

# Smallholder Livestock Farmers' Knowledge Base and Adaptation to Climate Change Impacts in Wabinyonyi Sub-County, Nakasongola District, Uganda

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## Abstract

The effects of climatic change are increasingly becoming more felt among smallholder livestock farmers. Adaptation to a reasonable extent depends on farmers' local knowledge, based on unusual changes in weather patterns such as; extreme and prolonged weather events resulting in changes in timing of and conditions for grazing. Four focus group discussions with smallholder livestock farmers' and four key informants were held with respondents from Nakasongola District. Some of the drivers of climatic change were mentioned as anthropogenic activities such as massive deforestation for wood fuel and charcoal burning. Adaptation strategies were early morning grazing, exchange of animals for grazing rights, selling off livestock at giveaway prices, reservedly fencing off part of the land to use during the dry season, burning dry grass in anticipation of better grass, and moving long distances in search of water. Limited knowledge about climatic change drivers, pressures and negligence by smallholder farmers limits small holder farmers' adaptive capacity. Some adaptive strategies like periodic bush burning during the dry seasons were counterproductive to climatic change mitigation efforts. The study concludes that smallholder livestock farmers' resilience to climatic change is low and needs to be enhanced. The local knowledge based more on the observed weather and climatic changes rather than on properly conceptualised drivers and pressures limits their adaptive capacities and strategies. This also limits mitigation efforts against climatic change impacts.

**Keywords:** Livestock, Climate, Variability, Adaptation, Knowledge Base.

## 1. Introduction

Climate change has exposed humanity to unpredictable patterns and extreme weather conditions, manifested by changes in cropping seasons, as well as changes in regional climatic patterns (Hope.K, 2009). The Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC, 2007) presents a summary of the expected adverse impacts of climate change based on projections of temperature, precipitation and humidity. This clearly presents significant shifts from conditions in the 20<sup>th</sup> century and underscores increase in incidences of heat waves, with extreme weather events such as floods and drought. There is increasing concern regarding changes in climatic variables that are threatening the transformation of livelihoods in resource-constrained rural communities of East Africa (Tafesse *et al.*, 2013; Watson, 2010; Smit *et al.*, 2000).

In Uganda today, Climate change is one of the big challenges facing the Country. The Ugandan Agricultural Census (UBOS and MAAIF, 2014) indicate that out of the two million agricultural households that experienced food shortage in 2012, 1.8 million (91.5%) experienced severe drought. This severe drought has contributed to lowering of the water table, subsequent drying up of water sources hence low milk production, death of cattle, and food insecurity within cattle corridor areas such Nakasongola (NEMA, 2008). Nakasongola district is a known cattle grazing area where over 60% of the population depends on livestock farming for their livelihood (Government of Uganda, 2009). Nakasongola is also one of the most vulnerable districts in Uganda's cattle corridor due to extreme variability with notably less rain and increasing temperatures (MWE, 2010). This poses a big threat to smallholder livestock farmers who depend on rainfall rangelands and natural water stocks.

The value of local knowledge as a complement for scientific research in climate science is now being more broadly recognized, including by the IPCC. Many agriculture dependent communities rely largely on local knowledge to adapt to climatic change impacts. This study therefore assessed the smallholder livestock farmers' knowledge base and its impact on their adaptation to climate change impacts in Wabinyonyi Sub-County, Nakasongola District. 2. Materials and methods

### 2.1. Survey Design and Study Area

Qualitative data collection methods were employed for obtaining data on local knowledge and adaptation to climate change impacts. Key Informants were held with: District Forestry Officer, the District Community Development Officer, District Livestock Production Officer and the District Veterinary Officer. The key informant interviews were aimed at getting insights into the smallholder livestock farmers' knowledge base about climatic change and their capacity to respond to climate change variations and impacts. Four Focus Group Discussions (FGDs) were held with local smallholder livestock free range farmers in order to assess the local

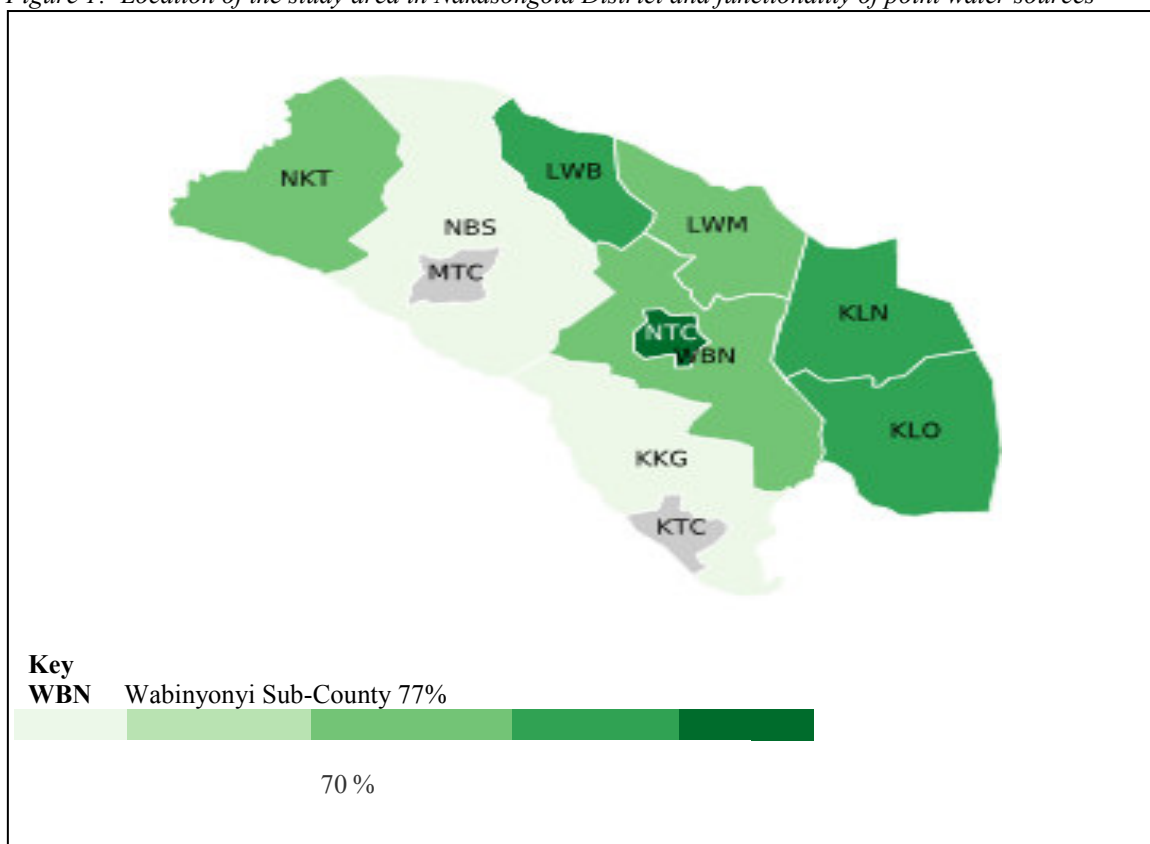
knowledge base and adaptation to climate change impacts. Secondary data was also collected by reviewing administrative and production sector specific documents from Nakasongola District.

### 2.2. The study area:

This study was conducted in Ssaasira Parish, in Wabinyonyi Sub-County in, one of the cattle grazing areas in the district, that is also among the most drought prone Sub-Counties in Nakasongola District with annual rainfall of 500-1000mm. There is a general decline of rainfall in the main season of April-May. The period of June to September and January to March is dry and the mean minimum temperature range from 18-25°C, while annual mean maximum temperatures range from 25-35°C (Nakasongola District Statistical Abstract, 2009).

Wabinyonyi Sub-County has no lake, has only 27 functional deep boreholes and 1 valley dam used for water for production (MWE, 2010). However, the valley dam dries up during the dry season due to high evapo-transpiration rates. Functionality is the ratio functional water sources to all water sources. Sources not operating for five years or more are assumed to be abandoned, and hence not included in the calculation (MWE, 2016). Wabinyonyi Sub-County had an estimated population of 18,313 people and over 3,370 households (UBOS, 2014).

Figure 1: Location of the study area in Nakasongola District and functionality of point water sources



## 3. Results and discussion

### 3.1 Awareness of smallholder livestock farmers about climate change and related impacts

Majority of the respondents were aware about the concept climate change based on unusual changes in climate and weather patterns such as; extreme and prolonged weather events resulting in changes in timing of and conditions for grazing and also cropping seasons<sup>1</sup>. Some of the local knowledge base depends on farmers' beliefs on causative effect of anthropogenic activities such as massive deforestation, charcoal burning and cultural imputations about drivers of climatic change and are sometimes associated with sorcery and witchcraft while,

<sup>1</sup> Respondents' perception on rainfall changes show that the rainy season pattern has changed, with onset of rains originally from March to now late April. The farming seasons have increasingly become unpredictable, impacting on household ability to prepare and look after their livestock. Small scale farmers have noticed temperature variations over the years, witnessed in increased drying up of water sources and pastures, leading to low milk production and milk products, poor quality meat and increased deaths of cattle.

some of the drivers were associated with cultural imputations such as sorcery and witchcraft<sup>1</sup>. Sorcery is linked to brick makers and road constructors. It is perceived that they engage in witchcraft in order to stop the rain from destabilizing their productive activities. Road constructors were also believed to destabilize the micro- climate through regular rock blasting. Some respondents also mentioned that some sorcerers whom they think stop the rains with an intention of attracting more customers and sacrifices.

Drought was considered the major climate change impact affecting smallholder livestock farmers' livelihoods. Drought causes a rapid and extended loss of water sources and pastures, leading to poor health and sometimes death of livestock, poor quality meat, low milk production and other dairy products plus the increased livestock diseases. A number of smallholder livestock farmers meet at one watering point and vector transmission becomes very easy, others walk long distances<sup>2</sup> with little to feed on, their resistance to disease becomes compromised leading to low productivity in terms of milk and meat. Because this impact is spatial and ecological, it affects the value of livestock base which becomes reduced tremendously threatening food security, household income due to high expenditure and family stability.

Change of livestock feeding patterns impacts on children and women in several ways;

There is a gender related aspect to climatic change impacts in the study area. Women and girls bear the burden of fetching for their families and spend significant amounts of time daily hauling water from distant sources. The water from distant sources is rarely enough to meet the needs of the households and the care of livestock. This was noted not only to be tiring but also exposed women and girls to risks of sexual abuse. During the FGDs in Ssaasira village, one female participant had this to say:

*"Now days it is very difficult to understand men. When life becomes hard, many of the men just abandon their families; they resort to drinking, idling about in the trading centre, and become more aggressive and violent at home. In the end, it is us, women who have to shoulder the burden of fending for the family members such as children and other relatives".*

Many school age going children are stopped from going to school to help their parents/guardians take the animals for feeding and watering. This is associated with increased labor demands and low income levels during the long dry spells. Some of the children who show up for classes report late, which compromises their learning capabilities and outcomes. One of the parents in Macuum village when asked had this to say

*"...i want my children to be in school but the situation is out of hand, as they have to first feed the animals, the only source of income".*

Social conflicts associated with fencing off grazing land, exchange of animals for grazing land and increasing water shortages. Social conflicts happen when animals destroy other people's gardens/crops and due to exchange of livestock for grazing rights. These causes' serious social dislocations, suspend or destroy income opportunities, create food insecurity, damage the environment and sometimes may result into loss of lives.

One respondent during the FGDs Naitondo revealed that:

*"Many farmers after giving out their livestock for grazing rights and water, they become jealousy instead and set fire on the others' grazing land killing a number of animals".*

There is an urgent need for practical ways to prevent, mitigate, resolve and potentially transform land related conflicts, because the tensions that trigger violent disputes over grazing land pose significant obstacle to adapting ways that can build resilience to climate change impacts.

### 3.2 Local knowledge base and implications for adaptation to climatic change impacts

Smallholder livestock farmers practice bush burning in anticipation of better grass<sup>3</sup> and with an intention of influencing the rain to fall. Farmers believe that smoke from the bush fires influences rainfall formation. However, this is not true because this practice is more pronounced towards the end of the dry season, that point when everyone is fed up of too much heat and its almost rainy season, increasing chances of rains. Secondary literature indicates that this is the worst form of ecosystem degradation as it destroys everything that lives in the bushes. Ecologically, fire is a tool which has both advantages and disadvantages to the ecosystem, and in the context of climate change, burning bushes should be avoided because it emits poisonous gases in the atmosphere which contribute to the build up of atmospheric carbon dioxide which affects the ozone layer and the corresponding climate change. The loss of vegetation also means that the ability of these areas to capture carbon-dioxide is reduced.

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<sup>1</sup> This can be explained by the previous studies indicating that Nakasongola was the leading supplier of charcoal to Kampala from the study by Markus (2004), Nakasongola was the second most important supplier of charcoal (14.5%) to Kampala after Luweero (25.3%). However some farmers did not know the direct relationship between deforestation and climatic change and associated impacts on their livelihoods.

<sup>2</sup> Smallholder livestock farmers move from various villages with a few or more animals long distances of between 5-15 kilometers to Wabbale valley dam and by time they reach or return home, some animals collapse on the way and die. This situation has caused more devastation as farmers watch their animals die due to lack of water.

<sup>3</sup> Burning of bushes respondents said was inevitable because it enables fresh grass for livestock to grow.

Further analysis showed that smallholder livestock farmers also practice charcoal burning as an alternative source of income to replace livestock farming. This can be explained by the previous studies indicating that Nakasongola was the leading supplier of charcoal to Kampala from the study by Markus (2004), Nakasongola was the second most important supplier of charcoal (14.5%) to Kampala after Luweero (25.3%). Indeed farmers admitted having intensified charcoal burning as a livelihood activity. It has become very common in the recent past and more pronounced during the dry season, replacing livestock grazing which has been severely undermined by the changing and unpredictable weather seasons and termite infestations. However, some of the respondents could not link charcoal burning as an adaptive strategy to its contribution as being an indirect driver to climate change.

Reservedly fencing off parts of grazing land in preparation for the dry season to forestall challenges of inadequate water and pastures. This reduces livestock grazing resources, restricts animal movements in search for water and forage and bumping into diseases at the valley dam. The practice however, leads to increased levels of over grazing of the fenced land thus accelerating degradation of grasslands. Over grazing also means that animals eat most of the available plant material, both fresh and dry in the struggle to survive. This reduces evapo-transpiration thereby allowing an increase in local temperature levels<sup>1</sup>.

Smallholder livestock farmers have resorted to moving long distances in search of water for livestock and home consumption as an adaptation strategy to reduced water sources and pastures. However, it's a key driver to animal mobility. Several walk long distances in search of water for just one or a few animals. In many cases farmers lose cattle (the weak ones, sick and pregnant) in the process of moving long distances looking for water and pastures, while at the water points diseases are easily transmitted increasing disease burden on animals leading to increased animal mortality. According to Kisamba.M *et al* (2006), improved access to water can have substantial positive impacts on livestock farmers' investments in the rangeland and livestock management.

#### 4. Conclusion and Recommendations

Climate change impacts to livestock farming are anticipated to become worse. The local knowledge base and its impact are fair, but it's rarely translated into expected mitigation efforts to climate change. Some of the adaptive measures are in the long term contributing factors to climate change. Therefore, smallholder livestock farmers need functional knowledge about climatic change and interventions that can enhance the adaptive capacity and build their resistance against climatic change impacts.

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<sup>1</sup> Majority of smallholder livestock farmers in Wabinyonyi Sub-County practice over grazing. This is supported with evidence from Nakasongola District Environment Policy, (2009) which indicates that over 60% of the population in Nakasongola District rear livestock for their livelihood. Records from the District Veterinary Office indicate that by 1998 the population of cattle increased by 30% from 1991 the year of the last livestock census (UBOS, 1991). This has been attributed to the high demand for livestock products.

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