the Sustainable Development Goal (SDG) 13 on climate change. FAO provides implementation support to national and local projects designed specifically to address climate change adaptation, climate-related disaster risk management, or a combination of adaptation and mitigation. Specifically, FAO supported development of the institutional framework for climate change adaptation in agriculture in Uganda and led the preparation of the country's National Adaptation Plan (NAP) framework. USAID funds research on climate change adaptation, the latest being the 2013 Uganda Climate Change Vulnerability Assessment. Together with DFID, USAID also funded a study on the costs of climate change in Uganda. USAID also funds capacity building interventions for climate change adaptation through programs such as the enabling environment for agriculture activity. DFID is implementing a project called the Northern Uganda-Transforming the Economy through Climate-smart agriculture (NUTEC), which is also implemented in Bududa district.

Notably, the mentioned ministries and international agencies have designated person-in-charge of climate change adaptation. For instance, the climate change advisor at DFID; the Team leader-Climate change and energy at UNDP; the Program Manager for Climate Change at FAO; the Commissioner for climate change within the climate change department at the MWE; and the Climate desk officer at the MOFEPD.

At the local government level, climate change stakeholders include political leaders (Local Council V and Local Council III Chairpersons); technocrats including the Chief Administrative (CAO), sub-county chiefs, agricultural extension officers (AEOs), and environment and natural resources officer. In addition, there are technical committees, including the District

Technical Planning Committee, the Environmental Committee as well as the Disaster Management Committee at district and sub-county levels.

The LCV and LCIII chairpersons oversee the implementation of government programs, including climate change adaptation. The Environment and Natural Resources Officer manage the environmental and natural resources function or programs. The Agricultural Extension Officers manage implementation on agricultural programs, including those related with climate change adaptation. The disaster management committees at district and sub county levels supports the the implementation of climate change programs. Non-Governmental Organizations (NGOs) and Community Based Organizations implement climate change programs and project interventions as well as support the local government climate change structures in functions like planning for and evaluation of climate change interventions.

Climate change mainstreaming in the agricultural sector

Mainstreaming climate change adaptation in the agricultural sector is flagged off in the Uganda's climate change policy which identifies agriculture among the priority sectors given its high vulnerability to climate change and significance to the country's development. Specific emphasis is put on climate change adaptation strategies that enhance resilient, productive and sustainable agricultural systems; and promoting value addition, improving food storage and management systems in order to ensure food security at all times as a factor of resilience. The policy underscores the need to support research and development, transfer and diffusion of climate-smart technology and information to better understand the impacts of climate change (MWE, 2015a).

The policy recognizes agriculture among the key priority sectors in addressing climate change adaptation and sets out agricultural sector climate change adaptation priorities. They are expanding extension services, climate-smart agriculture, livestock and crop enterprise diversification, value-addition post-harvest handling and storage, markets and access to finance, rangeland management, research on climate resilient crops and animal breeds, as well as value addition and irrigation infrastructure. The key players supporting implementation of these sector priorities include the National Agricultural Research Organization (NARO), universities and private research organizations, national programs such as the National Agricultural Advisory Service (NAADS) and Operation Wealth Creation, NGOs and CBOs (USAID, 2013). MAAIF is charged with management of climate change adaptation interventions in the agricultural sector. Notably, however, the interventions towards climate change adaptation necessitate financial investment yet farmers have limited access to finance. Agricultural insurance which would potentially promote financing of adaptation measures (Acosta-Diaz et al., 2009), is loosely advanced as a climate change mitigation strategy particularly in the context of farming communities which are more vulnerable to climate risk hazards. Institutionalization of agricultural insurance in climate change adaptation and its advancement in the climate change vulnerable communities necessitates empirical exploration. Limited advancement of agricultural insurance in climate change adaptation will compromise efforts to create resilient communities in the face of climate change.

Institutional structures for climate change adaptation

Among the stakeholders supporting national efforts include Climate Action Network Uganda (CAN-U), a coalition of non-governmental organizations advocating for climate adaptation justice in Uganda; the department of meteorology within the Ministry of Water and Environment which coordinates climate change activity, in its capacity as the national focal point for climate change under the UNFCCC; the Ministry of Health and Ministry of Finance, Planning and Economic Development which finances climate change adaptation budgets across ministries and sectors; the Commission on Disaster Management and Refugees (CDMR) under the Office of the Prime Minister coordinating an effective response to climate induced disasters such as droughts and floods; the Directorate of Water Resources Management and Directorate of Water Development within the Ministry of Water and Environment.

Specific to the agricultural sector, the National Agricultural Research Organization and universities such as Makerere conduct research developing climate-smart technologies such as risk resistant varieties and water resources management technologies. Agricultural extension organizations particularly the Ministry of Agriculture Animal Industry and Fisheries, the National Agricultural Advisory Service (NAADS) and Operation Wealth Creation work with the local government agricultural extension structures and NGOs to institutionalize, promote adoption and replicate the technologies. They also extend information, credit services, agricultural financing and agricultural insurance services to farmers (USAID, 2013). However, how the technologies and services are being accessed by farmers, how they influence farmers' adaptive capacity and emerging constraints in the context of adaptation to climate change induced floods and landslides in Bududa district is yet to be understood. In addition, there is paucity of knowledge regarding the coordination and interactions between agricultural extension, research organizations and local communities to tap into local knowledge, innovations and technologies towards

building more sustainable adaptive capacity.

Case study findings: Mainstreaming climate change adaptation agricultural programming at local government level

Results of the study showed that Bududa district local government does not periodically undertake periodic planning of climate change adaptation. Climate change adaptation is loosely mainstreamed into the district programming. Climate change adaptation was underscored in the vision of Bududa District Local Government "to have a prosperous and democratic society in a sustainable environment" though on the contrary stakeholders did not perceive climate change adaptation as central to the vision. This variance signifies insufficient knowledge of the district strategic positioning regarding climate among some stakeholders. The other gap was that the institutional programming was adhoc and focused more on disaster management in times of disasters like landslides rather than the required integrated/institutionalized processes of planning, implementing and evaluation. In addition, there are no specific and stand-alone policies, plans and byelaws towards promoting climate change adaptation. Further to note, there was no evidence of mainstreaming climate change adaptation programming across the different district departments and at the relevant lower level local government structures. While effective climate change programming would necessitate an institutionalized framework for developing abilities of staff in climate change, the district had no institutionalized training plan specific for stakeholders in climate change. The district-level intended actions on staffing, budget and policy frameworks were not responsive to climate change adaptation processes contrary to the requirement under the Uganda Climate Change Policy, 2015 and the Uganda Climate Change Plan of Action. In confirmation, one of the respondents had this to say:

"One of the problems is that the budget process is often guided by the indicative planning figures yet as a district, we do not have special budget codes or the authority to include critical climate change adaptation that the community would have identified" (Participant C).

Though the identified institutional capacity gaps can be explained by many factors, low level of budget support from the central government, the rural and hard to reach nature of the district appeared more critical. Interviews revealed that the district does not make sufficient budget allocation for climate change adaptation and quite often the budget does not address key priorities of the district for climate change adaptation. The district budget formulation process rarely picks out critical areas of support needed towards climate change adaptation. Arguably, funding is critical to support efforts towards building a competent human resource and institutional framework for effective climate change programming.

Notably, however, positive signs of improvement towards strengthening the institutional capacity for climate change adaptation programming were noticed. It was evident that the district leadership team was committed to creating an enabling environment that could galvanize district intended actions that support local climate change adaptation. The district developed a contingency plan for disaster risk reduction (DRR) to major challenges of unreliable weather pattern caused by global weather change. Further interviews revealed that the district in close collaboration and coordination with the Office of the Prime Minister (OPM) and the District Disaster Management Focal Persons routinely collects data using GIS with the aim of identifying the various hazards ranging from drought, floods, landslides, human, animal and crop diseases, pests, wildlife animal attacks, earthquakes, fires and conflicts among others. It was through this process that the district developed the district Multi-Hazard, Risk and Vulnerability Profile in 2016. These documents provide vital evidence to inform periodic programming for climate change adaptation.

In addition, the five-year District Development Plan (DDP) mirrors the strategic alignment of the district local government programs to the intended district level actions as provided for within the provisions of the law. A case in point is the participatory process for the integration of climate change adaptation plans for the lower local governments and other development partners into the district strategic plan which was being followed as required by the broader National Adaptation Policy and Actions (NAPA). This provides an opportunity for stakeholders' engagement as well as justifies any potential initiatives to support capacity building towards effective stakeholder engagement in climate change programming.

The significance of strategic positioning to climate change adaptation at local government level is consistent with Matthews et al. (2012) who consider strategic alignment as a key success factor for climate change adaptation because it enables local authorities to access a wider range of resources and to develop mutual benefits with other local projects that address climate change challenges. Burton et al. (2006) shared a similar view that adaptation efforts and activities need to be well directed, they must be guided and supported by policies and strategies developed by the leadership teams of affected areas.

Conclusions

Significant steps have been taken to mainstream climate change adaptation in agricultural programming and interventions are geared towards expanding extension

services, climate-smart agriculture, livestock and crop enterprise diversification, value-addition post-harvest handling and storage, markets and access to finance, rangeland management, research on climate resilient crops and animal breeds, as well as value addition and irrigation infrastructure. Notably, however, adoption of such interventions necessitates capital resources, yet farmers are poor with limited access to agricultural finance/credit. Agricultural insurance which would foster access to finance is loosely advanced as a climate change mitigation strategy particularly in the context of farming communities which are more vulnerable to climate risk hazards.

Climate change adaptation is loosely mainstreamed in local government programming despite the policy provisions. There are critical institutional capacity gaps which are hinged on low level of budget support from the central government towards climate change adaption in local governments. In the context of agricultural programming, the budget allocation towards expanding extension services, climate-smart agriculture, livestock and crop enterprise diversification, value-addition post-harvest handling and storage, markets and access to finance is quite limited. Generally, district local governments were observed to make insufficient budget allocation for climate change adaptation in terms of addressing the key priorities.

PRACTICAL IMPLICATIONS

The Ministry of Agriculture, Animal and Fisheries in collaboration with Ministry of Water and Environment as well as Ministry of Finance Planning and Economic Development need to institutionalize agricultural insurance in climate change adaptation with focus on the farming communities which are more vulnerable to climate change hazards. However effective institutionalization of agricultural insurance will necessitate further research to identify the potential, opportunities and challenges of advancing agriculture as a robust climate change adaptation strategy in Uganda.

Effective mainstreaming of climate change adaptation in agricultural programming in local governments will necessitate increased budget support from the central government towards capacity building of local government climate change structures for effective climate change adaptation programming. The budget should be targeted to finance key priorities areas for climate change adaptation in the specific contexts on local governments. Capacity building will foster districts' ability to plan, monitor and evaluate climate change adaptation initiatives.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

REFERENCES

Adger WN (2010). Social capital, collective action, and adaptation to climate change. In Der klimawandel VS Verlag für Sozialwissenschaften pp. 327-345.

Burton I, Diringer E, Smith J (2006). Adaptation to climate change: International Policy Options. Pew Centre on Global Climate Change, Arlington, USA.

Acosta-Díaz E, Acosta-Gallegos JA, Trejo-López C, Padilla-Ramírez JS, Amador-Ramírez MD (2009). Adaptation traits in dry bean cultivars grown under drought stress. Agricultura Technica en Mexico 35(4):419-428.

Creswell J (2014). Research design: Qualitative, quantitative, and mixed methods approaches 2nd ed. Thousand Oaks, CA: Sage Publications.

Environmental Alert (2010). Climate Change in Uganda: Insights for Long Term Adaptation and Building Community Resilience. http://envalert.org/wp-content/uploads/2016/06/Climate-Change-Issues-paper.pdf

Food and Agricultural Organization of the United Nations (FAO) (2011). FAO-Adapt Framework Programme on Climate Change Adaptation. http://www.fao.org/resilience/resources/resources-detail/en/c/1114449/

Food and Agricultural Organization of the United Nations (FAO) (2016). Integrating Agriculture in National Adaptation Plans (NAP-Ag) Inception Report, Kampala, Uganda. https://www.adaptation-undp.org/sites/default/files/resources/nap-ag-highlights-2015-2017.pdf

Government of the Republic of Uganda (GOU) (2012). Uganda Vision 2040. (Available at: http://npa.ug/wpcontent/themes/npatheme/documents/vision2040.pdf) (Accessed, April 2019).

Isoard S, Grothmann T, Zebisch M (2008). Climate Change Impacts, Vulnerability and Adaptation: Theory and Concepts. Workshop 'Climate Change Impacts and Adaptation in the European Alps: Focus Water. Vienna. https://eve.cranfield.ac.uk/urd/sits.urd/run/siw_ipp_cgi.start

Irish Aid (2016). Uganda Climate Action Report for 2016. www.irishaid,ie

OXFAM (2018). OXFAM Annual Report 2018-2019. OXFAM, Kampala Uganda. https://uganda.oxfam.org/latest/policy-paper/oxfam-uganda-annual-report-2018-2019

Macro trends (2020). Uganda Carbon (CO2) Emissions 1960-2020. Available at https://www.macrotrends.net/countries/UGA/uganda/carbon-co2-emissions

Matthews HD, Solomon S, Pierrehumbert R (2012). Cumulative Carbon as a policy framework for achieving climate stabilization. Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences 370:4365-4379.

Ministry of Water and Environment (MWE) (2014). Uganda Second National Communication to the United Nations Framework Convention on Climate Change October 2014. https://unfccc.int/resource/docs/natc/uganc2.pdf

Ministry of Water and Environment (MWE) (2015a). Uganda National Climate Change Policy. https://www.mwe.go.ug/sites/default/files/library/National%20Climate%20Change%20Policy%20April%202015%20final.pdf

Ministry of Water and Environment (MWE) (2015b). Economic Assessment of the Impacts of Climate Change in Uganda, Final Study Report, Kampala, Uganda. https://cdkn.org/wp-content/uploads/2015/12/Uganda_CC-economics_Final-Report2.pdf

Smit B, Wandel J (2006). Adaptation, Adaptive Capacity and Vulnerability. Global Environmental Change 16:282-292.

Sridharan V, Pereira R, Zepeda E, Boehlert B, Shivakumar A, Tailotis C, Howells M (2019). The Impact of Climate Change on Crop Production with Water and Energy Implications. Water 11(1805):1-24.

United Nations Development Programme (UNDP) (2018). Climate Change Adaptation in Africa: UNDP Synthesis of Experiences and Recommendations, Bangkok, Thailand. https://www.thegef.org/sites/default/files/publications/CCA-Africa-

Final.pdf
United States Agency for international development (USAID) (2013). Uganda Climate Change Vulnerability Assessment, Report August, Kampala, Uganda. file:///C:/Users/DELL/Desktop/Articles/doc%2013%20USAID%20Uganda%20Vulnerability%20Assesment%20Report%202013.pdf
Uganda Bureau of Statistics (2014). The National Population and Housing Census 2014 Main Report, Kampala, Uganda. https://www.ubos.org/wp-content/uploads/publications/03_20182014_National_Census_Main_Report.pdf