



CLIMATE CHANGE VULNERABILITY AND WOMEN'S LAND RIGHTS

The Case of Arua District

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CLIMATE CHANGE VULNERABILITY AND WOMEN'S LAND RIGHTS

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ACRONYMS AND ABBREVIATIONS

ACODE	Advocates Coalition for Development and Environment
AIDS	Acquired Immunodeficiency Syndrome
ALPC	African Land Policy Center
BMC	BioMed Central
CBO	Community Based Organization
DDP	Delivery Duty Paid
EOC	Equal Opportunities Commission
ERIWY	Enhancing Resilience in Vulnerable Communities and Inclusion of Women and Youth
GRID	Global Resource Information Database
HIV	Human Immunodeficiency Virus
ICF	Inner City Fund
IFPRI	International Food Policy Research Institute
IGAD	Intergovernmental Authority on Development
IGI	International Gemological Institute
IPCC	Intergovernmental Panel on Climate Change
KG	Knowledge Group
LC5	Local Council Five
MWE	Ministry of Water and Environment
NARO	National Agricultural Research Organization
NAPA	National Adaptation Programs
ND-GAIN	Notre Dame Global Adaptation Initiative
NDP	National Development Plan
NGOs	Non-Government Organizations
UBOS	Uganda Bureau of Statistics
UKAid	United Kingdom Aid
UNDP	United Nations Development Programme

UN	United Nations
USA	United States of America
UWEP	Uganda Women Entrepreneurship Programme
WOUGNET	Women of Uganda Network
WOW	Work and Opportunities for Women
YLP	Youth Livelihood Program

EXECUTIVE SUMMARY

Climate change presents one of the most challenging threats to sustainable development for all categories of individuals and communities. In respect to gender, women and girls constitute one of the most vulnerable categories of populations. However, the vulnerability of women is context-specific because the impacts of climate change vary with location, household and for individual members of a given community due to a multiplicity of factors. One of the key factors for women's vulnerability to shocks and stresses is marginalisation entrenched in social norms and practices. Aspects of marginalisation against women in Uganda among others include inequitable access to physical, social, political and financial resources. Women particularly have far less access to, ownership of and control over land asset, yet most of their livelihoods predominantly depend on it. The marginalisation coupled with inherent vulnerability of women and girls to climate shocks and stresses makes it of paramount consideration for policy making and implementation of programmes and projects to solve these challenges.

For adaptation and resilience building interventions to be effective, there is need for gender specific vulnerability assessments to generate contextualised evidence and understanding of prevailing drivers of climate susceptibility and risk. Without such evidence, it is not easy to promote the use of gender as a criterion for targeting anti-vulnerability policy, programme and project interventions. Lack of targeted efforts to address gender disaggregated vulnerabilities will not only perpetuate existing gender inequalities but also reduce their already limited access to physical, social, political and financial resources.

In view of the aforementioned, an action-oriented study was conducted in Arua district with an overall objective of examining the climate change vulnerabilities for women and girls and the contribution of limited access, ownership and control over land to these vulnerabilities. The specific objectives of study were:

- i. To analyse gender-specific climate change vulnerabilities in Arua district;
- ii. To determine the nexus between gender specific climate change vulnerabilities and land access, ownership and control; and
- iii. To explore the potential mechanisms for addressing gender-specific vulnerabilities and enhance resilience of women to climate change.

This study was undertaken through an engaging and participatory process based on a Knowledge Group (KG) representing different stakeholders

relevant to the objectives of the study. The processes focused on vulnerability and risk assessment of different livelihood activities and social groups to climate change hazards and land rights issues. In addition, in-depth interviews were conducted with representatives of different social groups including women, people living with HIV/AIDS, people with disabilities and groups involved in different livelihood activities, which are predominated by smallholder farming. Materials from the Knowledge Group discussions and interview transcripts were subjected to content analysis with focus on characterising the adaptive capacity and/or resilience of the communities in Arua district. The attributes considered include: assets; psychosocial factors, flexibility to change strategies; ability for social organisation and collective action; ability to learn to recognize and respond to change.

Findings of this study show that Arua district is very vulnerable to climate change impact risk. The vulnerability and effects of different climate hazards and land issues vary with social groups and livelihood activities. The key climate hazards identified were drought, erratic weather patterns as well as climate induced pests and diseases. The land rights issues included lack of: (1) land ownership, (2) control over land, and (3) knowledge on land rights. Smallholder farmers were associated with the highest level of exposure to drought, floods, erratic weather patterns as well as climate induced pests and diseases like maize streak, cassava mosaic/brown streak, ground nuts rosette, among others. Women were particularly more affected by drought than other groups. The nature and degree of exposure to these hazards was worse for women/people with disabilities and those living with HIV/AIDSs because of marginalisation and inherent physical inabilities.

The immediate impacts of climate change in Arua district were directly linked to agricultural productivity and production including water shortage, crop failure and diseases. However, the impact chains have wider and compounding effects that are ultimately undermining development in general. Crop failure due to climate hazards has led to reduction in yields and accordingly affected incomes, nutritional needs, and other socio-economic aspects of development including increase in poverty levels. Knowledge Group discussions and interviews indicated that land ownership is a central factor of the vulnerability status of women in Arua district. The major issue pertaining to land was the prevailing structural inequalities in ownership and control that were rooted in social-cultural norms and traditions that marginalise women. Women face discrimination and violations that make them more vulnerable to shocks and stresses. This is especially so when they are (or not) able to make decisions pertaining to what they want to do with the land including choice of livelihood activities and climate change responses.

The adaptive capacity of communities in Arua district is very low. Inadequate knowledge on land rights was largely considered to be a major concern for, but not exclusive to, women. The combined effect of high levels of inadequate land access, ownership and control by women escalate their inability to cope with climate change impacts. Findings reveal that land is grabbed from widows by their in-laws, which leaves them with limited portions of land for cultivation. Several other limitations hinder resilience building among women and other social groups involved in smallholder farming livelihood activities. There is lack of the needed farming technologies or mechanisms such as irrigation schemes, ox-ploughs, water harvesting options, fast-maturing crop varieties, which would otherwise help in improving productivity and production. There is also a general lack of knowledge and awareness about effective adaptation response options. Most of the adaptive capacity needs were psychosocial covering issues such as stress and anxiety, family conflicts, poor school performance of students, alcoholism, perceived women inferiority, low self-esteem, failure to start families, among others.

There is need to enhance the adaptive capacity for the agriculture sector by promoting drought-tolerant varieties of crops, livestock, poultry while providing agricultural technologies such as irrigation schemes, water harvesting options, and fast-maturing crop varieties. Besides, there is a need to diversify livelihoods to reduce over dependence on the current smallholding farming systems. There is also need to support households with information on climate risk adaptive farming practices that should enable farmers to grow crops even when stresses and shocks occur. The information needed includes prerequisites for effective planning and use of improved crop varieties like those that are drought resistant.

Adaptation and resilience building interventions should intentionally integrate and provide psychosocial support in the wake of acute impacts and reducing the vulnerabilities contributing to their severity. It will require putting in place policy frameworks that target promotion of emotional resiliency and empowerment of individuals to face psychosocial impacts of climate hazards and land issues. Women being the most vulnerable, must be prioritised. Attention should be given to interdisciplinary and cross-sector approaches since psychosocial impacts and needs identified transcend different hazards and issues. This should include interventions to build positive perceptions and ability of women to mobilise land and other resources to handle adverse events through engaging in adaptive responses to shocks. To empower women, there should be efforts aimed at increasing land ownership and access security for women, empowerment of girls including through increased enrolment and retention in schools, and inclusive decision making. This should go hand-in-hand with increased

awareness and knowledge aligned to skills and consciousness to address the prevailing marginalisation.

1. INTRODUCTION

1.1 Background

Climate change presents one of the most challenging global threats to sustainable development for all categories of people and places. Climate change hazards, such as droughts and other extreme weather events significantly disrupt livelihoods, exacerbate the cycle of poverty, lead to crop failures, child labour, water scarcity, depression and domestic violence among others (Abbasi, Anwar, Habib, Khan, & Waqar, 2019; Akrofi, Mahama, & Nevo, 2021). Research shows that due to climate change, women bear the brunt of increased natural disasters, displacement, unpredictable rain fall, decreased food production, and increased hunger and poverty (WOW & UKAid, 2021). The United Nations Development Programme estimates that about 80% of people displaced by climate change are women (Habtezion, 2012). The impacts of climate change are more experienced in developing countries, which are characterized by high levels of vulnerability (UNDP, 2014).

According to the Intergovernmental Panel on Climate Change (IPCC), vulnerability is defined as “the degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change, including climate variability and extremes” (IPCC, 2001). Based on this definition, it can be noted that it is not the male or female gender itself that signifies vulnerability, but rather the specific context within which these genders are found. It should also be noted that the effects and risks of climate change are not evenly distributed between and within communities (O’Neill et al., 2017). Within countries, vulnerabilities have been linked to inequalities in the distribution and access to resources and opportunities (Abbasi et al., 2019). In other words, vulnerability arises from non-climatic factors and multidimensional inequalities which are often a result of development deficits (Yannick Glemarec, Seemin Qayum, 2016). Thus, several factors spanning the physical, economic, and social-cultural dimensions are key determinants of peoples’ vulnerability to climate induced hazards.

The economic setting holds significant implications for how men and women are impacted by climate change. This means that vulnerability to climate change impacts is intimately linked to poverty and economic marginalization (UNDP, 2014). It is widely recognised that women, in particular, have less access to productive resources, agricultural credit, and limited access to agricultural land (UN, 2020). The legal, institutional and socio-cultural barriers often limit women’s access to these services. Besides, women globally earn much less income than their men counterparts (Akrofi

et al., 2021). This economic marginalization affects women's ability to access knowledge and information on climate risks as well as adaptation measures, and their ability to make investments that can help them to adapt or recover from climate-related shocks and stresses (Leichenko & Silva, 2014). Moreover, women still face gender-based discrimination on ownership of land and access to natural resources (UNDP, 2014). Across the developing world, rural women suffer widespread gender-based discrimination in laws, customs and practices, which cause huge inequalities in their ability to access, control, own and use land and this limits their participation in decision-making at all levels of land governance (UN, 2020). Yet women's land rights are key in reducing their vulnerability to climate change impacts (Landesa, 2016).

Emerging evidence suggests that when women hold secure rights to land, efforts to tackle climate change are more likely to be successful, and the responsibilities and benefits associated with climate change response programs are more equitably distributed (UNDP, 2014). However, inequalities in the ownership and control of household assets undermine women's ability to achieve economic independence and wellbeing (Flatø, Muttarak, & Pelsler, 2017), thus rendering them disproportionately vulnerable to climate change effects. Gender inequality in access to land and property is substantial due to discriminatory inheritance practices, unequal access to land markets and gender-biased land reforms (UN, 2020). Women's land rights are generally considered secure if they are clearly defined, long-term, enforceable, appropriately transferable, and socially and legally legitimate (Landesa, 2016).

Gender-specific impacts of climate change are also largely attributable to gender-differentiated power relations, roles and responsibilities of men and women at the household and community levels (Cardona et al., 2012). Socially constraining norms and values often lead to increased vulnerability to climate change for women and girls. Geographic location also influences gender-related vulnerability to climate change (McDowell, Ford, Lehner, Berrang-Ford, & Sherpa, 2013). The vulnerability context also differs for rural and urban areas. For example, due to inadequate infrastructure and access to facilities and services, rural dwellers especially women may find it more difficult to adapt to climate change impacts (Akrofi et al., 2021). In Uganda, rural women and girls who play a leading role in food production and domestic responsibilities, are generally more at risk of climate change than men (WOUGNET, 2016). In most parts of Uganda, climate change has brought new challenges in the form of more tenuous livelihoods, worsening and recurrent drought and evolving gender roles (Opondo et al., 2016). In Arua, the main impacts of climate change include diminishing agricultural productivity, reduced food availability, and loss of incomes. These have

worsened gender inequalities and reduced the adaptive capacities of women who predominantly depend on agriculture for a living (Advocates Coalition for Development and Environment 2019). This calls for efforts to empower women to build their absorptive, adaptive and transformative resilience capacities to manage climate and other shocks and stresses (Opondo et al., 2016).

1.2. Gender and Climate Vulnerabilities

Emerging evidence reveals that vulnerability to climate change is a multi-layered and multi-faceted phenomena, determined by both biophysical and socio-economic factors, leading to differential vulnerabilities for women and men from different categories, groups and locations (Abbasi et al. 2019). Given the gender-differentiated roles and responsibilities, rights, access, ownership and knowledge shape climate vulnerabilities, often resulting in women being affected disproportionately because of the socioeconomic constraints and inequalities (WOW and UKAid 2021). Thus, gendered climate vulnerability can be based on four major situations and conditions namely 1) work types and spaces of men and women, 2) inequities in access and control over assets and resources, 3) gender division of roles and responsibilities, and 4) inequalities in decision-making (Goodrich et al. 2019).

In developing countries, the majority of women are engaged in subsistence agriculture as a source of both food and income generation, with peculiar vulnerabilities to climate change and variability (Rao et al. 2019). Thus, a changing climate as well as other risks and shocks pose challenges to managing household food and nutrition security by women in many societies, especially in Africa. In Ethiopia, for example, men have been found to be more concerned about the low livestock prices due to climate change, while women's concerns focus on food availability (Goodrich et al., 2019). Although agriculture is increasingly feminized in terms of women's labour contributions, this has not resulted into increased access and control over respective productive resources such as land, credit or technologies like drought-resistant crop varieties and groundwater irrigation (Ahmed et al. 2016). In fact, they are often excluded from extension and training opportunities, such as on the use of machinery or fertilizers, provided both by the public and private sectors. Women remain subsistence producers. Issues of water availability/scarcity are socio-culturally of major concern to women and their children, given their responsibility of availing water for household use. With increased water scarcity due to climate change, women's work load has increased (McDowell et al. 2017).

Like many other African Countries, Uganda is also very vulnerable to climate change. A study conducted in Eastern Uganda reveals that female-

headed households were more vulnerable to climate change (GVI-IPCC = -0.134) than male-headed households (GVI-IPCC = -0.176) (Balikoowa et al., 2019). In the same study, it was further noted that disparity in adaptive capacity was a major cause of vulnerability differences between female and male-headed households. In communities around Elgon Mountain, female vulnerability is attributed mainly to a limited asset ownership portfolio (Nabanoga and Bomuhangi, 2019). A study conducted by Kanssiime and Mastenbroek, (2016) in West Nile also reveals that various districts in this region were very vulnerable to climate change. Drought, pests and diseases were particularly more common in Arua, compared to the other study locations. Too much rainfall (heavy and erratic) was mostly reported by farmers in Nebbi and Zombo (Ibid). In the same study, it is revealed that heavy and erratic rainfall also led to flash floods, particularly in Nebbi because of its low lying nature. The prolonged droughts in the region have reduced the length of growing seasons, particularly the first season, which has been reduced to just two months i.e., April and May.

Compared to other districts in West Nile sub-region, Arua is characterised by unique climate change impact compounding factors such as high urbanisation rate, reduced per capita land ownership, environmental degradation, among others. However, there is lack of documentation of such vulnerability context to inform adaptation and resilience building interventions. Moreover, there is need to have such information produced in a way that enhances understanding of gendered vulnerabilities to climate change. This is especially so because of the prevailing social-cultural practices that discriminate against women on important livelihood assets such as land. Such information is important in galvanising the growing recognition of the importance of differential climate change vulnerabilities, women targeted policies, laws, programmes and projects on land rights, gender main-streaming and empowerment across scales.

1.3. Policy Context

Policies addressing climate change must place women at the core of strategies related to climate response including technology development and transfer, and capacity building (UNDP, 2014). Efforts to address climate change as well as legitimising women's land rights are enshrined in various global, regional, national policy and legal frameworks.

1.3.1. Global Policies

In the 2015 Paris Agreement, Parties are obliged to address climate change, respect, promote and consider their respective obligations on human rights including the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable

situations and the right to development. It also calls for gender equality, empowerment of women and intergenerational equity (UN, 2015b). Although the 2015 Paris Agreement on Climate Change does not explicitly mention land rights, global and national plans of action will benefit from an enhanced focus on land rights, and particularly women's land rights. The international community made strong and comprehensive commitments to gender equality and women's rights in the area of access to and control over resources at the Fourth World Conference on Women in 1995 (UN, 1996). The Platform for Action of the Fourth World Conference on Women recognised that women are among the most affected by climate change and have less access to land and productive resources. The Platform urges governments to ensure that women have access to land resources and are involved in decision-making at all levels, integrating their concerns in policies and programmes, and establishing ways to assess the impact of development and environmental as well as climate change based policies on women.

The Sustainable Development Goals (2016-2030) put a much-needed spotlight on poverty, climate change hunger, inequality, and violence against women as key challenges of the 21st century (UNDP, 2015). Goal 5 aims at achieving gender equality and empower all women and girls. Goal 13 aims at taking urgent actions to combat climate change and its impacts. Besides, the Sendai Framework for Disaster Risk Reduction 2015-2030 recognises that women and their participation are critical to effectively managing disaster risk and designing, resourcing and implementing gender-sensitive disaster risk reduction policies, plans and programmes (UN, 2015a). Empowering women and promoting gender equality is crucial to accelerating sustainable development and reducing climate change vulnerabilities. Furthermore, ending all forms of discrimination against women and girls is not only a basic human right, but it also has a multiplier effect across all other development areas.

Human rights treaties, mechanisms and instruments have also addressed the issue of women's access to and control over resources. The Convention on the Elimination of All Forms of Discrimination against Women requires Governments to take all appropriate measures to eliminate discrimination against women and ensure practical realization of the principle of equality of women and men (UN, 1985). States are obligated not only to refrain from engaging in acts of discrimination, but also to eliminate discrimination against women by any person, organization or enterprise. It also requires partner States to ensure the same rights for both spouses in respect of the ownership, acquisition, management, administration, enjoyment and disposition of property. This Convention has direct implications for climate change, obliging parties to take all appropriate measures to eliminate

discrimination against women in rural areas in order to ensure that they participate in and benefit from rural development and are involved in all levels of development planning.

1.3.2. Regional Policies

The 2003 Maputo Protocol is a progressive instrument providing a comprehensive set of human rights for African women. It focuses on a wide-range and substantive human rights for women covering the civil and political, economic, social and cultural as well as environmental rights (UN, 2003). Article 18 of the Protocol focuses on women's right to a healthy and sustainable environment to ensure greater participation of women in the planning, management and preservation of the environment, and the sustainable use of natural resources at all levels. Besides, the IGAD Gender Policy (2012-2020) was developed with the recognition that gender equality is a fundamental pre-requisite for the region's and indeed Africa's socio-economic and political transformation (IGAD, 2015). Further, the East African Community Vision 2050 obliges the East African region to harmonize gender policies and thereby realize gender equality and women's empowerment. The programmes and projects under the Vision 2050 are concentrating on specific interventions addressing the issues of climate change, women and gender empowerment, among others.

1.3.3. National Policy Context

Uganda's Vision 2040 is a key national planning framework for all government institutions and other stakeholders working on natural resources and gender issues in Uganda. It identifies key environmental challenges like climate change, poor waste management, water pollution, deforestation, wetland degradation among others. Although Vision 2040 is not explicit on land rights for women, it recognises the challenges faced by women, the minority groups and other marginalized groups in accessing and controlling land. It highlights the need to address land production issues through land reforms and domestic relations laws and programmes all geared at securing women's land rights, advancing gender equality and women empowerment (Government of Uganda, 2015). The third National Development Plan (NDP III) presents opportunities to implement Uganda's Vision 2040 on climate change, gender equality and women empowerment (Uganda National Planning Authority, 2020). It acknowledges that mitigating the climate change orchestrated impact of droughts, floods, heat waves and landslides on the livelihood of vulnerable populations including women is critical for reducing inequalities. Although the NDP III doesn't have a standalone chapter on gender and women's land rights, it has a strong focus on reducing vulnerability and gender inequality. The plan acknowledges the existence of unresolved conflicts

that are rooted in access to natural resources, especially land. It particularly diagnoses the negative effects of lack of access to land by women and youth on agricultural productivity and production.

The Constitution of the Republic of Uganda, 1995 as amended in 2005, which the supreme law of the country, emphasises the principles of non-discriminatory, gender equality and women's empowerment in various Articles of the Constitution. Under Article 21 it is stated that all persons are equal before the law in all spheres of political economic, social and cultural life and in every other aspect and shall enjoy equal protection of the law. Article 31 (1) of the Constitution entitles women and men to equal rights during and after marriage. Article 33 recognises that women shall be accorded (1) full and equal dignity of the person with men and (2) right to equal treatment with men coverings aspects of equal opportunities in political, economic and social activities. While the Constitution provides for gender equality, it does not specifically or explicitly recognize women's land and property rights.

The Land Act Cap 227, Section 28 outlaws discrimination against women and children in respect of ownership, occupation and use of any land. The National Land Policy 2013, commits to protecting the land rights of groups and communities marginalized by history or on the basis of gender, religion, ethnicity and other forms of vulnerability to achieve balanced growth and social equity. The Uganda Gender Policy 2007 further embraces gender equality and equity but it is silent of the issues of women's land rights and climate change vulnerabilities. The National Climate Change Act 2021 specifically provides for development of a strategy that takes into account gender and human rights issues differential impacts of climate change on gender as well as resilience and adaptation needs of the vulnerable and marginalised communities. (Government of Uganda 2021). Despite the strong women land rights commitments enshrined in the National Land Policy, customary practices in some areas of Uganda continue to override them.

These policies, laws and plans establish a framework for management aspects of vulnerability to climate change, gender issues, women's land rights, and provide the enabling environment for response actions downstream. Furthermore, these instruments help to clarify management roles across sectors as well as from national to local level. For example, the institutional mandate for climate change and gender are within the Ministry of Water and Environment and the Ministry of Gender Labour and Social Development respectively. The institutional mandates for these ministries are decentralised to cross-sectoral Ministries Departments and Agencies as well as local governments. If used effectively, both the legal and

institution frameworks can support more integrated, inclusive and equitable approaches to building resilience. They can facilitate governmental actors to identify, plan, resource and meet the specific needs of vulnerable groups especially women. They can enable direct and meaningful participation of vulnerable groups in decision-making, design and implementation of climate change adaptation activities. Although these policy, legal and institutional frameworks exist, in practice, women's rights to land, including the right to access, use, control, manage, and make decisions about land and land-based resources, are often diluted or denied (Landesa, 2016). In other words, they often do not contain the specificity or make the necessary linkages with other climate change based legal frameworks to protect and include vulnerable groups in times of climate- based disasters.

The institutional and policy gaps identified above, keep women more vulnerable to climate change than men (Flatø et al., 2017). This is attributed to a wide diversity among women based on class, age, education levels, marital status, class, location, and tradition. These hugely influence their access to land and level of vulnerability. Vulnerability of women is context specific because the impacts of climate change vary with location, household and for individual members of a given household due to a multiplicity of factors. Given this contextualised vulnerability perspective, not all women are equally vulnerable. Moreover, there are opportunities presented by women and communities, in general, that are not understood and documented to inform enhanced adaptive capacity and strengthened resilience building efforts.

Gender-specific vulnerability assessment is important for generating contextualised evidence and understanding of prevailing drivers of susceptibility to climate and other risks such as those related to land rights. Without such evidence, it is not easy to promote the use of gender as a criterion for targeting anti-vulnerability policy, program and project interventions. Knowledge of vulnerability levels for identifiable contextual groups of actors is needed to inform local or national adaptation courses of action. Lack of this kind of knowledge limits the ability to undertake informed decision making and achieving targeted adaptation support to the most vulnerable sections of society. Lack of targeted efforts to address gender disaggregated vulnerabilities will not only perpetuate existing gender inequalities but also reduce their already limited access to physical, social, political and financial resources. Hence the need for targeted and evidence-based climate change response interventions. In that way, potential risk to exacerbate vulnerabilities such as existing gender inequalities can be mitigated. The marginalisation coupled with inherent vulnerabilities of women and girls to climate and socio-economic shocks and stresses makes it of paramount consideration for policy making and implementation

of programmes and projects.

1.4. Objectives of the Study

The overall objective of the study is to examine the climate change vulnerabilities for women and girls and the contribution of limited access, ownership and control over land to these vulnerabilities in West Nile sub region Uganda. The specific objectives are:

- i. To analyse gender-specific climate change vulnerabilities in Arua district;
- ii. To determine the nexus between gender specific climate change vulnerabilities and land access, ownership and control; and
- iii. To explore the potential mechanisms for addressing gender-specific vulnerabilities and enhance resilience of women to climate change.

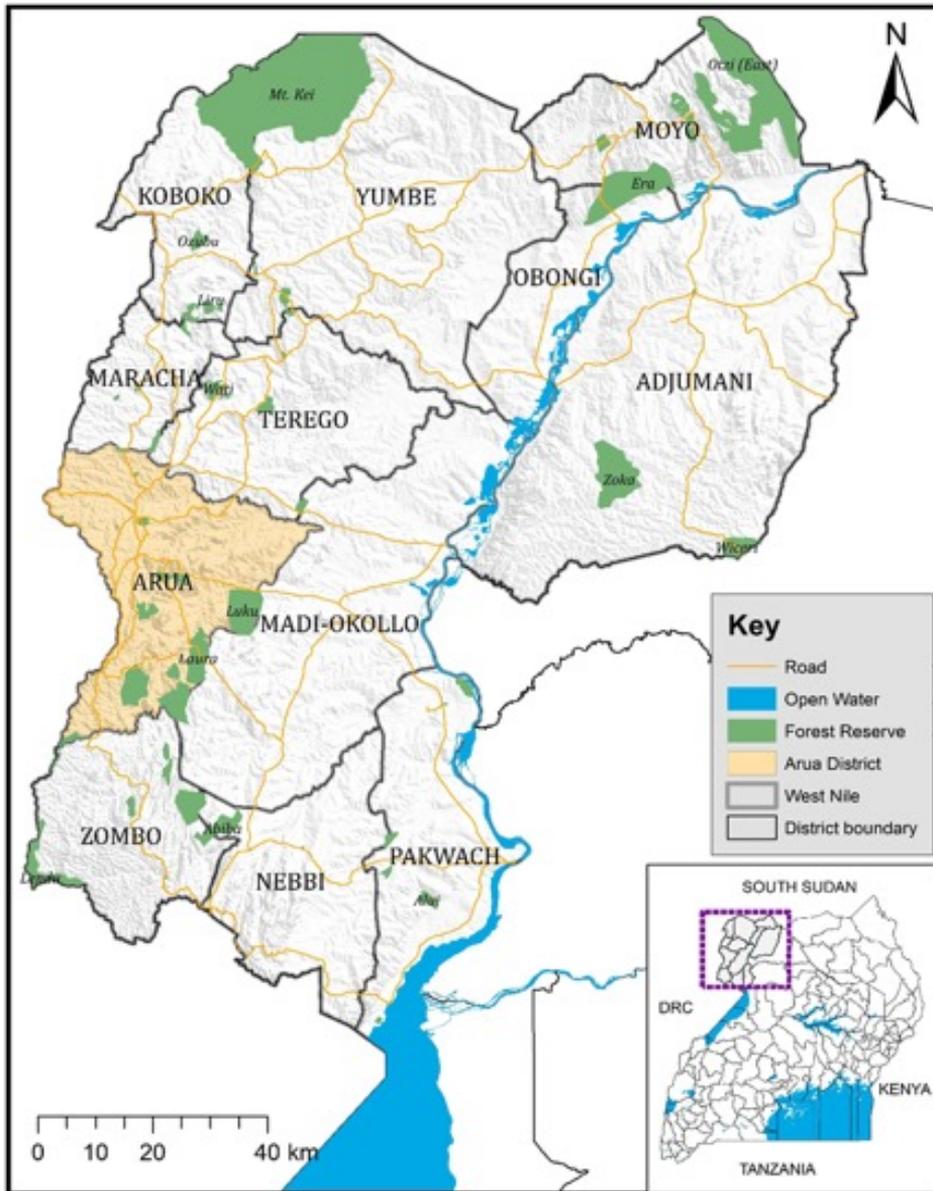
1.5. Study Area

The study was carried out in Arua district, located in the West Nile sub region of Uganda. The West Nile sub region comprises of Adjumani, Arua, Koboko, Maracha, Madi Okollo, Moyo, Nebbi, Obongi, Pakwach, Terego, Yumbe, and Zombo districts. Arua district is a hub for the sub region with many pull factors for urbanisation (Uganda Investment Authority, 2021). The district has the highest and fast-growing population than any other district in West Nile (UBOS, 2016). This is due to high levels of immigration and refugee settlement into the district. The district also hosts all West Nile ethnic tribes in West Nile as well as tribes from other regions of Uganda (Dawa, 2020). These unique characteristics of the district in the region provide a basis for gaining insights into the future trends for the rest of the districts in the region including aspects related to vulnerability to climate change and land issues. Land issues are uniquely important because of the recent establishment of Arua city that is expected to bring about new land and land-related dynamics in Arua district and the sub region at large.

1.5.1. Location

Arua is one of the 12 districts that make up the West Nile sub-region. The district is located in north-western Uganda. Arua district covers a total area of about 4,200 km² (Uganda Investment Authority, 2020). It is bordered by Maracha district in the northwest, Terego in the northeast, Zombo in the south, and Madi Okollo in the East. The district is bordered by Democratic Republic of Congo to the west (Figure 1).

Figure 1. Location of the study area (Arua District, West Nile sub region)



1.5.2. Population

The 2014 National Census report shows that the population of Arua district was 782,077, with approximately 51% being females (UBOS, 2016). About 54% of women are illiterate, with only 0.8% having access to mass media at least once a week (UBOS and ICF, 2018). The majority of this population fall in four major ethnic groupings including the Lugbara, Alur, Madi, and

Kakwa. The commonest languages spoken are Lugbara, English, Kiswahili, Arabic, and Alur (Uganda Investment Authority, 2020).

1.5.3. Climate

Arua district experiences a bi-modal rainfall pattern. In the past, light rains have usually been received between April and October. The wettest season (August and September) has generally been known to receive monthly rainfall of 120 millimetres (UNDP, 2016). However, there have been shifts in rainfall patterns that continue to be erratic. Areas that generally have a flat terrain, high rainfall intensity has caused floods. The rainfall is often associated with destruction of crops. Lightning has registered fatalities, mostly especially, in school. The dry seasons are usually very hot and run from December to March. However, the seasons have continuously become hotter and longer. Prolonged dry spells have led to drying up of water sources, and loss of crops (UNDP, 2016).

1.5.4. Livelihood Activities

The major livelihood activity in the district is subsistence agriculture, which employs over 80% of the households. The main crops grown include cassava, simsim, beans, millet, maize, among others (Uganda Investment Authority, 2020). Women provide over 50% of the farming labour force (Advocates Coalition for Development and Environment, 2019). Women are also involved in trade including selling of food items with consent of their husbands (United Nations Development Program, 2016). Other livelihood activities in the district include casual employment, fishing, art and crafts, and honey production (Uganda Investment Authority, 2020).

1.5.5. Land

The land tenure system is predominantly (about 90%) customary in which property is owned under specific single permanent holding. The land ownership and user rights are vested with clans. Land under a given clan is divided/portioned to families. A given family will continue to occupy and use a given portion of land as assigned by the clan. The head of a family (usually male) takes decisions on the management of land allocated to or owned by a household. Customary land is in some cases owned communally with non-permanent individual holdings. In this context, parcels are allotted to families for communal grazing and/or crop farming and are retained as long as they are in use (Arua District, 2020; Gunya, 2005). Generally, male elders dominate decision making for the allocation of land. Women and youth are usually excluded from determining land utilisation despite being the main users. Other land tenure systems, despite being at a low scale in the district, include leasehold (about 4%) and freehold (about 6%). Leasehold is based on agreement made between the lessor and lessee. Freehold system involves holding land in perpetuity based on a title deed

(Makabayi & Musinguzi, 2015). About 72% of women do not own land, while 89% do not have title deed on land (UBOS and ICF, 2018).

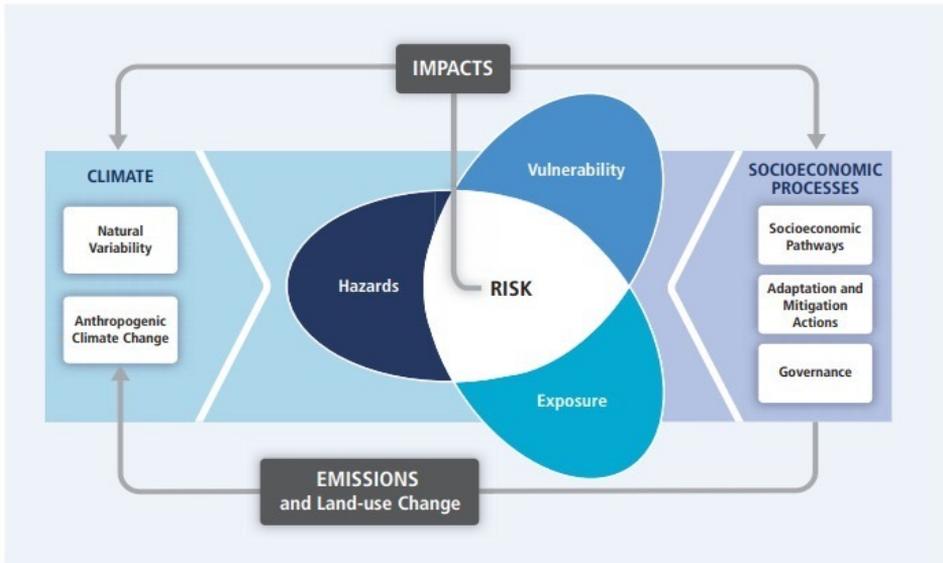
2. APPROACH AND METHODOLOGY

2.1. Conceptual Framework

The approach to this study is premised on the Intergovernmental Panel on Climate Change (IPCC) conceptual framework of climate impact risk (IPCC, 2014; IPCC, 2019), which is based on three major elements of hazard, exposure and vulnerability (Figure 2). Risk refers to the likelihood, or perceived likelihood, of the materialization of a hazard (Morchain and Kelsey, 2016). A hazard is an event or trend that may cause damage to human life, property, infrastructure, livelihoods, service provision, natural systems and environmental resources. Exposure is about presence of people, assets or natural systems in an area where hazards may occur (IPCC, 2019).

The risk of climate-related impacts results from the interaction of climate-related hazards, including hazardous events and trends, with exposure and vulnerability of human and natural systems. Changes in both the climate system and socio-economic processes, including adaptation and mitigation are drivers of hazards, exposure and vulnerability. This study gives attention to understanding of vulnerability to climate impact risk as a basis for undertaking targeted resilience building that is expected to result in increased adaptation and reduce overall climate risk Arua district. Specific attention is given to vulnerability assessment that underscores the importance of gender and assets, especially land in resilience and adaptive capacity building. The study looks at vulnerability as a function of the character, magnitude, and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity. On the other hand, resilience is the capacity to live and develop with change, and absorb shocks and stresses (Folke et al. 2016). The study will be hinged on the assessment of the above constituent elements of vulnerability.

Figure 2. Conceptual Framework for the Study



Sources: IPCC (2019), IPCC (2014) Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

In the context of this study, socioeconomic processes include the current development pathways in West Nile, and Arua in particular, covering governance aspects such as participation in decision making, gender equity on land ownership, access and control. The processes also cover the current and potential measures to deal with land rights issues as well as climate change impact risk and the associated effectiveness and efficiency. This includes adaptation interventions being undertaken to reduce vulnerability and how they are integrated in socioeconomic development at national, sub-national and local levels.

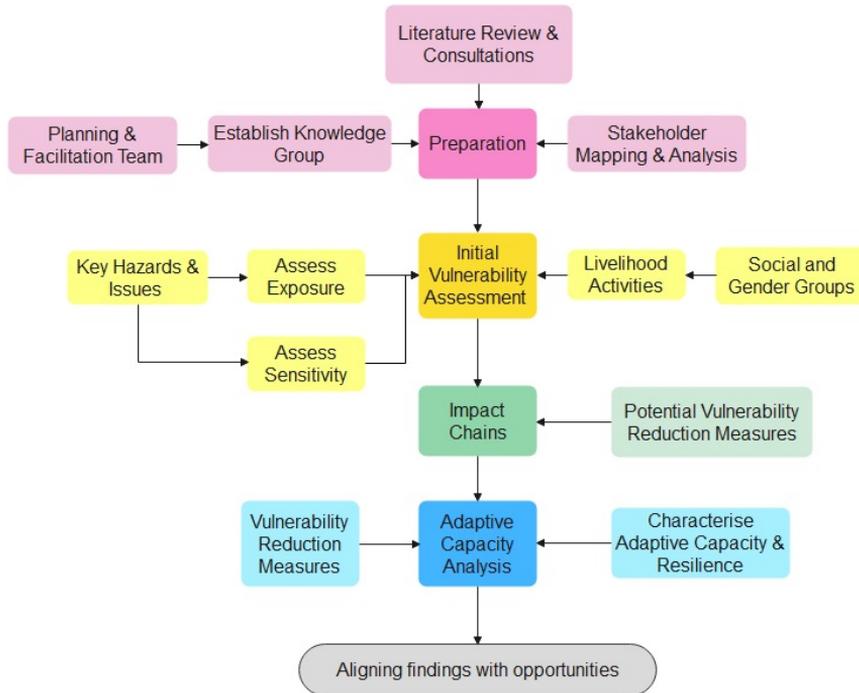
2.2. Study Process and Methods

To achieve the objectives and intended outcome of the study, a five-step stakeholder engaging vulnerability assessment and knowledge co-creation process was undertaken (Morchain and Kelsey, 2016; Vincent and Colenbrander, 2018). Taking a co-creation approach was aimed maximising opportunities for ownership and implementation of the results of the study. It builds and strengthens relationships between stakeholders, enabling local issues and the voices of marginalized groups to come to the surface. Moreover, the process allows for empowerment and enhancement of stakeholder capacities to address vulnerabilities including those related to climate change as well as access and control over land resources. The approach also helps in addressing a wider social-ecological landscape,

rather than limiting focus to an individual community/household level. Stakeholder engagement in the process promotes greater accountability of both governmental and non-governmental decision makers (Morchain and Kelsey, 2016).

The steps included: Preparation; Initial vulnerability assessment; Development of impact chains of climate change hazards and land rights issues; Adaptive capacity analysis; and Alignment of findings to existing and potential opportunities (Figure 3). This process was coupled with in-depth interviews with representatives of different social groups including those of women, people living with HIV/AIDS, People with disabilities, involved in different livelihood activities, which are predominated by smallholder farming.

Figure 3: Flow chart for the stakeholder engaging vulnerability assessment and knowledge co-creation process



2.2.1. Preparatory Phase

This phase largely involved preparatory and logistical arrangements for the study. The activities included establishment of a Planning and Facilitation Group as well as a Knowledge Group (KG). The Planning and Facilitation group mainly comprised of the research team and other individuals from Arua District Local Government including representatives of the Natural Resources and Community Development Offices listed in the composition

of participants later. The representatives from the district included an equal number of men and women as well as individuals who are technically responsible for climate change and land matters and those who could speak the shared local language, Lugbara. The Planning and Facilitation team identified and convened a Knowledge Group; oversaw logistical arrangements; prepared materials for undertaking the study and took overall responsibility including facilitation of the study process and delivery of outputs from KG engagement. Literature review and consultations were key elements of this phase and continued through the whole study process for purposes of coming up with a study grounded in integrated knowledge. Review of documents including district development plans, reports, profiles, among others and consultations were essential in identifying key hazards and issues as well as social groups (and their geographic locations) and livelihood activities in the study area.

Through a stakeholder mapping process led by the district representatives on the Planning and Facilitation group, a KG was established. A Knowledge Group comprised of about 15 people representing a range of diverse stakeholders from different community social and livelihood groups, representatives of women groups, organisations, departments and institutions at different levels (Table 1). The purpose of the KG group was to co-create knowledge on vulnerability and risk to climate change hazards and land issues using a round-table discussion approach whose results were documented as the group’s thinking and experiences. The process of establishing the KG served as a means to initiate and/or strengthen stakeholder relationships across sectors and levels of governance, as well as to generate ownership of study findings and create accountability of stakeholders with respect to communities and marginalised groups with focus on women and land rights. The specific composition members of the KG are summarised in (Table 1).

Table 1: The composition of the Knowledge Group

Organisation	No of representatives
Community Development Office	1
District Agricultural Office	1
District Lands Office	1
District Secretary for Production, Environment and Natural Resources	1
Sub county Secretaries for Production, Environment and Natural Resources	1

Organisation	No of representatives
National Agricultural Research Organisation	1
Small-holder farmers	2
Women groups	2
Cultural leaders	1
Religious organisations	1
Youth groups	2
Local NGOs	1

2.2.2. Initial Vulnerability Assessment

This phase involved construction of a vulnerability matrix from assessment of climate change impact exposure and sensitivity. The assessment was based on key hazards, issues, social groups and livelihood activities identified and agreed upon by the KG (Figure 4).

Figure 4: Joint identification of key hazards, issues, social groups and livelihood activities by the Knowledge Group



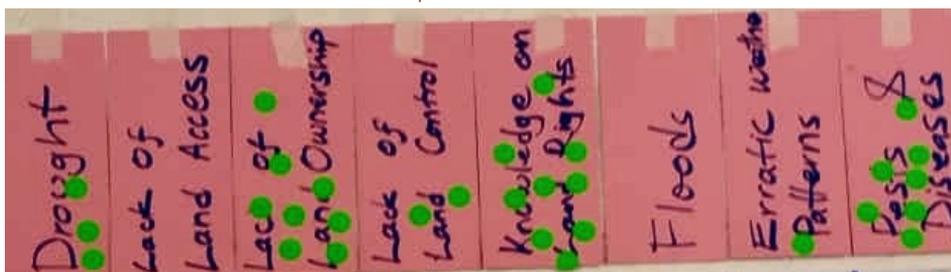
Photo: Doryn Flotty Stevens.

Assessment of exposure was done through a discussion with the KG on the extent to which the different social groups and livelihood activities could potentially be affected by the occurrence of the different climate hazards or land rights issues. Decisions on levels of exposure were reached through consensus on a scale of 0 to 3 (0 meaning the 'highest extent' and 3 the 'lowest extent'). The exposure value decisions by the KG were specifically based on present circumstance considerations, not the past or the future.

To assess sensitivity, the KG were asked to judge the actual impact of the hazards and issues (that were identified earlier) on social groups or livelihood activities, separately. The impact assessment considered a period

a presentation by the research team on climate projections and climate impact risks for Arua based on available information (World Bank, 2015). This was followed by development of a general future scenario (future situation) for Arua district. The process of developing a future scenario aimed at building on local/indigenous as well as experiential knowledge, and socio-economic expectations for the next 10 to 20 years. Scenario development was hinged on land issues and climate hazards, key drivers, decision factors and indicators. These included infrastructure development, policies and laws, climate change and land trends and uncertainty.

Figure 6: Dot-voting exercise for hazards and issues that the KG considered to be most relevant and important.



The shared future scenario served as the direct basis for guiding the KG to come up with the impact chains. Guidance of the future scenario discussions aimed at ensuring specificity and appropriate geographical and temporal scales of impact chain elements. This included immediate impacts on livelihood activities and social groups identified as vulnerable and alternative livelihood systems, including sources of income, in which affected social groups could be involved. Emphasis was put on identifying differential impacts of climate hazards and land issues across social groups, particularly differentiated groups of women such as the widows and people with disabilities. During the discussions, the KG was continuously reminded to identify potential measures for the visually mapped impacts of each hazard and issue. Such measures were later used as collective entry points to develop concrete solutions for reducing the vulnerability of communities and enhance their resilience. The identified measures, at this stage, were noted for later use in the adaptive capacity analysis.

2.2.4. Adaptive Capacity Analysis

The essence of this step was to explore possible opportunities and the direction that the earlier identified measures during impact chain development exercise could take, their feasibility, and the extent to which they could (or could not) benefit the different social groups. The phase involved turning the 'headlines' into first draft of solutions or pathways forward to address vulnerability and build existing and potential capacities.

This step was meant to paint a complete picture of vulnerability and to explore opportunities to build resilience.

The KG was guided to explore a number of measures in further depth by turning them from the impact chain into more fully-fledged ‘measures’ in consideration of adaptive capacity and resilience domains and attributes including entitlement to assets with particular focus on land; institutions; knowledge and information; innovation; flexibility to change strategies; ability for social organisation and collective action; ability to learn to recognize and respond to change; and the agency to determine whether to change or not.

The KG was guided with a list of questions (Appendix 7.1) intended to direct the design, rethinking and fine-tuning of the possible measures identified during the impact chain exercise, in order to ensure more context appropriate, inclusive (including gender inclusivity), sustainable and adaptive design of selected measures. Emphasis was put on group specific characteristics including access and ownership of land; social and cultural norms in context of their implications for and contributions to gender equity or lack of it. Throughout this process, each measure ‘headline’ was further elaborated to include the identified desirable attributes of adaptive capacity and resilience building. Each measure developed was as much as possible looked at from absorptive (e.g., ability to access and deploy tangible assets such as land, livestock, savings and intangible assets like social networks to help them survive climate shocks), adaptive (e.g., accessing and use of historical data and weather forecasts, flexibility to change livelihoods and incomes, awareness of changing conditions), or transformative (e.g., gender considerations, skills and knowledge, technologies, social structures) perspectives.

2.2.5. Aligning Findings with Opportunities

This stage of the study was aimed at turning all the information generated by the KG into action. The step of the study was used as an avenue for the KG to develop strategies or advocate for or ensure inclusion of emerging measures into plans, programmes and projects at different levels of governance. This involved aligning the already identified measures with existing opportunities such as informing ongoing development plans at sub county, or district level on land ownership and use, climate change adaptation, or development in general. Other considerations included upcoming funding opportunities at different levels, and as such provide evidence and justification for accessing such funds.

There was particular emphasis on stakeholder-informed understanding and use of information resulting from KG discussions on gender specific climate change vulnerabilities and issues pertaining to land access, ownership and

control. The KG was specifically requested and encouraged to use the co-produced information to propose practical actions and pathways forward that specifically address gender-linked inequalities.

2.3. Interviews with Representatives of Social and Livelihood Groups

The understanding of vulnerability characteristics including key hazards, impact risks and issues; levels of exposure and sensitivity; adaptive capacity; social groups; livelihood activities, confirmed during the knowledge group discussions, informed target specific in-depth (unstructured) interviews among communities. In-depth interviews were aimed at detailed qualifying (and to some extent quantifying) of gender disaggregated vulnerability; factors that influence access, ownership and control over land; and ascertain the linkages between climate change vulnerability and land rights.

The in-depth interviews were undertaken with representatives of social and livelihood groups identified from the different sub counties of Arua district. Social groups that were involved in the interviews are people with disabilities, people living with HIV/AIDS, as well as other men, women and youth. The livelihood groups covered are farmers and agricultural produce traders. The interviews were carried out in the month of August 2021 in the four sub counties (Vurra, Arivu, Ajia and Logiri) that make up the district of district. The number of participants in each sub county was determined by saturation point—the point at which the data collection process no longer offers any new relevant data/information (Dworkin, 2012). Accordingly, 18 in-depth interviews were conducted. An equal number of men and women across the social groups and livelihood activities. Data collection was undertaken in Lugbara, which is understood and used by most of the population including all those who participated in the in-depth interviews. The interviews were conducted by trained and experienced research assistants. All interviews were recorded for transcription. Considering how sensitive land-related conversations can be, preference was on working with assistants who were familiar and trusted in the study communities. The guide with general questions used to in-depth interviews is presented as Appendix 7.2.

2.4. Analysis

Analysis focused on content analysis of the materials generated through the engagement of the KG and in-depth interview transcripts. This involved simple qualitative analysis to identify key and high-level patterns emerging from the content with respect to factors for climate change vulnerability, access, ownership and control over land as well as linkages between climate change vulnerability and land rights. The content was coded according to

the considered attributes of land rights (access, ownership and control) and adaptive capacity and/or resilience. The considered attributes for adaptive capacity and/or resilience included: assets; institutions; knowledge and information; innovation; flexibility to change strategies (e.g., livelihood diversity); ability for social organisation and collective action (social capital, e.g., social grouping); ability to learn to recognize and respond to change (e.g., education and awareness); and the agency to determine whether to change or not, e.g., opportunities to actively participate in decision making (Morchain, D., & Kelsey, 2016; Mortreux & Barnett, 2017; Cinner & Barnes, 2019). Coding was also used to indicate whether the context of the attribute is positive or negative with respect to adaptive capacity. All these helped in coming up with domains to target in developing and implementing mechanisms and strategies for addressing gender-specific vulnerabilities and enhance their resilience to climate change.

3. FINDINGS

This section presents the findings from the five-step stakeholder engaging risk and vulnerability assessment through a knowledge co-creation process covering aspects of climate change vulnerability, land rights and associated hazards and issues. These are coupled and integrated with findings from in-depth interviews with representatives of different social and livelihood activity groups. The presentation covers climate change susceptibility and land rights, gender-specific vulnerabilities to climate change, gender and land rights, and adaptive capabilities to deal with the vulnerabilities in Arua district.

3.1. Climate Change Vulnerabilities and Land Rights in Arua District

Considering the level of exposure, sensitivity and adaptive capacity, Arua district is very vulnerable to climate change impact risk. The vulnerability and effects of different climate hazards and land issues vary with social groups and livelihood activities. The results of this study present critical levels of vulnerability, especially for women.

3.1.1. Climate Change Hazards

The key climate hazards identified and agreed upon through Knowledge Group discussions include drought, erratic weather patterns as well as pests and diseases (Table 2).

Table 2: Description of the major climate change hazards in Arua district

Climate change hazard	Description and justification
Drought	There have been reported cases of increasing occurrences of dry spells and drought leading to crop failure, reduced incomes and causing famine in Arua. The drought is characterised by unexpected deficiencies in precipitation leading to susceptibility of crops during different stages of growth.
Erratic weather patterns	Climate change is being manifested through erratic weather patterns. This hazard is characterised by greater variability in dates of rainfall onset and cessation, and length of potential growing season impacting on agro-climatic conditions, especially, during planting and harvesting periods. This is coupled with weather extremes including too much sunshine or rainfall, disrupting activities of farmers and other livelihood activities.

Climate change hazard	Description and justification
Pests and Diseases	Pests and diseases have been leading to crop and livestock losses, hence causing poor yields and reduced incomes among farmers. Farmers associated proliferation of plant diseases and pests with increasing incidences of drought. The diseases include cassava mosaic, ground nut rosette, armyworm in cereals, black quota, liver fluke, fowl pox and coccidiosis

3.1.2. Land Rights Issues

The land rights issues identified included lack of land ownership, lack of control over land and lack of knowledge on land rights (Table 3).

Table 3: Description of the key land rights issues in Arua district

Land rights issue	Description and justification
Lack of land ownership	The land ownership in Arua is predominantly hinged on customary tenure, which is based on norms and traditions that are centered on and favour men. This type of ownership in the area is characterised by very low level of protection of land ownership rights for women, persons with a disability and other marginalised groups.
Lack of control over land	Women and youth have no control over land. Decision making on land is predominated by old men. Women and youth are largely excluded from decision making processes on land, despite being the majority and main users.
Lack of knowledge on land rights	Despite the existence of policies, laws and other enabling provisions, there is low level of knowledge and awareness to enable the population to exercise their land rights. Women rights continue to be violated including cases of land grabbing, especially from widows.

3.1.3. Social Groups

The key social groups identified through KG discussion were women, men, youth, people with disabilities and people living with HIV/AIDS (Table 4).

Table 4. Description of social groups

Social group	Description and justification
Women	Women constitute the majority of the population involved in smallholder farming, which is rain fed. They are, therefore, among the most affected by climate hazards and impacts. Their heavy dependence on natural resources makes them more vulnerable to rights violation and marginalisation issues related to land including access to, ownership and control of natural assets especially land.
Youth	These are individuals below 35 years of age. Like in other parts of Uganda, the youth are the majority of the population in Arua. Climate change and land rights issues not only affect their current, but the future wellbeing as well. The youth also hold opportunities, enthusiasm and energy to address the current and future climate change and land challenges.
Men	Men influence most of the decisions on climate response actions and land matters. They influence the direction of deployment of capabilities and resources for implementing adaptation and resilience building measures.
People With Disabilities	They are known to be among the most affected groups of people due to their inability to perform certain activities during extreme weather events like floods. They also face land rights related discrimination. People with disabilities, especially women, are among those who are most likely to be excluded from avenues for demanding the critical support they require to manage risks and right violations that they face.
People living with HIV/AIDS	People living with HIV/AIDS face challenges including stigmatisation, which hinder their ability to deal with climate change impacts and land issues facing them. Moreover, their health status reduces their ability to effectively engage in livelihood activities. This is especially so, for a population in Arua that significantly depends on agriculture, which is energy intensive. The impacts of climate change on agricultural productivity and production affects the special nutritional needs of people living with HIV/AIDS. The compounding effect of climate change impacts and land rights issues is a fertile ground for further spread of HIV/AIDS. This escalates levels of risk, uncertainty and vulnerability of the region.

3.1.4. Livelihood Activities

The livelihood activities were smallholder farmers and produce traders. Most of the population is directly or indirectly involved in smallholder farming (Table 5).

Table 5: Description of livelihood activities

Livelihood activity	Description and justification
Smallholder farmers	These are farmers owning small plots (usually less than three acres) on which they rear livestock and grow subsistence crops and in some cases cash crops mainly relying on family labour. A big proportion of the population engages in small scale farming systems, which are very vulnerable to climate change impact risk.
Agricultural produce traders	This livelihood group constitutes individuals who are involved in aggregating harvested crops that are meant for the market. They heavily depend on agricultural performance, which in turn depends on prevailing weather patterns. Climate change hazards and land related issues that affect crop production, transportation, among others, directly disrupt the activities of agricultural produce traders, leading to livelihood related losses. Most of the agricultural produce traders are also directly involved in farming.

3.1.5. Exposure to Climate Change Hazards and Land Issues

Results from the KG discussion on the extent to which the different social groups and livelihood activities could potentially be affected by the occurrence of the different climate hazards or land issues are presented in an exposure matrix (Table 6). Results from KG discussions and interviews showed that smallholder farmers were associated with highest level of exposure to drought, floods, erratic weather patterns as well as pests and diseases like maize streak, cassava mosaic/brown streak, ground nuts rosette, among others. Women were particularly to the highest degree exposed to drought, lack of land ownership, lack of knowledge on land rights, floods, erratic weather patterns and pests and diseases. The nature and degree of exposure of women to these hazards and issues is potentially worse for people with disabilities and those living with HIV/AIDs. Hazards like drought, floods and erratic weather patterns create conditions that further impinge their ability to perform physical activities like walking to health centres for medical care.

Table 6: Exposure values for different social groups and livelihood activities to climate hazards and land rights issues

Key hazards and Issues/ Social groups and Livelihood activities	Drought	Lack of Land Access	Lack of Land Ownership	Lack of Land Control	Lack of Knowledge on Land Rights	Floods	Erratic Weather Patterns	Pests and Diseases
Small Holder Farmers	0	3	3	3	1	0	0	0
Produce Traders	1	3	2	3	2	1	1	1
Women	0	1	0	0	1	0	0	0
Youth	2	2	2	2	3	1	2	1
Men	1	3	3	3	2	1	0	1
People with Disabilities	0	1	2	2	2	0	0	0
People with HIV/AIDS	0	1	2	2	2	0	0	0

Note: values go from lowest levels (green), increasing through yellow and orange to the highest levels of exposure (red).

3.1.6. Sensitivity to Climate Change Hazards and Land Issues

Assessment of actual effect of the different climate hazards and land rights issues on social groups and/or livelihood activities for a period of the past 10 years shows that women are most impacted (Table 7). Smallholder farmers were being affected by erratic weather patterns associated with too much or too little rainfall, which have resulted in crop failure and loss, hence low agricultural production. Lack of land ownership rights for women, entrenched in the community traditions, was an outstanding gender specific impact. Women are generally considered to be less qualified to own land. People with disabilities and those living with HIV/AIDS are most affected by climate hazards because of their inhibited ability to actively participate in agriculture, trade, and other activities.

Table 7: Sensitivity values for different social groups and livelihood activities to climate hazards and land rights issues

Key hazards and Issues/ Social groups and Livelihood activities	Drought	Lack of Land Access	Lack of Land Ownership	Lack of Land Control	Lack of Knowledge on Land Rights	Floods	Erratic Weather Patterns	Pests and Diseases
Small Holder Farmers	2	3	3	3	2	2	0	1
Produce Traders	2	3	2	1	2	2	2	2
Women	1	2	0	1	1	1	1	1
Youth	2	2	2	2	2	3	2	2
Men	1	3	3	3	2	2	2	2
People with Disabilities	0	2	2	2	1	1	1	1
People with HIV/AIDS	0	3	2	1	1	1	1	1

Note: Values go from lowest levels (green), increasing through yellow and orange to the highest levels of sensitivity (red).

Generally, the results show that smallholder farmers were associated with low level of sensitivity to land rights issues because most of the households involved in agriculture own and have access to the land used. This is especially so for men because they have the traditional right to access, own and control land. The youth were the most difficult group to assess sensitivity for. Knowledge Group discussions indicated that youth were barely concerned about climate change hazards and land right issues.

3.1.7. Vulnerability to Climate Change Hazards and Land Issues

The initial vulnerability assessment, based on exposure and sensitivity, shows that women, people living with disabilities are the most vulnerable social groups. They were most vulnerable to drought, floods, erratic weather patterns as well as agriculture-related pests and diseases. Most of the impact risks are associated with climate hazards. The impact and risk associated with land rights was largely a major concern for women. Other social and livelihood activities were generally associated with relatively lower levels of vulnerability to the climate change hazards and land rights issues (Table 8). Smallholder farmers are presented with generally high levels of susceptibility to drought, floods, erratic weather patterns and pests and diseases. The vulnerability pattern presented in Table 8, with respect to smallholder farmers and land related issues, underscores women as the key culprits of land rights failures and risks in Arua. Whereas smallholder

farming is predominated by women, it is also general including men. The generalisation including men makes it a less vulnerable category compared to the women specific social grouping.

Table 8: Vulnerability Assessment matrix for Arua district (August 2021)

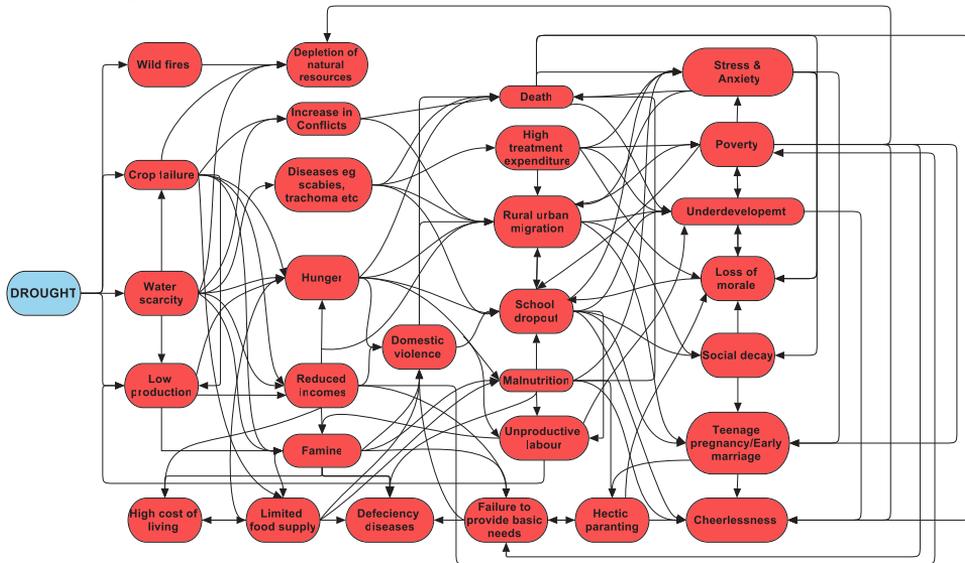
Key hazards and Issues/ Social groups and Livelihood activities	Drought	Lack of Land Access	Lack of Land Ownership	Lack of Land Control	Lack of Knowledge on Land Rights	Floods	Erratic Weather Patterns	Pests and Diseases
Small Holder Farmers	1	3	3	3	2	1	0	0
Produce Traders	2	3	2	2	2	2	2	2
Women	0	2	0	0	1	0	0	0
Youth	2	2	2	2	3	2	2	2
Men	1	3	3	3	2	2	1	2
People with Disabilities	0	2	2	2	2	0	0	0
People with HIV/AIDS	0	2	2	2	2	0	0	0

Note: The higher highest level of vulnerability is assigned the colour red (0), followed by orange (1) and yellow (2), down to the lowest level of vulnerability, green.

3.1.8. Impact Chains of Hazards and Issues

The Knowledge Group selected a total four climate hazards and land rights issues that were considered to be most important and most relevant. The selected were lack of knowledge on land rights, lack of land ownership, pests and diseases and drought. These were subjected to impact analysis and assessment through a discussion. Through the assessment, the Knowledge Group evaluated the hazards and issues and their implications over time, by mapping their impacts throughout the Arua socio-ecological system. The discussion covered current and potential future impact elements of the hazards and issues to come up with impact chains (e.g., Figures 7 and 8). Other impact chains are presented in Appendix 7.4. The graphic representations (impact chains) reflect the consequences of a respective hazard throughout the geographical, social, cultural, political and economic landscape in the context of Arua and West Nile.

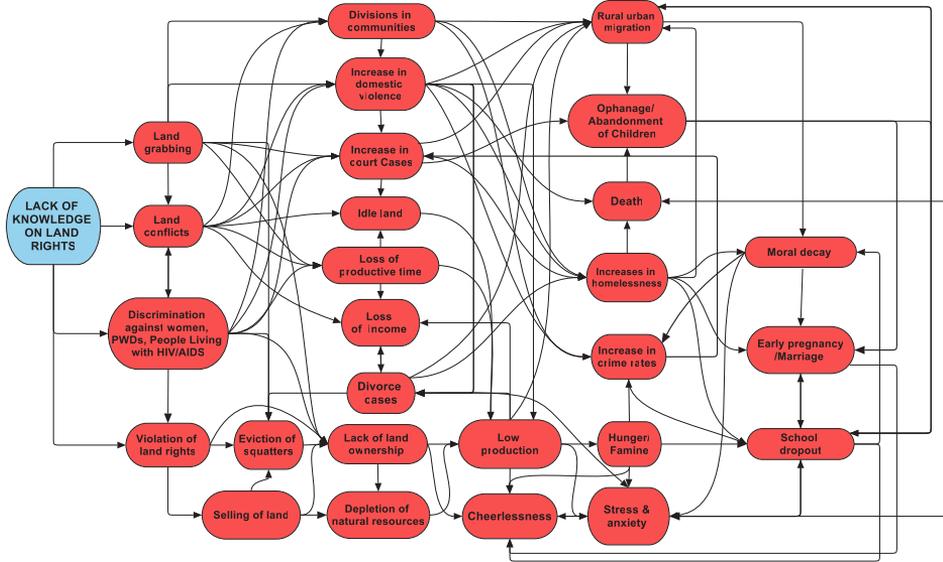
Figure 7: Impact chain for drought hazard in Arua district, West Nile (August 2021)



Analysis through the knowledge group showed that the immediate consequences of drought were wildfires, crop failure, water scarcity and general low agricultural production. These were directly and indirectly associated with depletion of natural resources, increase in conflicts, increase in diseases, hunger, reduced incomes, famine, high cost of living, and domestic violence. Related cascading and compounding impacts include death, rural-urban migration, school dropouts, stress and anxiety, poverty, early marriage and pregnancies, among others (Figure 7).

The current impacts of lack of knowledge about land rights identified include opportunistic land grabbing, land conflicts, violation of land rights, discrimination against women, people with disabilities, people living with HIV/AIDS, among others. These result into conflicts and divisions within and among communities, domestic violence, increase in court cases, loss of family incomes, divorce, evictions and associated landlessness, degradation and depletion of natural resources mainly resulting from the landless moving into marginal and sensitive ecosystems such as wetlands. The actualised and emerging consequences of all these impact system elements are rural-urban migration, orphanage or abandonment of children, death, homelessness, famine, stress and anxiety as well as school dropouts (Figure 8).

Figure 8: Impact chain for the identified 'lack of knowledge about land rights' issue in Arua (August 2021)



3.1.9. Adaptive Capacity

The KG discussions completed the vulnerability assessment by undertaking an exploration of opportunities to enhance adaptive capacity and strengthening resilience. This was done through identification of possible measures to deal with key identified impacts of climate hazards and land rights issues. Attention was given to the direction that the measures, their feasibility, and the extent to which they may (or may not) benefit the different social groups. The participatory adaptive capacity analysis considered available and needed capabilities as well as obstacles that needed to be dealt with in order to build resilience. Table 9, presents the results of the KG discussions on adaptive capacity for drought. Assessment on drought was focused on the smallholder farming because of its direct impacts on rain-fed agriculture.

Table 9: Adaptive capacity building opportunities, needs and concerns identified for drought in Arua district (August, 2021)

What is available	What is needed	Concerns
<ul style="list-style-type: none"> • Labour force for implementing drought adaptation responses • Interested smallholder farmers • Availability of seed varieties • Presence of water sources like wetlands, streams and rivers • Presence of youth projects like the Youth Livelihood Program (YLP) • Government assets such as motorcycles • Traders to support agro-input supply chains • Saving groups • Government institutions including for research 	<ul style="list-style-type: none"> • Improving Adequacy and distribution of water • Adaptation financing • Trainers and extension services • Improved seed varieties • Irrigation technologies and schemes • Adequate leadership skills • Proper staffing in government institutions • Adequate and quality of agro-inputs including animal drugs • Capacity building for adaptation • Water harvesting technologies 	<ul style="list-style-type: none"> • Poor road network • Limited or no supply of effective pesticides, seeds and fertilizer • Corruption • Laziness and poor attitudes among community members

Building on the earlier presented results from KG discussions, the analysis of adaptive capacity for lack of knowledge on land rights was largely considered to be a major concern for, but not exclusive to, women. The results of the KG discussion generated initial entry points for solutions and mechanisms to address vulnerability and enhance existing and build potential capacities by different stakeholders. The results from the discussion covering wide ranging aspects including institutional, organisational, regulative, socio-cultural, and political elements from the assessment are presented in Table 10.

Table 10: Adaptive capacity building opportunities, needs and concerns identified by KG for lack of knowledge on land rights in Arua district (August, 2021)

What is available	What is needed	Concerns
<ul style="list-style-type: none"> • Policies, laws and bye-laws • Community leaders e.g., chairpersons, clan leaders, traditional leaders, religious leaders etc. • Land administrators e.g., physical planners and land committees • Land technical experts • Demarcation tools/ equipment • Councillors • Elders • Community groups • Political will • Religious institutions • Role models (highly educated and respected individuals) in communities 	<ul style="list-style-type: none"> • Robust enforcement of land rights • Registration of land • Dissemination of land policies • Financing for community awareness raising • Mobilization and awareness raising skills • Facilitation of religious, education institutions for awareness creation • Expertise in awareness creation • Trainings on community policing • Community mobilisation and sensitization • Involvement of exemplary mentors and role models in communities • Advocacy for equal rights on land • Establishment of reliable land records • Clear land demarcation arrangements • Community dialogues on land rights 	<ul style="list-style-type: none"> • High illiteracy levels • High population growth rate • Disunity among community members • Language barriers to use existing knowledge • Drive for monetary gains by leaders • Land fragmentation • Political interference • Unfavourable land tenure systems • Unfair cultural practices and norms • Conflicting laws • Fear to change • Discrimination • Immigrants and refugees

3.1.10. Aligning Findings with Opportunities

The KG undertook a discussion to turn the information generated into action. Accordingly, strategies for inclusion of emerging measures into plans, programmes, projects and activities at different levels and entry points were generated. Focus on alignment of identified measures with existing

opportunities such as informing ongoing development plans at sub county or district level on land ownership and use, climate change adaptations, or development in general. The following opportunity alignments came from the discussion:

1. Integrate the findings of the study into parish development plans and emerging parish development model.
2. Presentation of findings to district sector committees of production, marketing, natural resources, social services, etc.
3. Partnership with religious, cultural leaders and institutions for awareness raising including engagement on provision of platforms for sensitisation on land rights targeting inclusion of women and youth.
4. Work with churches and other religious institutions to provide psychosocial support to those impacted and faced by climate hazards and land rights issues.
5. Development of research proposals for funding on pest, disease and drought by National Agricultural Research Organisation (NARO).
6. Leverage financial resources from Uganda Women Entrepreneurship Programme (UWEP) to raise awareness on women right to land access, ownership and control.
7. Proposal development for funding on wetland restoration and demarcation by the district Environment sector to the ministry of Lands.
8. Use of District Departmental reports as means of disseminating information on key land issues as one of the ways of addressing the lack of knowledge.
9. Inclusion of land issues among the priorities of the district development plan.
10. Inclusion of land issues in District Technical Planning Committee reports to be presented to politicians.

3.2. In-depth Characterisation of Adaptive Capacity and Resilience

This part of the report presents results of content analysis of in-depth interview transcripts. The results mainly cover key and high-level patterns emerging from the content with respect to factors for climate change vulnerability, access, ownership and control over land as well as linkages between and among climate change vulnerability, gender and land rights. The results are presented based on social domains (assets, flexibility, social organization, learning, psychosocial factors, and agency) of adaptive

capacity and resilience that were described under the methods section.

Results revealed various social domain indicators that need to be considered to enhance adaptive capacity and strengthen resilience amidst the climate change hazards and land rights issues. The examples of the indicators for the different social domains of adaptive capacity and resilience are presented in Table 11. All considered domains of resilience and adaptive capacity were reflected in the responses coded from the in-depth interviews.

Table 11: Examples of indicators for the different social domains of adaptive capacity and resilience.

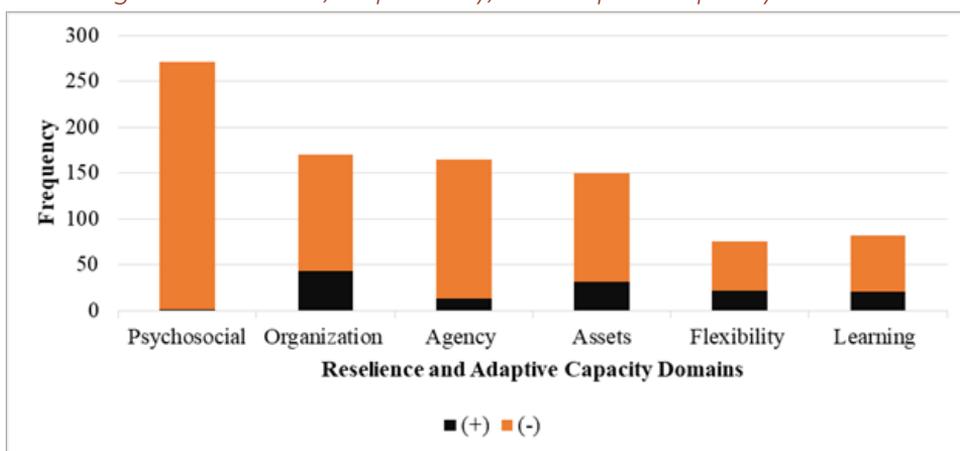
Domain	Examples of indicators
Assets	Land, agricultural produce, soils, food, income from farm produce, skills, labour force, seedlings, trees, money, irrigation technologies, seed varieties, loans, businesses, etc.
Flexibility	Leasing of land, cost of land, high population, diversification of livelihoods, shifting to fast maturing crops, children responsibility, adjustment to current land ownership trends, consideration for women to own land, high interest rates on private loans, etc.
Organisation	Land sharing arrangements, family support, skill development institutions, corruption, support from elders, government support, land history, land regulations, bye laws, land documentation, research organisations, women groups, cultural norms, etc.
Learning	Land records, knowledge of land policies, access to education, knowledge of land value, ignorance on farming methods, awareness raising, sensitisation, family dialogues, skill development, community mobilization, education, planning, financial literacy, lessons from past experience, etc.
Agency	Land ownership security, land access, enrollment of girls in school, participation in decision making, women empowerment, land control, writing of wills, access to schools, access to markets, seasons, laws and bye laws, etc.
Psychosocial	Stress and anxiety, violence against widows, family conflicts, poor class performance, loss of interest in education, early marriage/pregnancy, perceived women inferiority, alcoholism, community conflicts, discrimination, low self-esteem, peer pressure, devastation of future plans, future anticipation of land value, failure to start families, desire for luxury, perceived shortened life span, etc.

The most outstanding indicators were within the psychosocial domain (Figure 9). The key psychosocial elements from the interviews included stress and anxiety, family conflicts, poor school performance of students, alcoholism, perceived women inferiority, low self-esteem, failure to

start families, etc. Almost all the indicators of psychosocial factors were negative in nature and require remedies. In an interview, this is what a male interviewee with disabilities from Odravu village in Arivu sub county had to say:

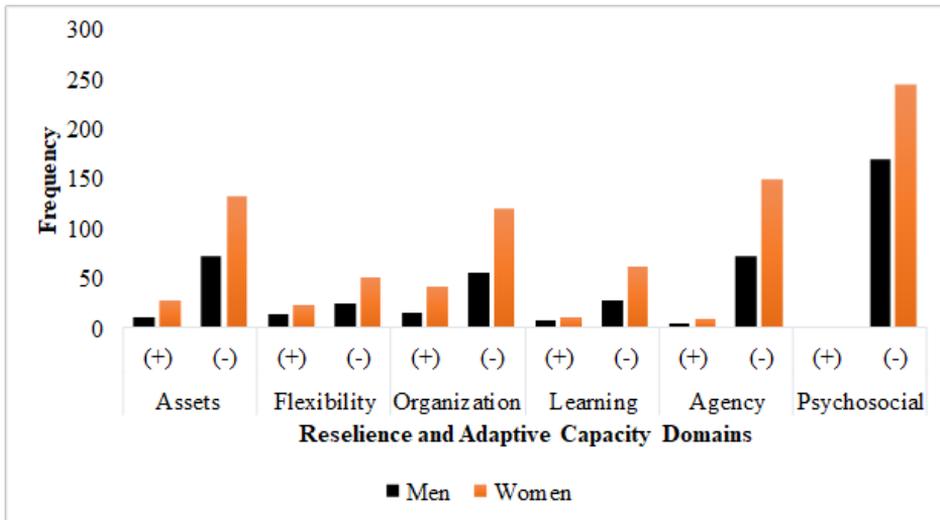
[...] crop yields obtained these days are very low leading to hunger, so most of the time when this happens, we get stressed about how the family gets for the months until the second season. At times we feed once a day.

Figure 9: Frequency of the different attributes/indicators for the resilience and adaptive capacity domains. (+) and (-) indicate positive and negative attributes, respectively, for adaptive capacity and resilience.



The trend of high frequency of negative attributes of the different domains was matched by a corresponding higher proportion of women for the different domains (Figure 10). This corroborates with the patterns that emerged from KG discussions indicating that women were most affected by climate change hazards and land rights issues.

Figure 10: Frequency of the different attributes for the resilience and adaptive capacity domains. (+) and (-) represent indicators that enable and hinder, respectively, adaptive capacity and resilience.



The combined effect of high levels of lack of land access, ownership and control by women escalate their inability to cope with climate change impacts. This is because activities and enterprises hinged on land like animal husbandry, poultry, trade and others that would diversify their livelihoods against climate change impacts are constrained hence devastating their well-being. Interviews revealed that land is grabbed from widows by their in-laws which leaves them with limited portions of land for cultivation as was narrated by a widow who is a small-holder farmer living with HIV/AIDS in Adravu village, Vurra sub county:

[...] now as a widow, if the in-laws come and grab the land away from you, there is nothing you can do because you are voiceless. That happened to me when my husband died. I knew where the boundary to my husband's land stopped, but my in-law reduced the land and showed me another boundary. So, I have nothing to say because I don't want fights. I just kept quiet.

The high susceptibility of women to the impacts of climate change and land rights violation is driven by other several factors including the fact that the majority of women have limited income options compared to men. Women are in most cases solely placed in the position to provide basic needs like food for their families, which raises challenges when there is a limited supply of the same due to hazards such as drought. This may lead to the earlier indicated negative elements such as stress, anxiety and

despair, which are usually associated with domestic violence.

Many women have formed saving groups from which they can access loans to start-up small businesses as means to diversify their livelihood options. This was pointed out by a smallholder farmer of Odravu village in Vurra sub county:-

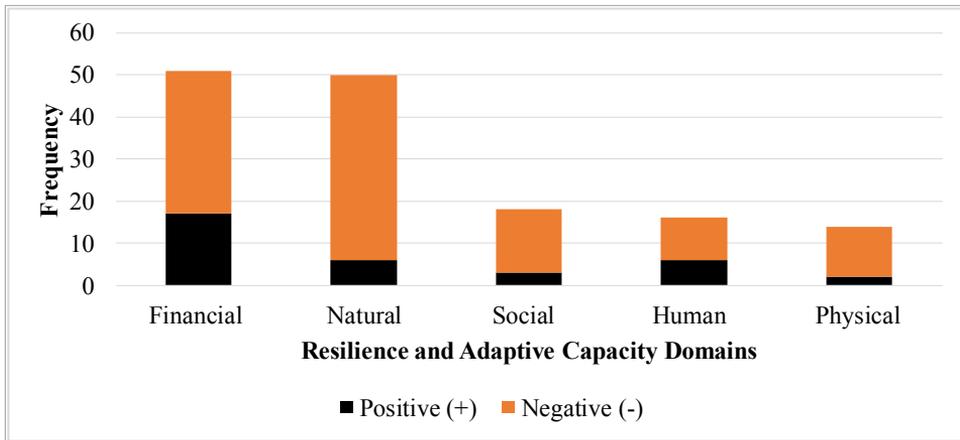
[...] women have formed a variety of groups to help improve their livelihood, for example, they have loan and farming groups.

Several other limitations hinder resilience building among women and other social groups involved in smallholder farming livelihood activity. There is lack of the needed farming technologies or mechanisms such as irrigation schemes, ox-ploughs, water harvesting options, fast-maturing crop varieties, etc. There is also a general lack of knowledge and awareness about adaptation response options. One of the small-holder farmers living with HIV/AIDS stressed the need for communities to be equipped with information to raise awareness on farming practices as one of the means to enhance adaptive capacity:

[...] The government should equip communities with information on improved ways of farming, whereby even if the droughts are on, we should be able to grow crops. Communities should be supported with information prerequisites on how to plant fast maturing crops like vegetables including cabbages, carrots, and other greens that grow very fast so that our incomes are maintained even when the growing seasons become short.

Land was among the attributes of natural assets that registered high frequency from content analysis of in-depth interview transcripts Figure 11). Other assets included physical (e.g., transportation and communication networks, radios), Financial (e.g., group savings and loans), Human (e.g., skills), and Social (e.g., organisations and community systems). Financial assets registered the highest frequency compared to all other asset categories. The asset attributes that hindered adaptive capacity and resilience building were more than those that enabled the same.

Figure 11: Frequency of the asset categories from the in-depth interview transcript content. The (+) and (-) represent indicators that enable and hinder, respectively, adaptive capacity and resilience



Lack of ownership of land among the population was partly attributed to selling it (mainly by men) due to the increased value, discrimination against women, and high cost of leasing land. A male, small-holder farmer from Andifeku Center A village, Ajia sub county reported:

[...] it has been a challenge, in that people have sold most of their land, creating some sort of scarcity. Yet, those days one would get land to use for free unlike now where we have to rent at a high cost. Meaning if there is no money you can't acquire any land for farming, especially, when you want to grow on a relatively large scale where some agricultural produce can be sold and some left for home consumption.

4. DISCUSSION

Targeted and continuous understanding of context specific vulnerability to climate change and land related dynamics is very important, most especially, for natural resource dependent communities (Thinda, et al., 2020). It is critical for developing specific, responsive and sensitive policies, programs and other interventions aimed at enhancing adaptive capacity and strengthening resilience (Howarth et al., 2018; Tanner et al., 2018). This is because vulnerability characteristics vary with location, time, policy and practice regimes (Thomas et al., 2019). In this study, gender-specific climate change vulnerabilities including those related to land rights were analysed, linkages among climate change vulnerabilities, gender and land rights explored, with focus on proposing mechanisms to enhance resilience in West Nile, Uganda. Findings show that women are not only more vulnerable to climate change impacts and risks, but also, by far, the primary victims of marginalisation and violation of land rights compared to other social groups. The situation is even worse for women who are widows, directly involved subsistence farming, have disabilities and living with HIV/AIDS. The linkages between vulnerability and land rights issues present a vicious cycle where shortfalls in land rights increase susceptibility to climate risks and impacts. On the other hand, climate change hazards are stress impact multipliers of land entitlement failures.

4.1. Climate Change Vulnerabilities and Gender

The livelihood activities and social groups in Arua district are susceptible to climate change related hazards, most especially drought, erratic weather conditions as well as pests and diseases. Women are disproportionately most vulnerable compared to other social groups, particularly those whose livelihood is dependent on smallholder farming. Already, the area is experiencing several impacts that call for enhanced adaptive capacity, strengthened resilience to reduce vulnerability with intentional focus on women. The vulnerability status is not surprising and can be explained by the susceptibility of the country to climate change in general. Uganda's climate is changing and vulnerability to the impacts of climate variability and change continues to be high (Government of Uganda 2014; Okaka, 2020). The country is ranked by the 2020 ND-GAIN index as the 12th most vulnerable country in the world and the 36th least ready country to adapt (Government of Uganda, 2007; Oriangi et al., 2020).

The immediate impacts of climate variability and change in Arua are directly linked to agricultural productivity and production. However, the impact process has wider and compounding effects that are ultimately undermining development in general. Like most parts of Uganda, about

80% of the population in Arua predominantly depends on Agriculture (Arua Local Government, 2020). Crop failure due to climate hazards has led to reduction in yields and accordingly affected incomes, nutritional needs, and other socio-economic aspects of development including increase in poverty levels. Increase in poverty rates is known to further undermine production and income diversification, which are critical in strengthening resilience and reducing vulnerability to stresses and shocks (Lin, 2011; BIRTHAL, & Hazrana, 2019; Chonabayashi, 2020). Therefore, arresting this trend of processes and events will require enhancing adaptive capacity for the agriculture sector including through diversification within the sector while at the same time working to diversify livelihoods to reduce over-dependence on the current smallholding farming systems. This should include promotion of and investment in off-farm enterprises.

The rarely considered psychosocial consequences of climate change hazards predominate concerns and indicators of adaptive capacity for the population in Arua district. This highlights the importance of recognising the complexity of climate change impact risk and vulnerability beyond the common physical and other business-as-usual climate-response considerations. Other studies have shown that climate change impacts are wide ranging including acute or traumatic effects, threats to emotional well-being based on observation of impacts and concern or uncertainty about future risks, as well as chronic social and community effects of hazards leading to migrations, and climate-related conflicts (e.g., Doherty & Clayton, 2011). The impact chains from this study clearly portray the occurrence of such categories of impacts in the district. This calls for adaptation and resilience building interventions that intentionally integrate and provide psychosocial support in the wake of acute impacts and reducing the vulnerabilities contributing to their severity. It will require promoting emotional resiliency and empowerment including actions at systems and policy levels to address broad psychosocial impacts. Women being the most vulnerable, must be prioritised.

The varied indicators of important social factors that enable (or inhibit) vulnerability reduction, enhance adaptive capacity and strengthen resilience, in view of climate hazards and land rights issues, demand drawing from all the domains considered in this study to improve the situation. However, the dominance of the least expected psychosocial factors deserve special attention. This is especially so because it is an area that is hardly thought about when dealing climate hazards and land issues in Uganda. The magnitude of psychosocial vulnerabilities and effects that need attention call for an interdisciplinary and cross-sector approach since they transcend the impacts chains of different hazards and issues. Other studies have underscored the importance and need for interventions to

deal with psychosocial factors that influence resilience (Bhattarai, et al. 2019; Ntontis, et al., 2020; Chen, et al., 2020).

4.1.1. Gender-specific Vulnerabilities and Land Rights

Land ownership is a central determinant of vulnerability status of women in Arua district. The key subject here is the prevailing structural inequalities in land ownership and control that are rooted in social-cultural norms and traditions that marginalise women. Women, especially widows, face discrimination and violations that make them more vulnerable to shocks and stresses. The drastic differences in vulnerability can partly be explained by disparities in men's and women's expected social, cultural and economic behaviours. Many women are excluded from skill and learning opportunities, which would otherwise help them in reducing their exposure and sensitivity to hazards such as droughts and floods (Watts et al., 2015). Inequalities in the ownership and control over productive resources, such as land, undermine women's ability to achieve their socio-economic potentials and desired well-being (Eastin, 2018; Meinzen-Dick, et al., 2019).

The ongoing marginalisation around land ownership and control is associated with compounding negative consequences. The impact chain analysis from this study shows that children and youth (especially females) continue to face realised and potential intergenerational problems including injustices. These stem from domestic violence, divorce, death and increased number of orphans, disruptions of family income streams, food insecurity, school drop-outs, stress and anxiety, child labour, early pregnancies and migration, especially from rural to urban areas. Whereas some studies have showed that patriarchy equips men with comparative capabilities to adapt to climate change (e.g., Onwutuebe, 2019), the results of this study show that exclusive and discriminatory capacity settings are not sustainable. This current local context clearly confirms the existing evidence, which shows that any kind of marginalisation will eventually permeate the entire socio-economic fabric (e.g., Rudolph et al. 2018). Other studies have also underscored the importance of land ownership and its terms as a driver of vulnerability to stresses and shocks (Hahn et al. 2009; Dechassa et al. 2016). Moreover, the findings of this study align to the general understanding that landless or smallholder farmers more vulnerable to climate change (McPherson, 2012).

In the context of this study, land ownership and control present themselves as enablers or inhibitors to building the ability of women to have free choice when responding to change (agency). This is especially so when they are (or not) able to make decisions pertaining to what they want to do with the land including choice of livelihood activities and climate change responses. Socio-ecological resilience requires that people have the

power and freedom to mobilize their assets, flexibility, social organization, learning, and socio-cognitive capacities to actively shape their future. It is that agency that allows people to have free choice in responding to social-ecological changes in a way that encompasses aspects of empowerment and self-efficacy (Cinner & Barnes, 2019). This includes the ability of women to proactively, dynamically and flexibly configure themselves to modify norms and actions and/or implement new ideas, approaches and programs following devastating impacts of climate hazards and effects of land rights violation (Aldunce, et al, 2014). Realising the ability to have free choice when responding to change provides an avenue for capturing people's belief in their own ability to manage prospective situations such as climate hazards and impacts and control productive resources at their disposal. To that end, there is need for interventions to build positive perceptions and ability of women to mobilise land and other resources to handle adverse events through engaging in adaptive responses to shocks that include reduction of their reliance on smallholder farming. Enhancing agency in Arua will include increasing land ownership and access security for women, empowerment of girls including through increased enrolment and retention in schools, and inclusive decision making.

Increasing awareness and knowledge aligned to skills and consciousness, comes out of this study as a key entry point for addressing the prevailing marginalisation around ownership and control over land against women. Though not sufficient, there exists information, to begin with, that would help in addressing land rights issues in Arua. However, this has not been brought to actionable levels especially for the least educated and privileged. Like was indicated by Chigbu et al. (2019), knowledge on land rights including on tenure systems, continues to be a benefit of very few elites. Increased knowledge is anticipated to positively influence change from traditions and practices that hinder women from controlling assets such as land and other productive resources (Deininger et al., 2008; Quisumbing and Kumar, 2014). Other reports have indicated access to knowledge to be one of the key catalysts of transformative social change including for responsive policy development and implementation to avert problems associated with discriminatory land tenure systems as usually characterised by communal ownership (African Land Policy Centre, 2019).

In Tanzania, efforts by NGOs to educate women about their land rights strengthened women's social relations, expanded their access to customary authorities, and increased knowledge of political processes (Goldman et al. 2016). Similar efforts targeting women and girls can help in bringing about meaningful and active participation in decision making processes aimed at reducing their vulnerability. Key among the needed aspects of knowledge transfer is awareness raising for individuals to be able to recognise and use

provisions contained in various policies and laws of Uganda. These include special protection accorded to the rights of women, children and persons with a disability to own, occupy or use customary land (Section 27 of the Land Act). Nevertheless, addressing this deep rooted marginalisation will require a holistic and integrated lines of action that go beyond actionable information and knowledge. Such approaches and considerations should cover the various domains of adaptation and resilience presented in this study including elements of governance and power relations (Cinner & Barnes, 2019).

4.2. Mechanisms for Addressing Gender-specific Vulnerabilities

The negative picture on adaptive capacity of the Arua district socio-ecological system revealed by the results of this study presents a heavy daunting task on developing mechanisms to address gender specific vulnerabilities, especially for women. The mechanisms to deal with such gender differential vulnerabilities to climate hazards and land issues must be cognisant of the context factors related to productive assets, flexibility, social organisation, learning, psychosocial and agency domains, all of which operate at multiple spatial and temporal scales.

Regarding vulnerability reduction demands related to climate change hazards, there is need to put in place adaptation processes and implements focused on drought, erratic weather patterns as well as pests and diseases. Specific target areas coming from the results of this study include irrigation, soil and water conservation. Effective irrigation systems will require establishment of water distribution systems and associated technologies. Other considerations include improvements in extension services, adaptation financing, and continuous capacity building at different levels of farming system support with linkages to knowledge brokering efforts around awareness raising on evolving adaptation response options. To deal with the deep rooted marginalisation of women, there is urgent need to increase participation of women, people with disabilities and other disadvantaged groups in the political and other socio-economic processes that establish procedures and influence outcomes pertinent to human security in the face of climate-related shocks and stresses (Thomas, et al., 2019). Other governance considerations include dealing with corruption and improving accountability that were identified as key concerns at different levels during knowledge group discussions.

With regard to the psychosocial vulnerability reduction and adaptive capacity enhancement, focus should be on integrating psychosocial support in the adaptation and resilience programming. Target for this kind of support

should cover negative emotional responses associated with awareness and experiences of climate change, risks and impacts. Particular attention should be given to women, widows, people living with HIV/AIDS and people with disabilities who are most faced with anxiety, stress, violence and conflicts. Whereas the youth were not particularly associated with significant psychosocial vulnerability indicators, there is need for detailed investigation into their emotional linkages to climate change and variability. Studies have shown that climate change anxiety is not uncommon among younger adults, which is usually correlated with emotional status (Clayton & Karazsia, 2020). The negative indicators of adaptive capacity that included devastation of future plans, failure to start families, desperation, perceived shortened life span loss of interest in education, alcoholism and low self-esteem point to cognitive and functional impairment factors related to anxiety among the youth. Mechanisms to deal with psychosocial related vulnerability and impact reduction will require addressing issues such as public awareness, information provision on post impact coping strategies.

Vulnerability reduction also requires dealing with the negative attributes of organisational adaptive capacity and resilience presented by the results of this study. Attention needs to be put on addressing issues related to trust and expectations of the population from local and national governments, especially those to do with clear policy as well as other intervention development and implementation up to household level. Efforts should be geared toward creating avenues for policy-makers across government levels to facilitate community engagement in responding to climate change across sectors likely to be affected by its impacts with agriculture as the entry point. This will continuously require understanding the trends and patterns of adaptive capacity within the community through embedded action research.

The ultimate aim should be to improve social organisation abilities to enable cooperation, collective action, and knowledge sharing. Strong Social and institutional linkages will go a long way in building resilience through influencing the way people share knowledge, cooperate, and access resources beyond their immediate domain (Cinner & Barnes, 2019). Resilient societies require building relationships to support key social processes including social networks and institutions, which can operate at different scales and sectors. Emphasis on promotion of equity, participation and democracy in such societies will go a long way in enhancing adaptive capacity and reducing vulnerability (Matewos, 2020). Participation of women is particularly important considering that they are the majority of those who depend on land and other natural resources, and have a wealth of experiential knowledge needed for adaptation to climate impacts and risks.

Existence of appropriate and responsive institutional environment will help in promoting entitlements to key capitals. Availability of diverse and vital productive assets provides a basis for responding to climate change induced effects (Matewos, 2020). Therefore, vulnerability reduction in Arua can only be complete if effective attempts are made to support entitlements to assets, especially land. Effective vulnerability reduction for the smallholder farmers calls for continuous building of the land base including through use of improved technologies (e.g., irrigation), improving efficiencies and widening opportunities (Brooks, et al., 2005; Fenichel, et al., 2016) for women to own and have control over it. This will also require holistic approaches to ensure that the poor, the powerless and exploited are empowered (beyond asset domain) to deal with the impacts of climate change and variability as well as land rights issues.

The challenge is that even though land is the most important asset and a source of rural livelihood, predominance of smallholder farming in the face of a changing climate means weaker adaptive capacity and high vulnerability. Studies have demonstrated this through indicators such as family income, which have been found to be correlated with land holding size (Headey et al., 2014; Matewos, 2020). Increasing population growth in the study area is likely to make the situation worse. Reducing the land asset dependence related vulnerability will largely hinge on increasing the ability to change livelihood strategies (flexibility). Flexibility reflects having opportunities for switching between coping and adaptation strategies, actions, and management structures based on, for example, information on new enterprise(s) (Aldunce et al 2014; Cinner, et al 2018). Flexibility allows for diversity, robustness and redundancy of alternative strategies available to ensure short and long-term vulnerability reduction, multiplicity of potential options, capabilities and responses linked to livelihoods, resources and social collaboration (Aldunce, et al, 2014).

5. CONCLUSIONS AND RECOMMENDATIONS

Through a stakeholder engaging and participatory process, this action-oriented study analysed gender-specific climate change risks and vulnerabilities including those related to land rights issues with focus on smallholder farming, which is the most predominant livelihood activity in Arua. The main climate hazards posing risks and impacts to livelihoods and lives are drought and erratic weather patterns. The key land issues were lack of knowledge on land rights and lack of control over land. Women, people living with HIV/AIDS and people with disabilities were the most affected social groups by climate hazards and land rights issues. Whereas Arua district faces a high risk of climate hazards, the realised level of impacts is still lower than the impact risk. Overall, women are most vulnerable to both climate hazards and land rights issues. The vulnerability is largely hinged on long standing male-driven marginalisation characterised by structural inequalities and governance shortcomings rooted in traditions and customs. Lack of access to and control over land comes out as a major amplifier of women's vulnerability. Male-controlled power dynamics are central in shaping the vulnerability of different social groups. Therefore, efforts aimed at strengthening resilience and enhancing adaptive capacity must deal with root causes of vulnerability including exclusion and marginalisation of women.

The findings of this study demonstrate that the impacts of climate change and land rights issues have cascading and compounding consequences on socio-economic development and well-being of the population. The adaptive capacity to the impacts and risks is characterised by negative indicators that require attention to reduce social vulnerability. Analysis of vulnerability resulted in revealing results where the hardly talked about psychosocial factors of adaptive capacity and resilience are central to the impacts and consequences of climate change and land rights issues. Clearly, this is a demonstration of the importance of context specific adaptation process evidenced by the unique characteristics of vulnerability in the study area. Effective vulnerability reduction and resilience building in Arua district will inevitably require psychosocial considerations and interventions.

In light of the current status and learnings around climate change vulnerability and land rights from this study, the following recommendations are made for addressing gender-specific vulnerabilities and enhancing resilience of women to climate change:

1. Considering the low level of preparedness, evidenced by a high number of negative indicators of adaptive capacity, governments

and civil society organisations must invest in capacity building efforts targeting multiple areas of vulnerability reduction (assets, flexibility, social organization, learning, psychosocial, and agency). Priority should be given to learning to increase capacity of local actors such as cultural and religious institutions, as well as communities and households to generate, absorb, and process information and knowledge about climate change adaptation options, especially those targeting erratic rainfall patterns.

2. Government policies, programmes and projects to augment adaptation and resilience must clearly articulate gender-differentiated goals and objectives. The evidence upon which the goals are hinged should equally be gender differentiated. This study, for example, has showed that gender aggregation of livelihood activities such as smallholder farming portrayed lower level of vulnerability of women, who are the majority, compared to when women were looked at separately. Therefore, ongoing and future programmes and projects should endeavour to collect gender differentiated data (including through monitoring and evaluation) to better inform their future activities on gender targeted vulnerability reduction outcomes. The evidence generated through this study should be a good beginning point for Arua district;
3. The dominance of the rarely considered psychosocial vulnerability and impact related issues such as stress and anxiety, family conflicts, alcoholism, perceived women inferiority, low self-esteem, failure to start families, etc., should be addressed with immediate effect. Governments (local and national) should provide leadership including coordinating with stakeholders such as religious institutions for interventions such as counselling and other psychosocial support to mitigate the eminent cascading consequences of psychosocial impacts such as disruptions of family income streams, food insecurity, school drop-outs, child labour, early pregnancies and unplanned migration, especially from rural to urban areas. The interventions on this front should be packaged with intentional learning objectives for improved programming and effective responses, especially that this is generally a new area of climate change adaptation intervention in Uganda;
4. District and lower local governments should develop partnerships with civil society and non-governmental organisations to step up efforts on awareness raising and knowledge creation on land rights. Schools should be considered as one of the avenues for influencing children and youth as a way of curtailing land rights violations and other related marginalisation that have been entrenched across generations;

5. Programmes and policies on vulnerability reduction in the agricultural sector must support investments aimed at building land asset base including in technologies that enhance productivity and production. For drought and erratic rainfall patterns, government and non-governmental organisations should work with communities and households to invest in irrigation technologies. This will require improvements in water distribution and availability targeting micro-irrigation schemes coupled with capacity building for rain-water harvesting. From a land rights point of view, effective land asset building will require strengthening land use and tenure security of farmers. One of the entry points is to implement the issuance of certificates of customary land ownership that was introduced through the Land Act in 2015;
6. Actions that promote livelihood diversification within and beyond the agriculture sector should be promoted by governments and other stakeholders. These include promotion of and investment in off-farm enterprises, adjustment of cultural and social norms to increase access and ownership of land by women, access to flexible and patient adaptation financing and controlling population growth. However, they must be scrutinised against maladaptation risk; and
7. Promotion of social organisation and cooperation at community level through improvement of social networks and social cohesion in communities spearheaded by the district community development system. This will enable collective action and knowledge sharing to promote land rights and enhance adaptive capacity. Entry points should include support and mobilisation of women to form groups for collective action to harness social capital.

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APPENDICES

Appendix 1: Guiding Questions for Fine-tuning the Possible Measures Identified during Impact Chain Exercise

1. What assets, presently unavailable, are required by women and other social groups involved in different livelihood activities for new enterprise(s)?
2. How will different climate and development scenarios affect these assets? For example, is some land liable to flooding if rainfall increases? Will some areas develop into urban areas as population and infrastructure development increase? What will be the effects (both positive and negative) on land and other assets?
3. Who will manage these assets?
4. Are there channels through which e.g., small-holder farmers and other livelihood groups, including women, can voice their concerns and negotiate with authorities and other stakeholders involved in developing the new enterprise(s)? What are the differences in channels of voicing concerns for women?
5. Are these links and channels reasonably expected to last longer than individual projects?
6. Is the land tenure of e.g., small-holder farmers a settled issue? If not, what are the unsettled land ownership and use issues that need to be addressed? How are these issues different for men and women? What are the needed measures? Where measures are different for men and women, please indicate so will elaborate.
7. Do men and women have equal entitlements to land? If not, what are the existing differences? How can the differences that disadvantage women be addressed?
8. How are land access, ownership and control by women addressed? If not addressed, what are the ongoing efforts on the same?
9. Is there a fair system in place for e.g., small-holder farmers to deal with disputes? How are women-affecting issues addressed in dispute management?
10. What support is required for e.g., small-holder farmers to ultimately analyse relevant information by themselves (e.g., to achieve the objectives of enterprise(s) and independently make well-informed choices based on that understanding? Any specific considerations for women?

11. How will e.g., small-holder farmers gain an understanding of working with uncertainty and of reducing climate impact risks?
12. What changes are required to develop an enabling environment for small-holder farmers, including women small-holder farmers, to explore and experiment with innovative approaches?
13. Are there programmes and projects to support such innovative approaches and enterprises? Which ones are these?
14. Are there programmes and projects to support the empowerment of e.g., small-holder farmers and foster the creation of long-lasting links between small-holder farmers and relevant stakeholders, including authorities?

Appendix 2: Interview Guide for a Study on Vulnerability to Climate Change and Women's Land Rights

Introduction

My name is ----- . I am undertaking a study (on behalf of Advocates Coalition for Development and Environment, ACODE) to understand and document climate change gender specific vulnerabilities including those associated with women access, ownership and control over land asset in West Nile. You have been selected to contribute towards this study with understanding that your responses and views will be treated with utmost confidentiality. This study is voluntary and does not involve any immediate and direct benefits to those collaborating in it. However, this is a very important study in as far development of policies, programmes, plans and projects in ways that reflect actual opportunities, needs, and issues of communities and households in West Nile. Therefore, your contributions to the study through participating in these interviews is of paramount importance and highly valued. If at any point in time you feel uncomfortable participating in the interview, please feel free stop.

Consent & Ethical Clearance

Do you agree to participate in the interview which will be used to come up with reports and other communication materials that will be availed to the wider public?

Do you agree to have your interview recorded?

Interview Identification Information	
100. Date of Interview: Day ____ Month ____/2021 101. Start time of interview: ____/___ End time: ____/____	102. Interviewer Name: _____
103. Participant Identification #: _____	104. County
105. Sub- County	106. Parish
107. Village	108. Distance from Arua City: _____ Kilometres.
109. GPS coordinates: Longitude _____ Latitude _____	1 Urban
110. Urban/ Rural	2 Rural
111. Sex	1 Female 2 Male
112. Occupation	
113. Native Language of the Participant?	114. Language used to interview the participant
115. Marital status?	1 Married 2 Single 3 Co-habiting 4 Divorced 5 Separated 6 Widowed

Topical Interview Questions

201. How are current climate changes affecting your livelihood(s)? Probing will consider shifts in seasons, intensity and duration of droughts, flooding patterns.

202. With reference to any specific event, how have the climate hazards affected men, boys, women, and girls?

203. What major land issues have you faced in the last 10 years or are currently facing?

204. How differently are these land issues affecting men, boys, women, and girls?

205. What are the implications of the land issues being faced on addressing climate change impacts?

206. What are the implications of the prevailing climate changes and their effects on land issues in your community?

207. How should the land challenges facing women in your community be

dealt with?

208. Considering the current land and climate change issues, what livelihood situation do you foresee (consider starting from next year to the next 10 or 20 years)?

209. What changes are needed in your community to address climate change vulnerabilities? Specify the changes meant for women.

210. What present or future opportunities do you see within and outside your communities for addressing gender-specific vulnerabilities to climate change for improved livelihoods?

211. What challenges do you foresee in addressing gender-specific vulnerabilities to climate change for improved livelihoods?

212. Do you have any last suggestions, comments or questions about what we have been talking about?

Appendix 3: Glossary

Glossary	
Adaptation	The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploit beneficial opportunities.
Adaptive capacity	The ability of systems, institutions, humans and other organisms to adjust to potential damage, to take advantage of opportunities, or to respond to consequences.
Adaptive capacity analysis	Exploration measures to reduce vulnerability identified in vulnerability assessment and the testing of their potential in contributing to risk reduction and resilience over the longer term.
Agency	Ability to have free choice in responding to environmental change.
Assets	Financial, physical, technological, and service (for example, land) resources that people have access to.
Climate change	Climate change refers to a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer.
Drought	A period of abnormally dry weather long enough to cause a serious hydrological imbalance.

Glossary	
Erratic weather patterns	The occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable.
Exposure	The extent to which a social group (or a livelihood activity) could potentially be affected/damaged by the occurrence of a hazard or an issue.
Flexibility	Opportunities for switching between strategies and capture the diversity of potential options available.
Floods	The overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas not normally submerged.
Gender	The characteristics of women, men, girls and boys that are socially constructed.
Hazard	Factors that have an impact on a landscape, both at present and (possibly) in the future.
Impact chain	A graphic representation of the consequences of a given hazard or issue throughout a socio-ecological landscape.
Issues	Factors that have an impact on a landscape, both at present and (possibly) in the future. They include environmental degradation, unequal access to assets, goods and services, gender and ethnic-related inequalities.
Knowledge group	Individuals with profound knowledge about the social ecological landscape in question.
Land access	The processes by which people, individually or collectively, are able to use land, whether on a temporary or permanent basis.
Land control	The ability to maintain influence or authority over land.
Land ownership	The act, state, or right of possessing land.
Land rights	The ability of individuals to freely obtain, use, and possess land at their discretion, as long as their activities on the land do not impede on other's rights.
Learning	Capacity to generate, absorb, and process new information about response options, and ways to live with, and manage uncertainty.
Livelihood activities	Undertakings to secure necessities of life.

Glossary	
Organization	Ways in which society is organized to enable (or inhibit) cooperation, collective action and knowledge sharing.
Psychosocial	Socio-cognitive characteristics, such as risk attitudes, personal experience, perceived social norms, and cognitive biases, perceptions of climate risk and adaptation options and cognitive biases.
Resilience	The capacity to live and develop with change, and absorb shocks and stresses.
Risk	The potential for consequences where something of value is at stake and where the outcome is uncertain, recognizing the diversity of values.
Sensitivity	The actual impact of a hazard or issue on a social group (or on a livelihood activity) over a set period of time in the past.
Social group	A more or less homogeneous group of people within a landscape, such as women.
Vulnerability Assessment	Analysis of exposure and sensitivity of a social group or a livelihood activity with respect to relevant hazards and issues.

Appendix 4: Impact Chains for Lack of Land Ownership and Pest and Diseases



ABOUT ACODE

The Advocates Coalition for Development and Environment (ACODE) is an independent public policy research and advocacy think tank based in Uganda. ACODE's work focuses on four programme areas: Economic Governance; Environment and Natural Resources Governance; Democracy, Peace and Security; Science, Technology and Innovation. For the last eight consecutive years, ACODE has been ranked as the best think tank in Uganda and one of the top 100 think tanks in Sub-Saharan Africa and globally in the Global Think Tanks Index Report published by the University of Pennsylvania's Think Tanks and Civil Societies Program (TTCSP).

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