THE REPUBLIC OF UGANDA

Kabale District
Hazard, Risk and Vulnerability Profile

2016

Acknowledgement

EXECUTIVE SUMMARY

The multi-hazard vulnerability profile outputs from this assessment was a combination of spatial modeling using socio-ecological spatial layers (i.e. DEM, Slope, Aspect, Flow Accumulation, Land use, vegetation cover, hydrology, soil types and soil moisture content, population, socio-economic, health facilities, accessibility, and meteorological data) and information captured from District Key Informant interviews and sub-county FGDs using a participatory approach. The level of vulnerability was assessed at sub-county participatory engagements and integrated with the spatial modeling in the GIS environment. The methodology included five main procedures i.e.

Preliminary spatial analysis

Hazard prone areas base maps were generated using Spatial Multi-Criteria Analysis (SMCA) was done in a GIS environment (ArcGIS 10.1).

Stakeholder engagements

Stakeholder engagements were carried out in close collaboration with OPM's DRM team and the District Disaster Management focal persons with the aim of identifying the various hazards ranging from drought, to floods, landslides, human and animal disease, pests, animal attacks, earthquakes, fires, conflicts among others. Stakeholder engagements were done through Focus Group Discussions (FGDs) and key informant interviews guided by checklist tools (Appendix I). At district level Key Informants included: Chief Administrative Officer, District Agricultural Officer, District Production Officer, District Planner, District Natural Resources Officer, District Veterinary Officer and Principal Assistant Secretary while at Sub-county level Key informants included: Sub-county and Parish Chiefs, community Development mobilizers and health workers.

FGDs were carried out in four purposively selected sub-counties that were ranked with highest vulnerability. FGDs comprising of an average of 12 respondents (crop farmers, local leaders, nursing officers, police officers and cattle keepers) were conducted at Ikumba, Kyanamira and Bubaare Sub-counties and Hamurwa Town Council. Each Parish of the selected Sub-counties was represented by at least one participant and the selection of participants was engendered. FGDs were conducted with utmost consideration to the various gender categories (women, men) with respect to age groups since hazards affect both men and women though in different perspectives irrespective of age.

Participatory GIS

Using Participatory GIS (PGIS), local communities were involved in identifying specific hazard prone areas on the Hazard base maps. This was done during the FGDs and participants were requested through a participatory process to develop a community hazard profile map.

Geo-referencing and ground-truthing

The identified hazard hotspots in the community profile maps were ground-truthed and geo-referenced using a handheld Spectra precision Global Positioning System (GPS) unit, model: Mobile Mapper 20 set in WGS 1984 Datum. The entities captured included: hazard location, (Sub-county and parish), extent of the hazard, height above sea level, slope position, topography, neighboring land use among others. Hazard hot spots, potential and susceptible areas will be classified using a participatory approach on a scale of "not reported/ not prone", "low", "medium" and "high".

Data analysis and integration

Data analysis and spatial modeling was done by integrating spatial layers and non-spatial attribute captured from FGDs and KIIs to generate final HRV maps at Sub-county level.

Data verification and validation

In collaboration with OPM, a five-day regional data verification and validation workshop was organized by UNDP in Mbarara Municipality as a central place within the region. This involved key district DDMC focal persons for the purpose of creating local/district ownership of the profiles.

Multi-hazards experienced in Kabale district were classified as:

- Geomorphological or Geological hazards including landslides, rock falls, soil erosion and earth quakes.
- Climatological or Meteorological hazards including floods, drought, hailstorms, strong winds and Lightning
- Ecological or Biological hazards including crop pests and diseases, livestock pests and diseases, human disease outbreaks, vermin and wildlife animal attacks and invasive species.
- Human induced or Technological hazards including bush fires, road accidents land conflicts.

General findings from the participatory assessment indicated that Kabale district has over the past two decades increasingly experienced hazards including landslides, rock falls, soil erosion, floods, drought, hailstorms, strong winds, Lightning, crop pests and diseases, livestock pests and diseases, human disease outbreaks, vermin, wildlife animal attacks, invasive species, bush fires, road accidents and land conflicts putting livelihoods at increased risk. Landslides and floods were identified as most serious problems in Kabale District with almost all sub-counties being vulnerable to the hazards. This is due to its rugged terrain with a slope percentage rise (20+) which makes it vulnerable to landslides, but also the area is relatively flat with slope percentage rise (0-2) which is very prone to flooding in case of heavy rains.

The limited adaptive capacity (and or/resilience) and high sensitivity of households and communities in the district increase their vulnerability to hazard exposure necessitating urgent external support. To reduce vulnerability at community, local government and national levels should be a threefold effort hinged on:

- Reducing the impact of the hazard where possible through mitigation, prediction, early warning and preparedness;
- Building capacities to withstand and cope with the hazards and risks;
- Tackling the root causes of the vulnerability such as poverty, poor governance, discrimination, inequality and inadequate access to resources and livelihood opportunities.

The following were recommended policy actions targeting vulnerability reduction:

- The government should improve enforcement of policies aimed at enhancing sustainable environmental health.
- The government through MAAIF should review the animal diseases control act because of low penalties given to defaulters.
- The government should establish systems to motivate support of political leaders toward government initiatives and programmes aimed at disaster risk reduction.
- The government should increase awareness campaigns aimed at sensitizing farmers/ communities on disaster risk reduction initiatives and practices.
- The government should revive disaster committees at district level and ensure funding of

disaster and environmental related activities.

- The government through UNRA and the District Authority should fund periodic maintenance of feeder roads to reduce on traffic accidents.
- The government through MAAIF and the District Production Office should promote drought and disease resistant crop seeds.
- The government through relevant ministries coordinated by OPM should increase importation of Lightning conductors and also reduce taxes on their importation.
- The government through OPM and Meteorology Authority should support establishment of disaster early warning systems.
- The government through MWE increase funding and staff to monitor wetland degradation and non-genuine agro-inputs.
- The government through OPM should improve communication between the disaster department and local communities.
- The government through MWE should promote Tree planting along road reserves.
- The government through MAAIF should fund and recruit extension workers at sub-county level and also provide staff with necessary logistics.

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BBW	Banana Bacterial Wilt
DDMC	District Disaster Management Committee
DEM	Digital Elevation Model
DLG	District Local Government
DRM	Disaster Risk Management
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
ENSO	El Niño Southern Oscillation
FGD	Focus Group Discussion
GIS	Geographical Information Systems
HRV	Hazard Risk Vulnerability
KII	Key Interview Informant
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MWE	Ministry of Water and Environment
NCCP	National Climate Change Policy
OPM	Office of the Prime Minister
PGIS	Participatory GIS
SMCA	Spatial Multi-criteria Analysis
STRM	Shuttle Radar Topography Mission
UBOS	Uganda Bureau of Statistics
UNDP	United Nations Development Program
UNRA	Uganda National Roads Authority
UTM	Universal Transverse Mercator
WGS	World Geodetic System

DEFINITION OF KEY TERMS

Climate change: Climate change refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer).

Drought: The phenomenon that exists when precipitation has been significantly below normal recorded levels, causing serious hydrological imbalances that adversely affect land resource production systems.

El Niño: El Niño, in its original sense, is warm water current that periodically flows along the coast of Ecuador and Peru, disrupting the local fishery. This oceanic event is associated with a fluctuation of the inter tropical surface pressure pattern and circulation in the Indian and Pacific Oceans, called the Southern Oscillation. This coupled atmosphere-ocean phenomenon is collectively known as El Niño Southern Oscillation, or ENSO. During an El Niño event, the prevailing trade winds weaken and the equatorial countercurrent strengthens, causing warm surface waters in the Indonesian area to flow eastward to overlie the cold waters of the Peru Current. This event has great impact on the wind, sea surface temperature, and precipitation patterns in the tropical Pacific. It has climatic effects throughout the Pacific region and in many other parts of the world. The opposite of an El Niño event is called La Niña.

Flood: An overflowing of a large amount of water beyond its normal confines.

Food insecurity: A situation that exists when people lack secure access to sufficient amounts of safe and nutritious food for normal growth and development and an active and healthy life. It may be caused by the unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate use of food at the household level. Food insecurity may be chronic, seasonal, or transitory.

Impact: Consequences of climate change on natural and human systems.

Risk: The result of the interaction of physically defined hazards with the properties of the exposed systems i.e., their sensitivity or vulnerability.

Susceptibility: The degree to which a system is vulnerable to, or unable to cope with, adverse effects of climate change, including climate variability and extremes.

Semi-arid: Ecosystems that have more than 250 mm precipitation per year but are not highly productive; usually classified as rangelands.

Vulnerability: The degree of loss to a given element at risk or set of elements at risk resulting from the occurrence of a natural phenomenon of a given magnitude and expressed on a scale from 0 (no damage) to 1 (total damage)" (UNDRO, 1991) or it can be understood as the conditions determined by physical, social, economic and environmental factors or processes, which increase the susceptibility of community to the impact of hazards "(UN-ISDR 2009.)

Also Vulnerability can be referred to as the potential to suffer harm or loss, related to the capacity to anticipate a hazard, cope with it, resist it and recover from its impact. Both vulnerability and its antithesis, resilience, are determined by physical, environmental, social, economic, political, cultural and institutional factors" (J.Birkmann, 2006)

Hazard: A physically defined source of potential harm, or a situation with a potential for causing harm, in terms of human injury; damage to health, property, the environment, and other things of value; or some combination of these (UNISDR, 2009).

INTRODUCTION

1.1 Background

Uganda has over the past years experienced frequent disasters that range from drought, to floods, landslides, human and animal diseases, pests, animal attacks, earthquakes, fires, conflicts and other hazards which in many instances resulted in deaths, property damage and losses of livelihood. With the increasing negative effects of hazards that accompany population growth, development and climate change, public awareness and pro-active engagement of the whole spectrum of stakeholders in disaster risk reduction, are becoming critical.

The Government of Uganda is shifting the disaster management paradigm from the traditional emergency response focus towards one of prevention and preparedness. Contributing to the evidence base for Disaster and Climate Risk Reduction action, the Government of Uganda is compiling a National risk Atlas of hazard, risk and vulnerability conditions in the Country to encourage mainstreaming of disaster and climate risk management in development planning and contingency planning at National and Local levels.

Since 2013, UNDP has been supporting the Office of the Prime Minister to develop District Hazard Risk and Vulnerability profiles in the sub-regions of Rwenzori, Karamoja, Teso, Lango, Acholi and West Nile covering 42 districts. During the above exercise, local government officials and community members have actively participated in data collection and analysis. The data collected was used to generate hazard risk and vulnerability maps and profiles. Validation workshops were held in close collaboration with Ministries, District Local Government (DLG), Development Partners, Agencies and academic/research institutions. The developed maps show the geographical distribution of hazards and vulnerabilities up to sub-county level of each district. The analytical approach to identify risk and vulnerability to hazards in the pilot sub-regions visited of Rwenzori and Teso was improved in subsequent sub-regions.

This final draft report details methodological approach for HRV profiling and mapping for Kabale District in Southwestern Uganda.

1.2 Objectives of the study

The following main and specific objectives of the study were indicated:

1.2.1 Main objective

The main objective of the study was to develop Multi-hazard, Risk and Vulnerability Profile for Kabale District, Southwestern Uganda.

1.2.3 Specific Objectives

In fulfilling the above mentioned main objective the following are specific objectives as expected:

i.   Collect and analyze field data generated using GIS in close collaboration and coordination with OPM.

ii. Develop District specific multi-hazard risk and Vulnerability profile using a standard methodology.

iii. Preserve the spatial data to enable use of the maps for future information.

iv. Produce age and sex disaggregated data in the HRV maps.

1.3 Scope of Work

Through UNDP's Project: *"Strengthening Capacities for Disaster Risk Management and Resilience Building"* the scope of work entailed following:

i. Collection of field data using GIS in close collaboration and coordination with OPM in Kabale District and quantify them through a participatory approach on a scale of "not reported/ not prone", "low", "medium" and "high".

ii. Analysis of field data and review the quality of each hazard map which should be accompanied by a narrative that lists relevant events of their occurrence. Implications of hazards in terms of their effects on stakeholders with the vulnerability analysis summarizing the distribution of hazards in the district and exposure to multi-hazards in sub-counties.

iii. Compilation of the entire district multi-hazard, risk and vulnerability HRV Profiles in the time frame provided.

iv. Generating complete HRV profiles and maps and developing a database for all the GIS data showing disaggregated hazard risk and vulnerability profiles to OPM and UNDP.

1.4 Justification

The government recognizes climate change as a big problem in Uganda. The draft National Climate Change Policy (NCCP) notes that the average temperature in semi-arid climates is rising and that there has been an average temperature increase of 0.28°C per decade in the country between 1960 and 2010. It also notes that rainfall patterns are changing with floods and landslides on the rise and are increasing in intensity, while droughts are increasing, and now significantly affect water resources, and agriculture (MWE, 2012). The National Policy for Disaster Preparedness and Management (Section 4.1.1) requires the Office of the Prime Minister to "Carry out vulnerability assessment, hazard and risk mapping of the whole country and update the data annually". UNDP's DRM project 2015 Annual Work Plan; Activity 4.1 is "Conduct national hazard, risk and vulnerability (HRV) assessment including sex and age disaggregated data and preparation of district profiles."

1.5 Structure of the Report

This Report is organized into four sections: Section 1 provides Introduction on the assignment. Section 2 elaborates on the overview of Kabale District. Section 3 focuses on the methodology employed. Section 4 elaborates the Multi-hazard, Risks and Vulnerability profile and Coping strategies for Kabale District. Section 5 describes Conclusion and policy related recommendations.

OVERVIEW OF KABALE DISTRICT

2.1 Location

Kabale District between coordinates: 1° 15' 0" S and 30° 0' 0" E in Southwestern Uganda. Kabale District is bordered by Rukungiri District to the North, Ntungamo District to the Northeast, the Republic of Rwanda to the East and South, Kisoro District to the West and Kanungu District to the Northwest. The district has 19 sub-counties, 3 town councils and 1 municipality with 3 divisions. These include; Buhara, Butanda, Kaharo, Kamuganguzi, Kitumba, Kyanamira, Maziba, Rubaya, Bubaare, Bufundi, Hamurwa, Ikumba, Muko, Nyamweru, Ruhija, Bukinda, Kamwezi, Kashambya and Rwamucucu sub-counties. The town councils are Katuna, Hamurwa and Muhanga. The 3 divisions in Kabale Municipality include; Central, Northern and Southern (Figure 1).
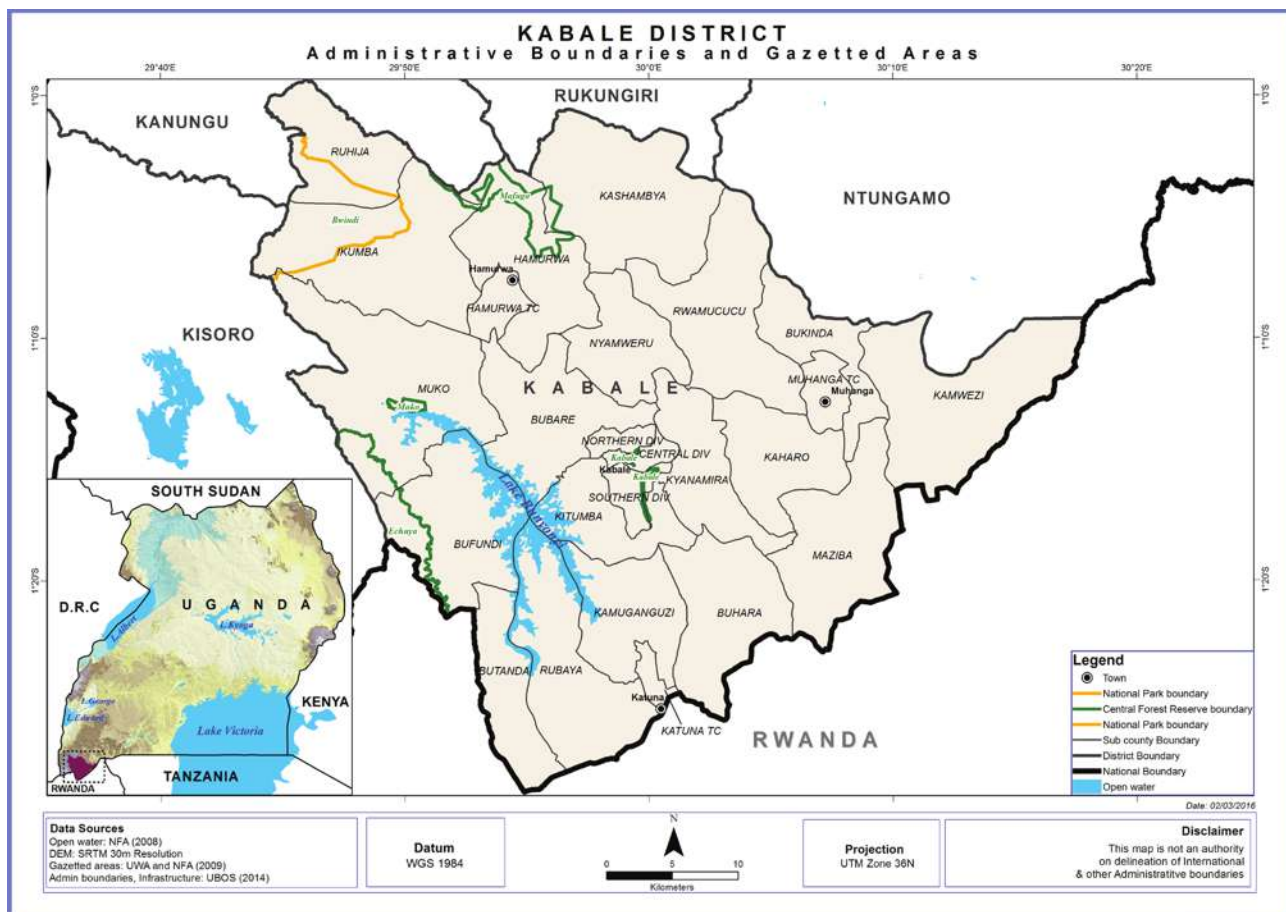
Figure 1: Administrative Boundaries and Gazetted areas, Kabale District

2.1.1 Geomorphology

The relief of Kabale District ranges between 1,200m to 3000m above sea level, with the highest points being to the Western and Southern parts of the District. Most of Uganda forms part of an interior high plateau comprising of a number of levels, which represent several stages of transition across underlying structures of the ancient rock basement. These stages of transaction are the result of long continued sub aerial denudation, which progressed in phases related to continental cyclic changes but which was complicated in this region by the direct and indirect effects of warping and rift valley development. The interaction of these sub aerial process with the underlying structures and tectonic deformation have produced the present landscape, in the south west of the county the plateau reaches its greatest heights with hill summit levels above 2000m in Kabale.

The rise of the plateau levels to the west is emphasised by the impressive mountainous topography found along the borders. The major volcanoes of the West in Kigezi consist of young conical hills rising to a maximum of over 4000 m (Figure 2).

Figure 2: Geomorphology, Kabale District

2.1.2 Geology and Soils

More than 80% of Kabale District is underlain by the oldest rock system, the precambrian age which consists of the basement complex system as the oldest overlain in some areas by a succession of sedimentary strata which have undergone a variable degree of dynamothermal metamorphism. The absolute age of the precambrian formations has not been determined with any accuracy and their chronological relationship to one another often remains obscure.

The soils of Kabale District are mainly volcanic, ferralitic and peat soils. The volcanic soils are mainly found in Muko sub-county in Kabale District. The ferralitic soils are the most widespread in the district and are in the advanced stage of weathering and have little or no mineral reserves to draw on. They largely depend on bases held in the clay and organic complexes for their fertility. Productivity of the ferralitic soils depends on favourable, adequate depth and maintenance of the humic top soil. The peat soils in Kabale District are mainly papyrus swamps. The peat soils are formed as a result of accumulation of a thick layer of organic matter below swamp vegetation due to slow decomposition. Peat swamps produce the rich organic soils for agriculture which dominate the valleys of Kabale district (Figure 3).
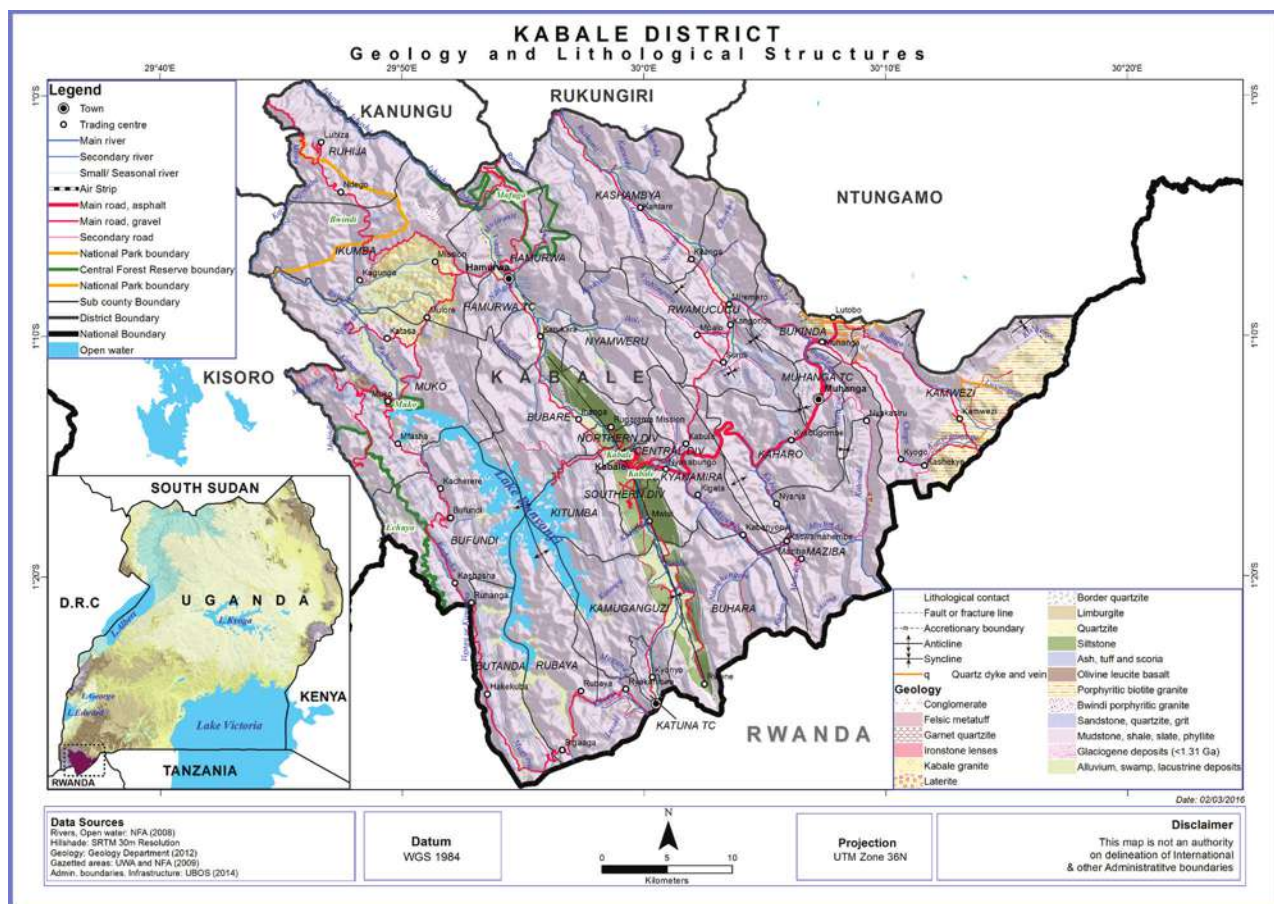
Figure 3: Geology and Lithological Structures, Kabale District

2.1.3 Vegetation and Land use Stratification

Vegetation Zones: The Vegetation of Kigezi was last studied in 1964 by Lange dale Bown el at, (1964). Looking at the district as a whole, five categories of vegetation can be distinguished, although most of the area has been greatly modified through cultivation.

High altitude forest

The high altitude forest comprises those, which lie at altitudes over 5,000 feet, mainly on the lower slopes of the major mountains, but also in the highlands of Kabale especially Bwindi Forest. Though not including such a large number of species as the forests at medium altitudes, these forests are quite varied in form and composition; a variation, which reflects the wide range of sites that, they occupy.

Forest/Savannah Mosaic at high altitudes

Only few remnants of forest still survive in the district and at altitudes between 2,200 m and 3,200 m there is a mosaic of patches of savannah and scrub at various stages of the succession back to forest, where the influence of fire and cultivation has been reduced. The savannahs delivered are barely distinguishable, the tree layer which is often scarce and usually 2-4m high, is characterised by protea gagwedi and faurea saligua and the grass layer, 0.6-15m high is dominated by Andropofon distachyus, cymbopogon validus, exotheca abyssiniaca of hyparrhenia cymbaria. At the lower limit, this merge gradually into dries combretum savannah and above into a space stunted health. Further pennisetim claudestinum grasslands have developed on deep soils at altitudes of 5,500-7,000 feet in southern part of the district following the destruction of the original forest cover. In the South Western part of the district the shallow soils support grasslands in areas which were originally forests. Small areas are covered by evergreen thicket e.g. Echuya/Orugano.

Land use

Kabale District has a total area of 1,864 square kilometres, out of which arable land area is 1,695 sq. km, water body is 48.5 sq. km, swamps/wetlands is 79.4 sq.km and marginal land is 41.1 sq km. About 75% of arable land is largely owned according to customary laws. However, some land is held by freehold and leasehold of about 41.1 sq. km (2.4%) and 391.2 sq. km (22.6%) respectively. The average land area for agriculture is 2.06 ha or 5.08 acres per household. The per capita land holding is 0.3 ha/0.8acres (1995). Land is seriously fragmented and an average household has 6-7 plots of land on different hillsides. Each plot measures between 0.1 and 0.7 of an acre (Figure 4).
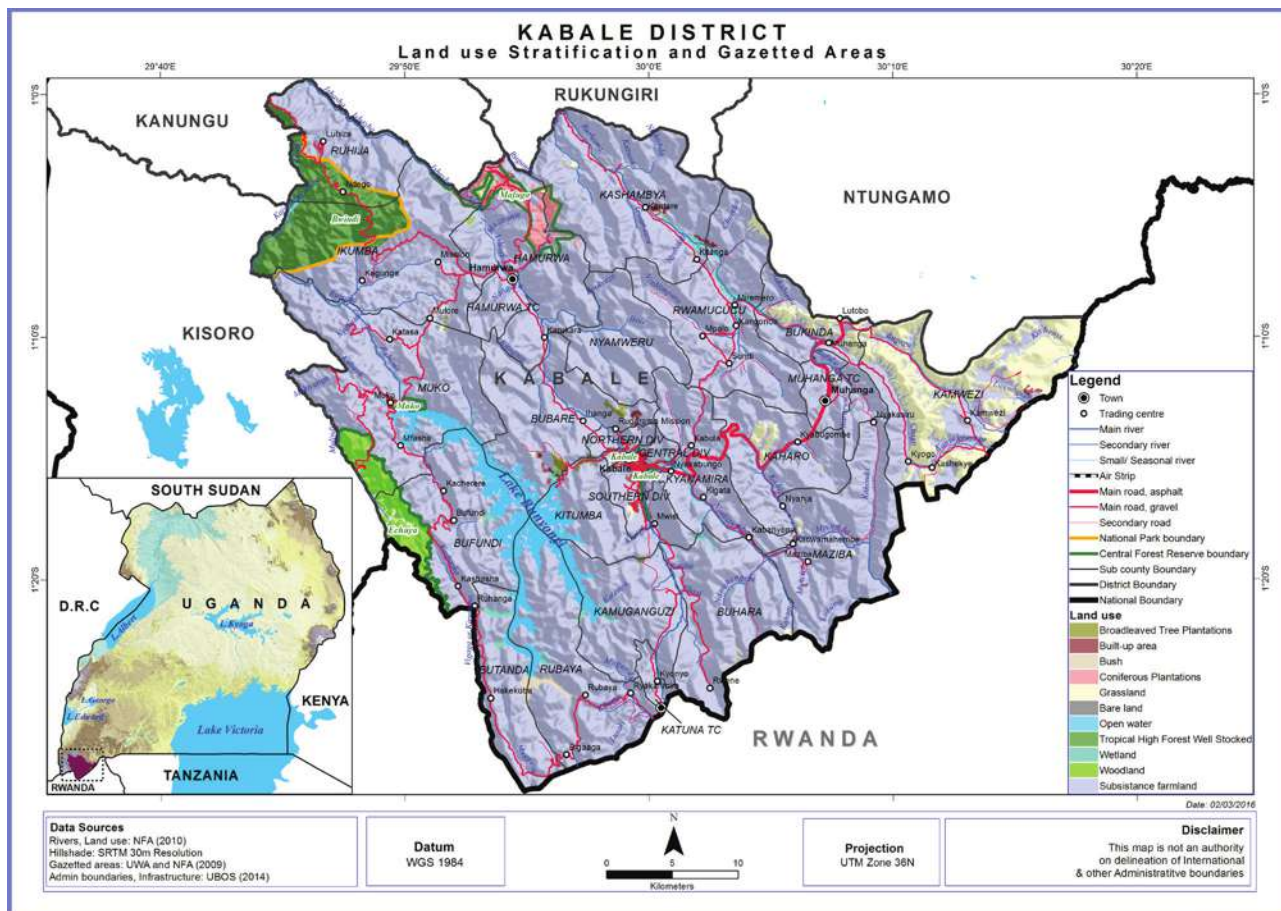
Figure 4: Land use Stratification, Kabale District

2.1.4 Temperature and Humidity

In reference to the 1993 data from Kabale meteorological station, the district records a mean annual maximum temperature of 24.4^0. The station records 10.9^0 as the mean annual minimum. This indicates slightly high temperatures throughout the year. An analysis of temperature covering the period from 1960 to 1985 shows a positive trend in both the minimum and maximum temperature covering all the months. The rate of rise of the annual temperature is found to be 0.39^0 per decade. This rate is warming is quite high and is very much above the global average (about 0.3^0 C per decade). One possible explanation for the micro-climatic warming in Kabale could be that due to massive land and swamp reclamation it is possible that the local radiative balance in this region could have been affected.

Relative humidity ranges between 90% - 100% in the mornings and decreases to between 50-65% in the afternoons during all the months. The recordings show that the relative humidity for both the mornings and afternoons decrease in the months of July, August, September, and October.

2.1.4.1 Wind

The long-term wind speed records from the East African Meteorological Department (1975) indicate average annual wind speeds of 3 knots and 5 knots at 0600 hours and 1200 hours, for Kabale. The wind speed values indicated, therefore, represent conditions of moderate to strong or turbulent conditions. The average number of calms experienced in the area, are indicated to be experienced for 99days at 0600 hours, and 27 days at 1200 hours, respectively, at Kabale. The general conclusion from these climatic figures is that for most of the year, Kabale district experiences moderate to strong and gusty winds, increasing in the afternoon.

2.1.4.2 Rainfall

Total Annual Rainfall received by Kabale District ranges between 900mm- 1350mm per annum. Lowest rainfall amounts are experienced in Kamwezi, Maziba, Kaharo, Rwamucucu and Bukinda sub-counties with rainfall ranging between 900mm – 1100mm per annum. Highest annual rainfall between 1251mm – 1359mm are experienced in Ruhija, Ikumba and Muko sub-counties towards the border with Kisoro and Kanungu (Figure 5).
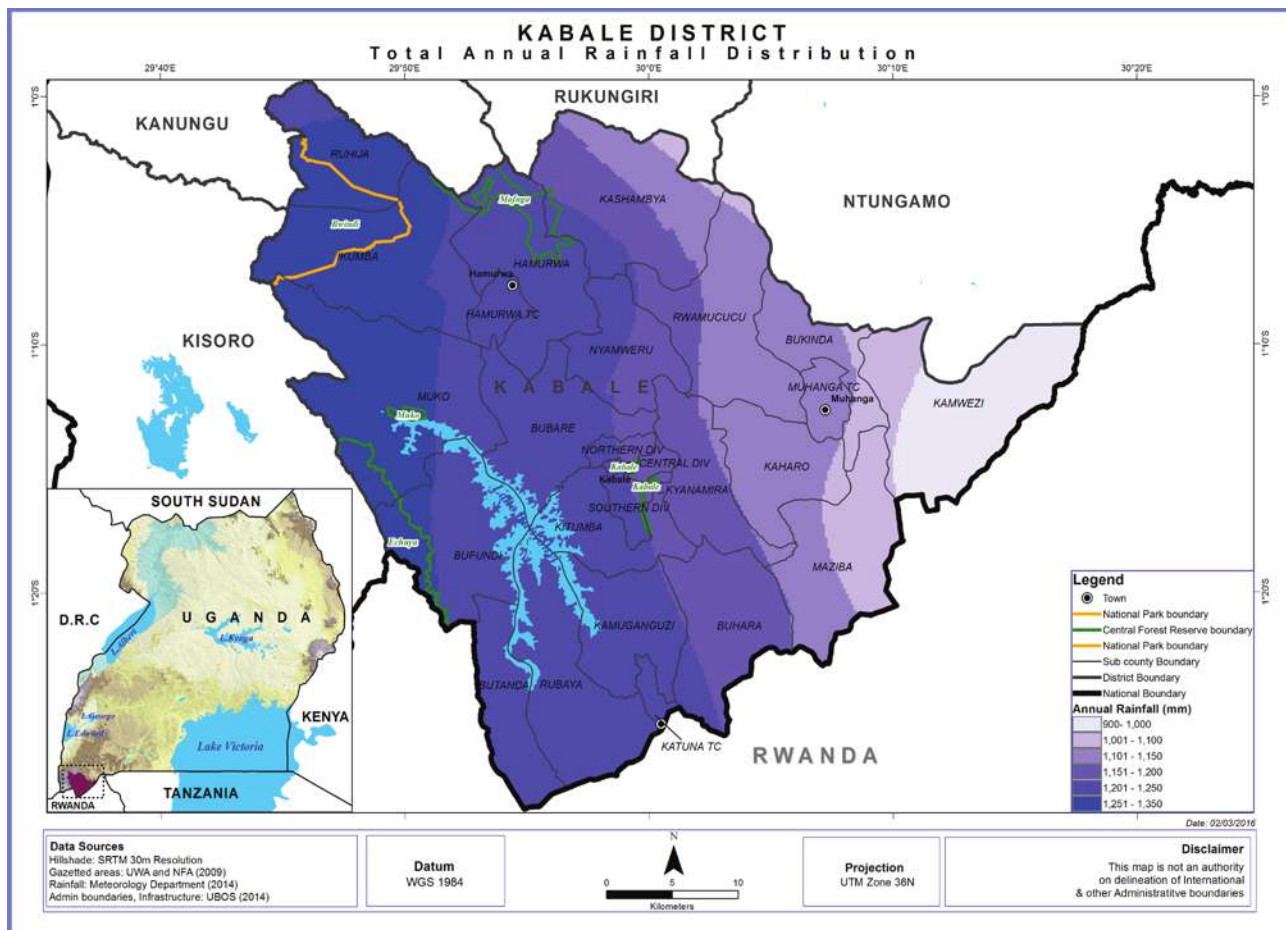
Figure 5: Total Annual Rainfall Distribution, Kabale District

2.1.5 Hydrology

Water bodies account for 48.5km^2 with the largest being Lake Bunyonyi, while wetlands cover 79.4km^2. The district also has a large network of streams scattered all over the district that drain four major outlets including Maziba river that drains into Rwanda, Kanyabaha that drains into Kisizi in Rukungiri and Lake Bunyonyi outlet that drains to Kisoro. There are concerns of reduced stream flow, increased silting and water pollution. An elder in Kabale was quoted thus; *"The volume of the water has drastically reduced. In Hamurwa, Kiruruma river was locally known as "Ruboroga", i.e. the "roaring river", but now it no longer roars. The valleys used to be full of water but this is no more. In Kabale town, it was known as "Rwabakazi", because women would never cross it due to the large volumes. Today, they easily jump over it. Downstream in Maziba sub-county, it was known as "Rucwamahembe", because cattle would drown in it. Today, cattle comfortably water in it".*

These are attributed to inadequate interventions in sustainable land management on farming land upstream and other malpractices. Pollution from various activities around Kabale municipal council have also played a major role. It has also been noted that a large percentage of wetlands has been reclaimed for agricultural and dairy farming, which will inevitably have an impact on natural water recharge capacity.

2.1.6 Population

According to the National Population and Housing Census (2014) results, Kabale District had a total population of 534,160 people. Results also showed that most of the people in Kabale District reside in rural areas (457,592 (85.7%) compared to (76,568 (14.3%) who reside in urban centers. The gender distribution was reported to be males: 252,164 (47.2%) and females: 281,996 (52.8%).

About 98.1% (523,984) of the population form the household population and only 1.9% (10,176) is Non-household. Muko sub-county had the highest population of 46,847 people while Hamurwa town council had the least population of 5,146 people (Figure 6). Table 1 shows the population distribution per sub-county for the different gender.

Table 1: Population Distribution in Kabale District

| Sub-County | HOUSEHOLDS | | POPULATION | | |
	Number	Average Size	Males	Females	Total
Central Division	4,069	3.3	7,497	8,185	15,682
Northern Division	3,555	3.6	6,423	6,822	13,245
Southern Division	4,478	3.7	10,274	10,466	20,740
Buhara	5,675	4.6	12,404	13,950	26,354
Butanda	4,104	4.5	8,476	9,787	18,263
Kaharo	4,281	4.5	9,310	9,888	19,198
Kamuganguzi	4,488	4.6	9,592	10,932	20,524
Katuna Town Council	2,157	4.4	4,882	5,167	10,049
Kitumba	4,175	4.6	9,450	10,050	19,500
Kyanamira	4,781	4.2	9,588	10,719	20,307
Maziba	4,775	4.4	10,039	10,878	20,917
Rubaya	6,050	4.6	12,797	14,930	27,727
Bubaare	7,574	4.6	16,461	18,815	35,276
Bufundi	5,670	4.5	11,772	13,994	25,766
Hamurwa	5,945	4.5	12,684	14,390	27,074
Hamurwa Town Council	1,267	4.0	2,405	2,741	5,146
Ikumba	7,161	4.4	14,371	17,302	31,673
Muko	10,258	4.5	22,221	24,626	46,847
Nyamweru	3,685	4.8	8,201	9,415	17,616
Ruhija	2,317	4.4	4,704	5,514	10,218
Bukinda	2,225	4.5	5,002	5,095	10,097
Kamwezi	6,287	4.4	13,008	14,526	27,534
Kashambya	5,929	4.3	12,029	13,947	25,976
Muhanga Town Council	2,766	4.1	5,847	5,859	11,706
Rwamucucu	5,959	4.5	12,727	13,998	26,725

Source: UBOS Census 2014
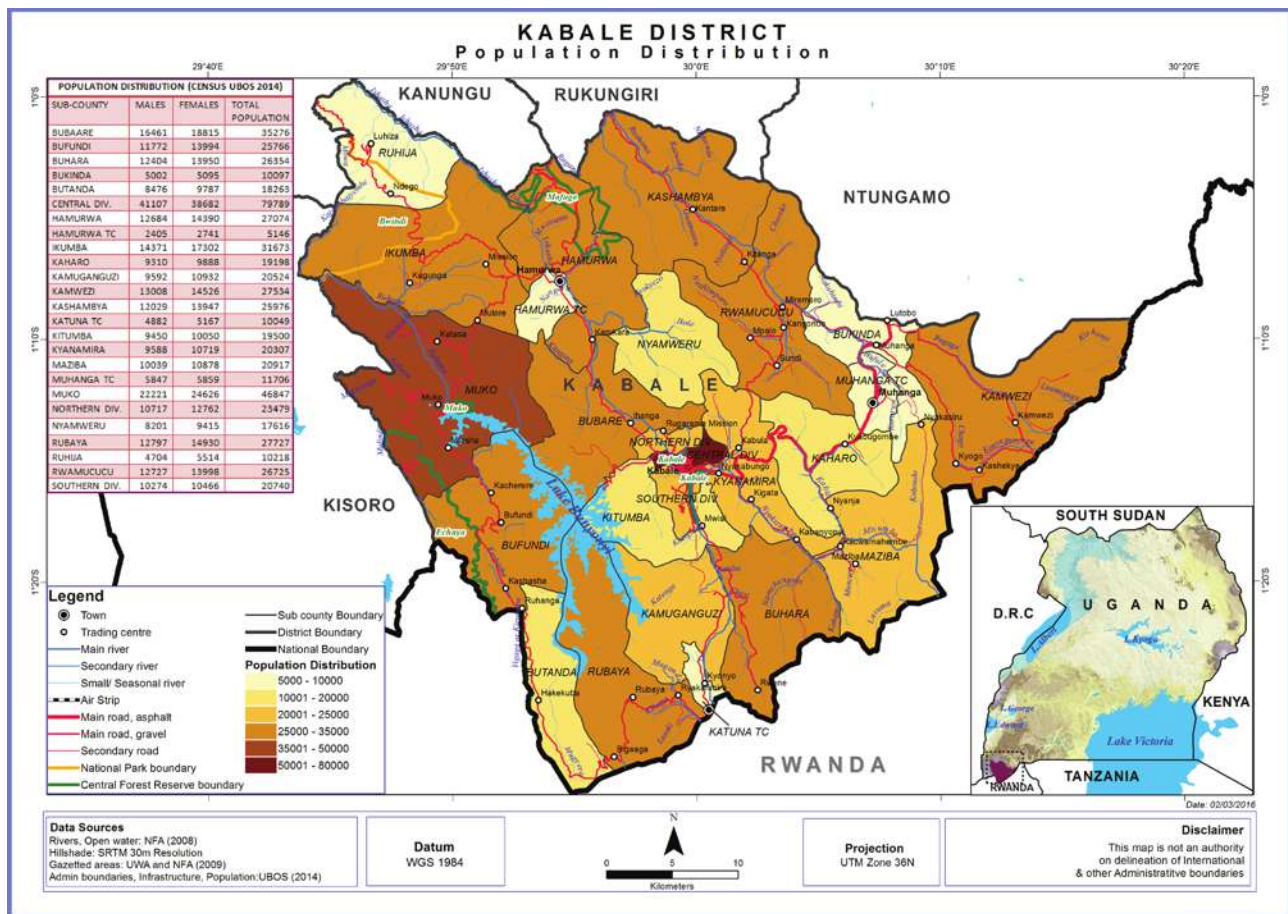
Figure 6: Population Distribution, Kabale District

2.1.7 Economic activities

The district climate favors mainly the growth of highland food crops such as maize, Irish potato, sweet potato, sorghum, bananas, beans, and finger millet. Others, which are grown on small scale by households, include; tobacco, Arabic coffee, temperate fruits (apples, grapes, pears), peas, wheat, barley and vegetables (cabbages, tomatoes, cauliflowers, carrots, onions, beet root, spinach, collards and green pepper). Livestock production is also practiced and the animals reared include cattle, goats, sheep, pigs, rabbits and chicken.

METHODOLOGY

3.1 Collection and analysis of field data using GIS

3.1.1 Preliminary spatial analysis

Hazard prone areas base maps were generated using Spatial Multi-Criteria Analysis (SMCA) basing on numerical models and guidelines using existing environmental and socio-ecological spatial layers (i.e. DEM, Slope, Aspect, Flow Accumulation, Land use, vegetation cover, hydrology, soil types and soil moisture content, population, socio-economic, health facilities, accessibility, and meteorological data) in a GIS environment (ArcGIS 10.1).

3.1.2 Stakeholder engagements

Stakeholder engagements were carried out in close collaboration with OPM's DRM team and the district disaster management focal persons with the aim of identifying the various hazards ranging from drought, to floods, landslides, human and animal disease, pests, animal attacks, earthquakes, fires, conflicts etc. Stakeholder engagements were done through Focus Group Discussions (FGDs) and key informant interviews guided by checklist tools (Appendix I). At district level, One Key Informant Interview comprising of seven respondents (Chief Administrative Officer, District Agricultural Officer, District Production Officer, District Planner, District Natural Resources Officer, District Veterinary Officer and Principal Assistant Secretary) was held at Kabale District Headquarters (29.99179E; -1.25367S). At sub-county level Key informants included: Sub-county and parish chiefs, community Development mobilizers and health workers.

FGDs were carried out in four purposively selected sub-counties that were ranked with highest vulnerability. FGDs comprising of an average of 12 respondents (crop farmers, local leaders, nursing officers, police officers and cattle keepers) were conducted at Ikumba Sub-county (29.85600E; -1.11400S), Hamurwa Town Council (29.90600E; -1.12500S), Kyanamira Sub-county (30.03286E; -1.26593S) and Bubaare Sub-county (29.94583E; -1.21971S). Each Parish of the selected Sub-counties was represented by at least one participant and the selection of participants was engendered. FGDs were conducted with utmost consideration to the various gender categories (women, men) with respect to age groups since hazards affect both men and women though in different perspectives irrespective of age. This allowed for comprehensive representation as well as provision of detailed and verifiable information.

Focus Group discussions and Key Informant Interviews were transcribed in the field for purposes of input into the NVIVO software for qualitative data analysis. Case stories and photographs were documented and captured respectfully. In order to produce age and sex disaggregated data, results from FGDs and KIIs were integrated with the district population census data. This was also input in the multi-hazard, risk and vulnerability profile maps.

3.1.3 Participatory GIS

Using Participatory GIS (PGIS), local communities were involved in identifying specific hazards prone areas on the Hazard base maps. This was done during the FGDs and participants were requested through a participatory process to develop a community hazard profile map.

3.1.4 Geo-referencing and ground-truthing

The identified hazard hotspots in the community profile maps were ground-truthed and geo-referenced using a handheld Spectra precision Global Positioning System (GPS) unit, model: Mobile Mapper 20 set in WGS 1984 Datum. The entities captured included: hazard location, (Sub-county

and parish), extent of the hazard, height above sea level, slope position, topography, neighboring land use among others (Appendix I). Hazard hot spots, potential and susceptible areas will be classified using a participatory approach on a scale of "not reported/ not prone", "low", "medium" and "high". This information generated through a participatory and transect approach was used to validate modelled hazard, risk and vulnerability status of the district. The spatial extent of a hazard event was established through modelling and a participatory validation undertaken.

3.2 Develop District Specific Multi-hazard Risk and Vulnerability Profiles

3.2.1 Data analysis and integration

Data analysis and spatial modeling was done by integrating spatial layers and non-spatial attribute captured from FGDs and KIIs to generate final HRV maps at Sub-county level. Spatial analysis was done using ArcGIS 10.1 to generate specific hazard, risk and vulnerability profile for the district.

3.2.2 Data verification and validation

In collaboration with OPM, a five-day regional data verification and validation workshop was organized by UNDP in Mbarara Municipality as a central place within the region. This involved key district DDMC focal persons for the purpose of creating local/district ownership of the profiles.

3.3 Preserve the Spatial data to enable future use of the maps

HRV profiles report and maps have been verified and validated, final HRV profiles inventory and geo-database have been prepared containing all GIS data in various file formats to enable future use of the maps.

RESULTS FROM MULTI-HAZARD RISK, VULNERABILITY MAPPING

4. Multi-hazards

A hazard, and the resultant disaster can have different origins: natural (geological, Hydro-meteorological and biological) or induced by human processes (environmental degradation and technological hazards). Hazards can be single, sequential or combined in their origin and effects. Each hazard is characterized by its location, intensity, frequency, probability, duration, area of extent, speed of onset, spatial dispersion and temporal spacing (Cees, 2009).

In the case of Kabale District, hazards were classified following main controlling factors:

   i.   Geomorphological or Geological hazards including; landslides, rock falls and soil erosion

   ii. Climatological or Meteorological hazards including; floods, drought, hailstorms, strong winds and Lightning

   iii. Ecological or Biological hazards including; crop pests and diseases, livestock pests and diseases, human epidemic diseases, vermin attacks and wildlife animal attacks,

   iv. Human induced or Technological hazards including; bush fires, road accidents land conflicts.

4.1 Geomorphological and Geological Hazards

4.1.1 Landslides, rock falls and soil erosion

Results from the participatory assessments indicated that landslides, mudslides, rock falls and soil erosion were very severe in Kabale District. It was reported that these landslides are a serious problem in the district because they occur every rainy season. Incidences of landslides are severe in Kyerero parish in Bukinda sub-county, Kyokyezo parish in Nyamweru sub-county, Kaharo parish in Kaharo sub-county, Mugando village in Rubaya, Kyokyezo in Nyamweru sub-county, Ihunga parish in Ikumba sub-county. Landslides cut off roads especially in Nyombe village, Butanda sub-county which is on shores of Lake Bunyonyi. This information was integrated with the spatial modelling using socio-ecological spatial data i.e. Soil texture (data for National Agricultural Research Laboratories – Kawanda (NARL) 2014, Rainfall (Meteorology Department 2014), Digital Elevation Model (DEM), SLOPE, ASPECT (30m resolution data from SRTM Shuttle Radar Topography Mission (SRTM) to generate Land slide, rock falls and soil erosion vulnerability map (Figure 7).

Plate 1: Landslides, rock falls and soil erosion hot spot in Bubaare Sub-county

KABALE DISTRICT
Landslides, Rock fall and Soil erosion Prone areas and Vulnerability ranking

POPULATION DISTRIBUTION (CENSUS UBOS 2014)

SUB-COUNTY	MALES	FEMALES	TOTAL POPULATION
BUBAARE	16461	18815	35276
BUFUNDI	11772	13994	25766
BUHARA	12404	13950	26354
BUKINDA	5002	5095	10097
BUTANDA	8476	9787	18263
CENTRAL DIV.	41107	38682	79789
HAMURWA	12684	14390	27074
HAMURWA TC	2405	2741	5146
IKUMBA	14371	17302	31673
KAHARO	9310	9888	19198
KAMUGANGUZI	9592	10932	20524
KAMWEZI	13008	14526	27534
KASHAMBYA	12029	13947	25976
KATUNA TC	4882	5167	10049
KITUMBA	9450	10050	19500
KYANAMIRA	9588	10719	20307
MAZIBA	10039	10878	20917
MUHANGA TC	5847	5859	11706
MUKO	22221	24626	46847
NORTHERN DIV.	10717	12762	23479
NYAMWERU	8201	9415	17616
RUBAYA	12797	14930	27727
RUHIJA	4704	5514	10218
RWAMUCUCU	12727	13998	26725
SOUTHERN DIV.	10274	10466	20740

Legend

- ◉ Town
- ○ Trading centre
- —— Main river
- —— Secondary river
- —— Small/ Seasonal river
- ▪▪▪ Air Strip
- —— Main road, asphalt
- —— Main road, gravel
- —— Secondary road
- —— National Park boundary
- —— Sub county Boundary
- —— District Boundary
- —— National Boundary
- —— Central Forest Reserve boundary

Landslide, Rock fall, erosion hotspots
- ▲ Landslide hotspot
- ★ Soil erosion evident spot
- ♣ Rock fall hotspot

Landslide, Rock fall, erosion vulnerability
- Not prone
- Low
- Moderate
- High

Data Sources
Admin boundaries, Infrastructure: UBOS (2014)
Landslide vulnerability: generated from Soils: NARL-2014,
Rainfall: Meteorology Dep't-2014, DEM, SLOPE: SRTM 30m Res.
Open water, Rivers, Gazetted areas: UWA and NFA (2009)

Datum WGS 1984

Projection UTM Zone 36N

Disclaimer This map is not an authority on delineation of International & other Administrative boundaries

Date: 02/03/2016

0 5 10 Kilometers

Figure 7: Landslides, Rock fall Soil erosion Prone Areas and Vulnerability Ranking, Kabale District

4.1.2 Earthquakes and faults

Participants in the focus group discussions indicated that Kabale District experiences earth tremors. It was observed that these earth tremors are not serious and thus do not cause any damage. Figure 8 indicates earthquake epicenters and vulnerability ranking.
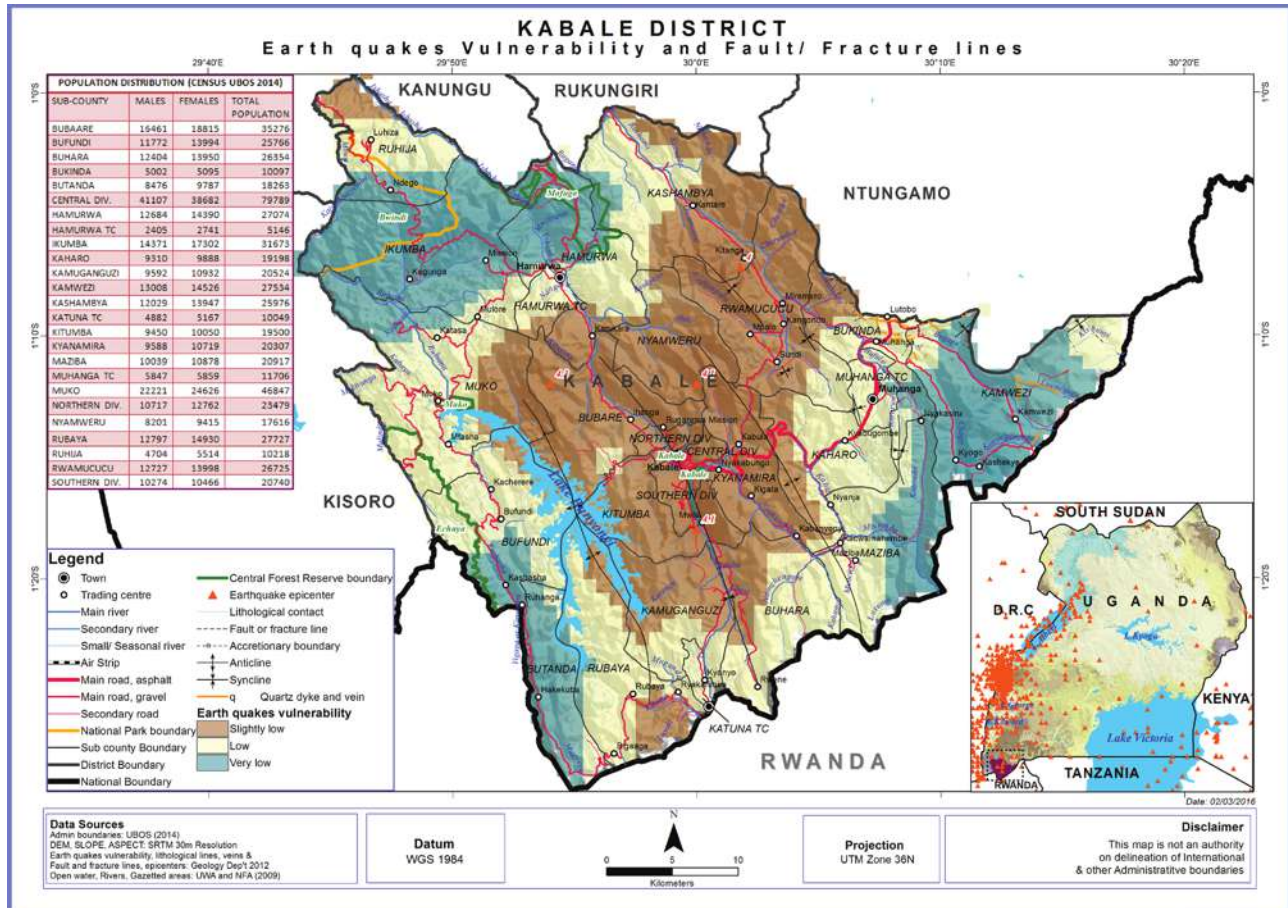
Figure 8: Earthquakes Vulnerability and Fault/Fracture lines, Kabale District

4.2 Climatological and Meteorological Hazards

4.2.1 Floods

Participants in the focus group discussions indicated that floods are a common occurrence in Kabale District during the rainy seasons. These floods mainly occur down in the low lands including valleys. It was reported that floods destroyed 38 households, killed 5 people including one university student, 2 cows and 10 goats in the recent past. It was noted that floods also destroy crops and other agricultural produce and thus causing serious economic losses. The most affected sub-counties are; Bukinda, Nyamweru, Bufundi, Kitumba, Kamuganguzi, Rubaya, Butanda, Buhara and Kyanamira. This information was integrated with the spatial modelling using socio-ecological spatial data i.e. Soil texture (data for National Agricultural Research Laboratories – Kawanda (NARL) 2014, Rainfall (Meteorology Department 2014), Digital Elevation Model (DEM), SLOPE, ASPECT (30m resolution data from SRTM Shuttle Radar Topography Mission (SRTM) to generate flood susceptibility map (Figure 9).

Plate 2: *Flooding hot spot at Mukirwa, Bubaare Sub-county*
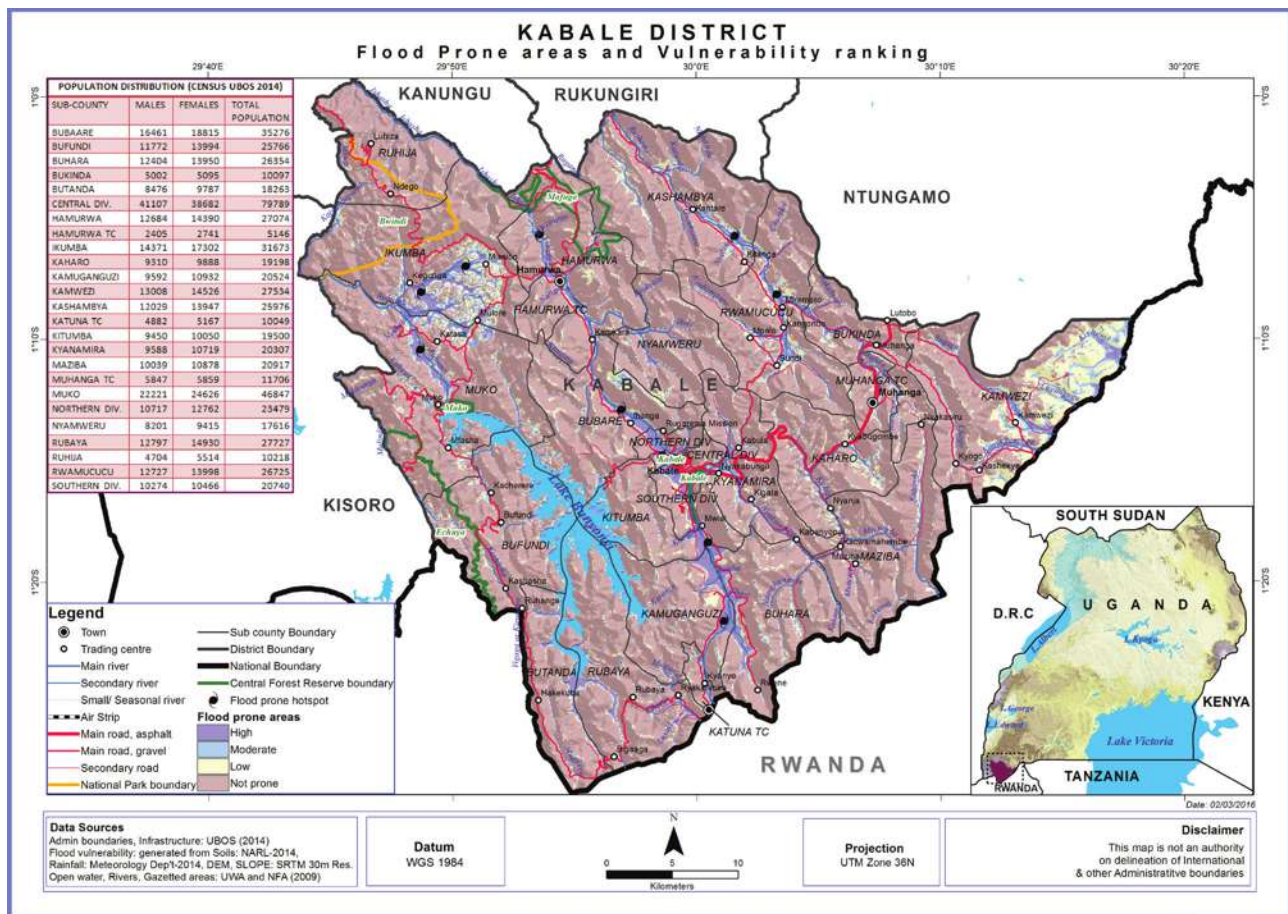
Figure 9: Flood Prone Areas and Vulnerability Ranking, Kabale District

4.2.2 Drought

Results from participatory assessments indicated that droughts in form of long dry spells without rain are not a serious problem Kabale District. However, with the increases conversion of wetlands into agricultural and deforestation in the district there have been noticeable changes in the weather patterns whereby the dry spells are starting to become even longer. The most affected sub-counties are Kamwezi and part of Maziba in order of severity. This information was integrated with spatial modelling using socio-ecological spatial data i.e. Rainfall and Temperature (Uganda National Meteorological Authority, 2014) using the Standardized Precipitation Index (SPI) to generate drought vulnerability map (Figure 10).
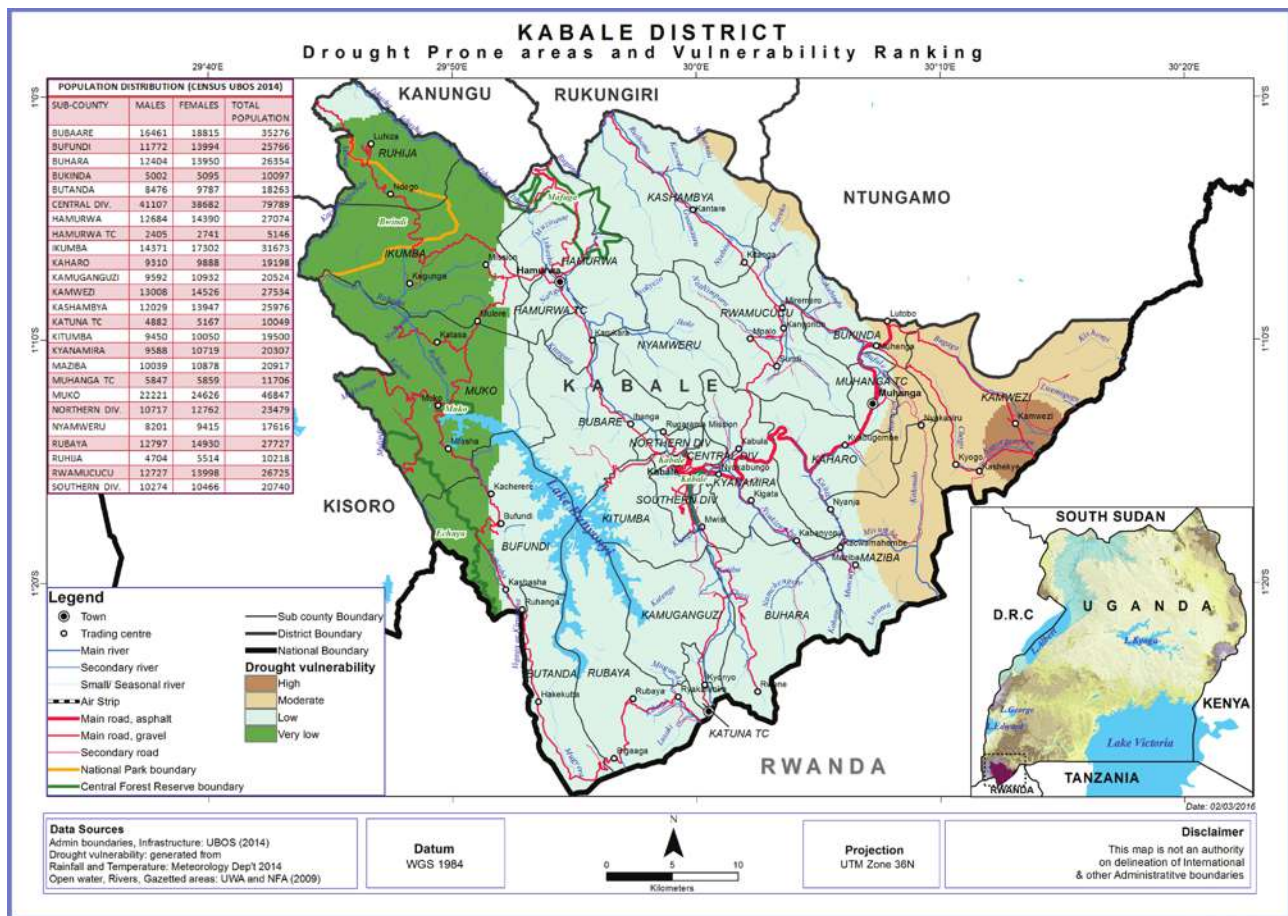
Figure 10: Drought Prone Areas and Vulnerability Ranking, Kabale District

4.2.3 Hailstorms

Participatory assessments through the focus group discussions indicated that hailstorms are experienced during heavy rains. Participants reported that hailstorms usually cause serious damage to crops such as banana plantations, beans, cassava, maize, sweet potatoes and Irish potatoes. The most affected sub-counties are; Ikumba, Muko, Ruhija, Bubaare, Rubaya and Nyamweru (Figure 11).

4.2.4 Strong winds

Results from participatory assessments showed that strong winds occur in the rainy seasons. Participants reported that strong winds blow off roof tops of houses and schools and cause tree falls and logging of banana plantations. It was reported that in April 2015, a number of roofs on houses in Nyamabare and Kashasha villages, Ikumba sub-county were blown off. The most affected sub-counties are; Butanda, Nyamweru, Muko and Ikumba.

4.2.5 Lightning

Lightning is a sudden high-voltage discharge of electricity that occurs within a cloud, between clouds, or between a cloud and the ground. The distribution of lightning on Earth is far from uniform. The ideal conditions for producing lightning and associated thunderstorms occur where warm, moist air rises and mixes with cold air above. Participatory assessments indicated that lightning was a common occurrence in Kabale District. It was reported that in 2014, 3 people and 3 cows were killed by lightning in sub-counties of Rubaya, Ikumba, Nyamweru, Butanda and Muko. Another incident happened in January 2016, where lightning struck a tree at the Kabale Golf course.
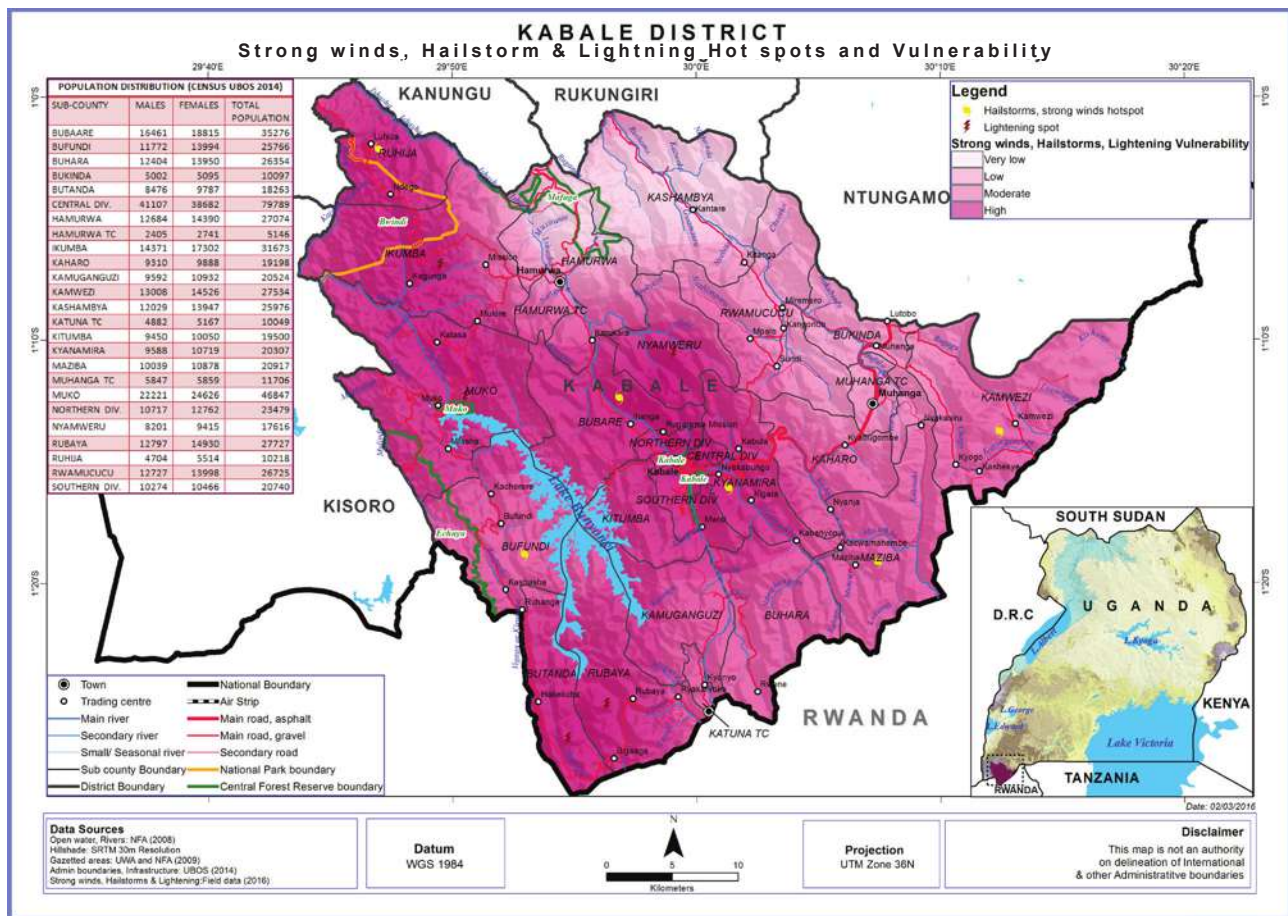
Figure 11: Strong winds, Hailstorms and Lightning Hotspots and Vulnerability, Kabale District

4.3 Ecological and Biological Hazards

4.3.1 Crop Pests and Diseases

Results from participatory assessments indicated that crop pests and diseases were a serious problem in Kabale District. The most reported crop diseases were; banana bacterial wilt, potato bacterial wilt, bean root rot, scab and powdery mildew in apples. Some of the crop pests mentioned included; eucalyptus mites, sweet potato butterfly and tea mites. Participants observed that banana bacterial wilt caused serious impacts in the sub-counties of Kamwezi, Bukinda, Rwamucucu, Kaharo, Maziba and Kashambya. The sub-counties of Hamurwa, Muko and Bufundi were mostly affected by the sweet potato butterfly which is attributed to the neighboring forests of Bwindi, Mafuga and Echuya respectively (Figure 12).
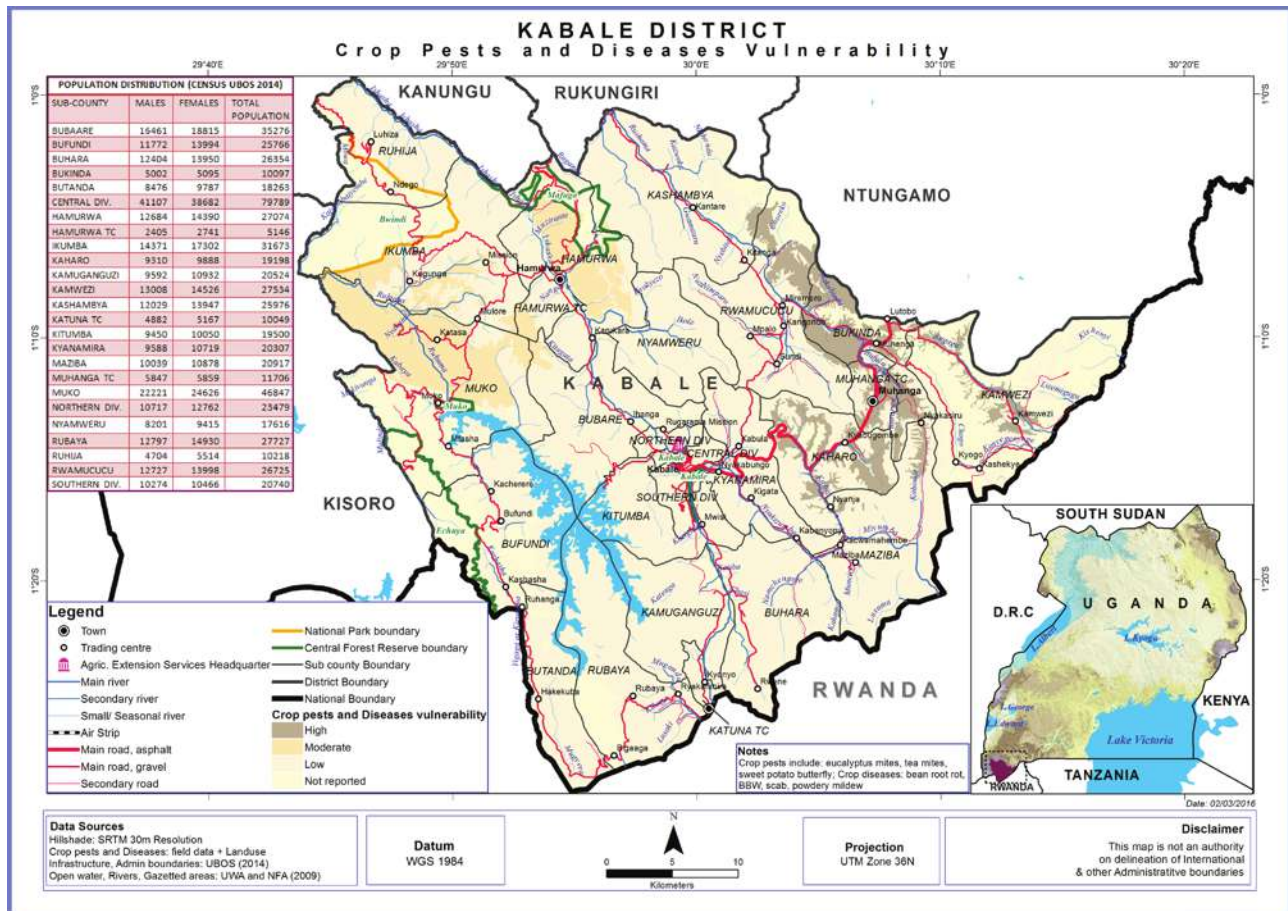
Figure 12: Crop Pests and Diseases vulnerability, Kabale District

4.3.2 Livestock Pests and Diseases

Results from the focus group discussions showed that livestock pests and diseases were a common occurrence in Kabale District. The most reported livestock diseases were; rift valley fever (new outbreak), lumpy skin disease, east coast fever, foot and mouth disease, swine fever, Newcastle, coccidiosis, foot rot in rabbits and rabies in dogs. Ticks were the most mentioned pests in livestock. Participants observed that foot and mouth outbreaks are common during the wet seasons. It was noted that these diseases were common in the livestock dominant sub-counties of Bubaare, Maziba, Kamwezi, Kitumba and Nyamweru (Figure 13).
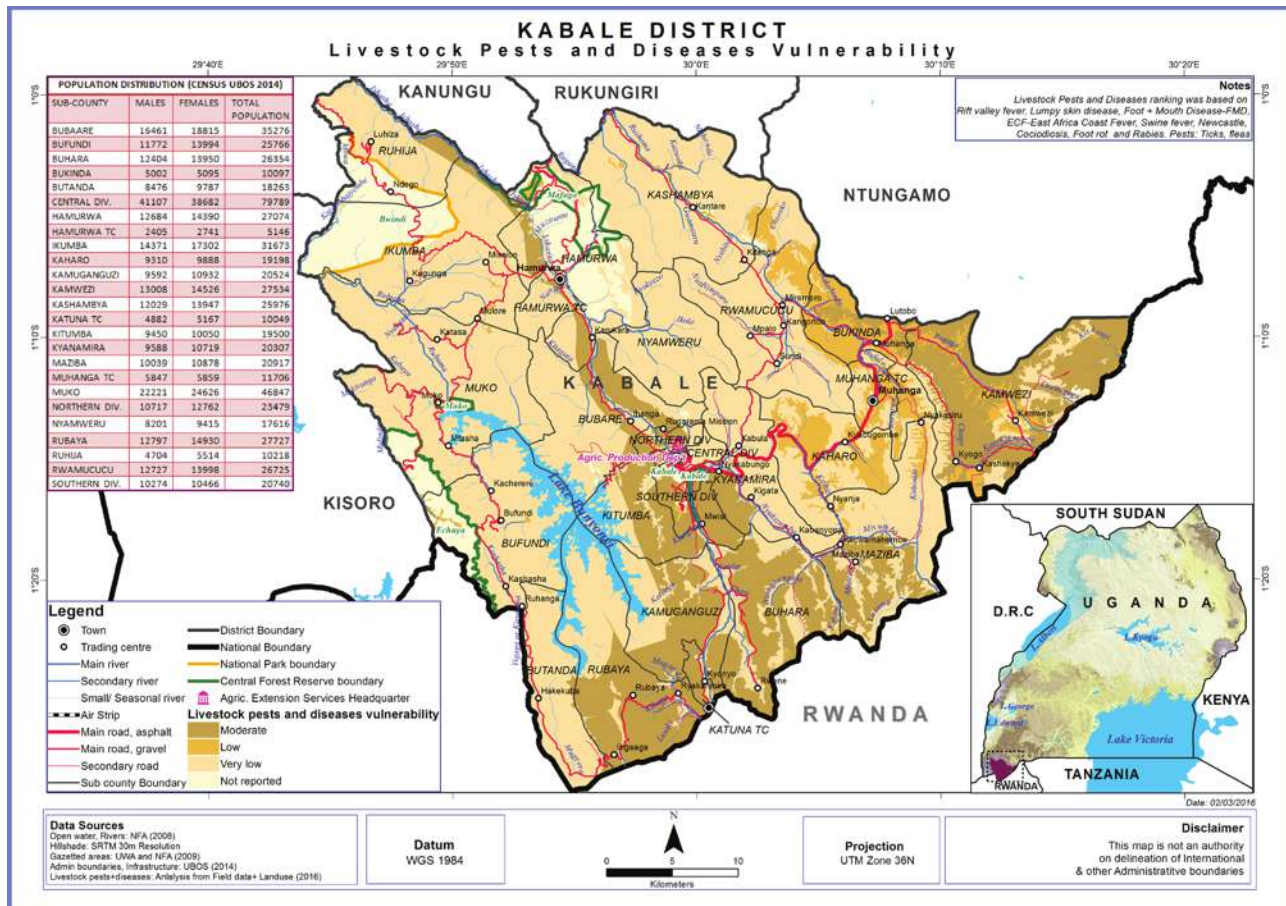
Figure 13: Livestock Pests and Diseases vulnerability, Kabale District

4.3.3 Human Diseases

Participants noted that the most common disease epidemics experienced in Kabale District are; malaria, HIV/AIDS and Tuberculosis (Municipality). It was reported that the entire district was affected by malaria. Participants also observed that HIV/AIDS prevalence rates were very high in Katuna Town Council, Kamwezi Sub-County and Kabale Municipality(Bombokya) attributed by truck Drivers (Figure 14)
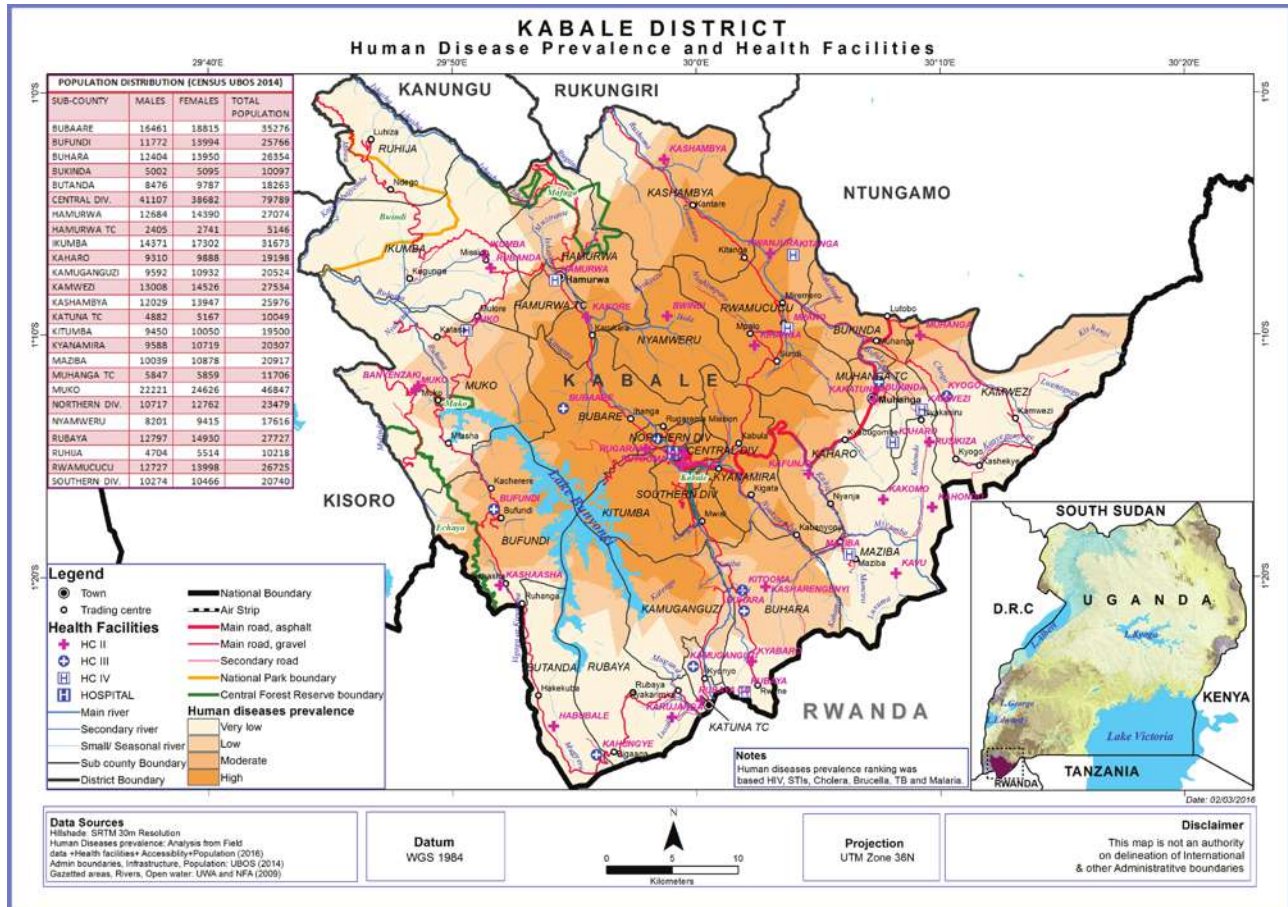
Figure 14: Human Diseases Prevalence and Health Facilities, Kabale District

4.3.4 Vermin and Wild-life Animal Attacks

Human wildlife conflicts are a serious problem in the district especially for the communities surrounding Bwindi Impenetrable National Park and Echuya central forest reserve. Participants reported that it is a common occurrence for elephants and baboons to destroy their crops yet they are not compensated. They revealed that this issue has significantly increased food insecurity problems in their communities. The most affected sub-counties are; Ikumba, Ruhija and Muko (Figure 15).
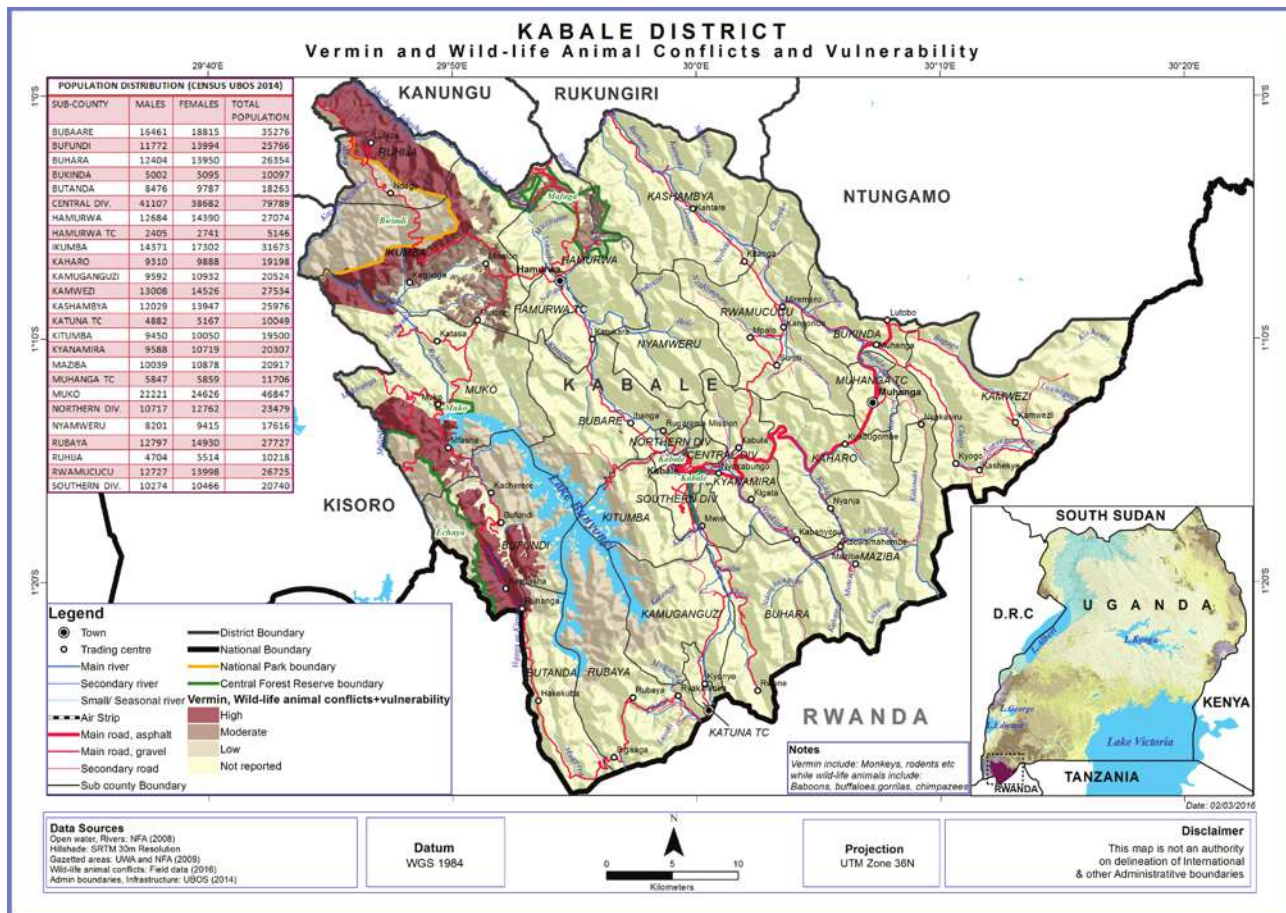
Figure 15: Vermin and Wildlife animal attacks and vulnerability, Kabale District

4.3.5 Invasive species

Participants in the focus group discussions indicated that the most noticeable invasive species in Kabale District was the water hyancinth in Lake Ngorogoza in Southern Division, Kabale Municipality and *Lantana camara* in Kamwezi, Kitumba and Rwamucucu sub-counties (Figure 16).
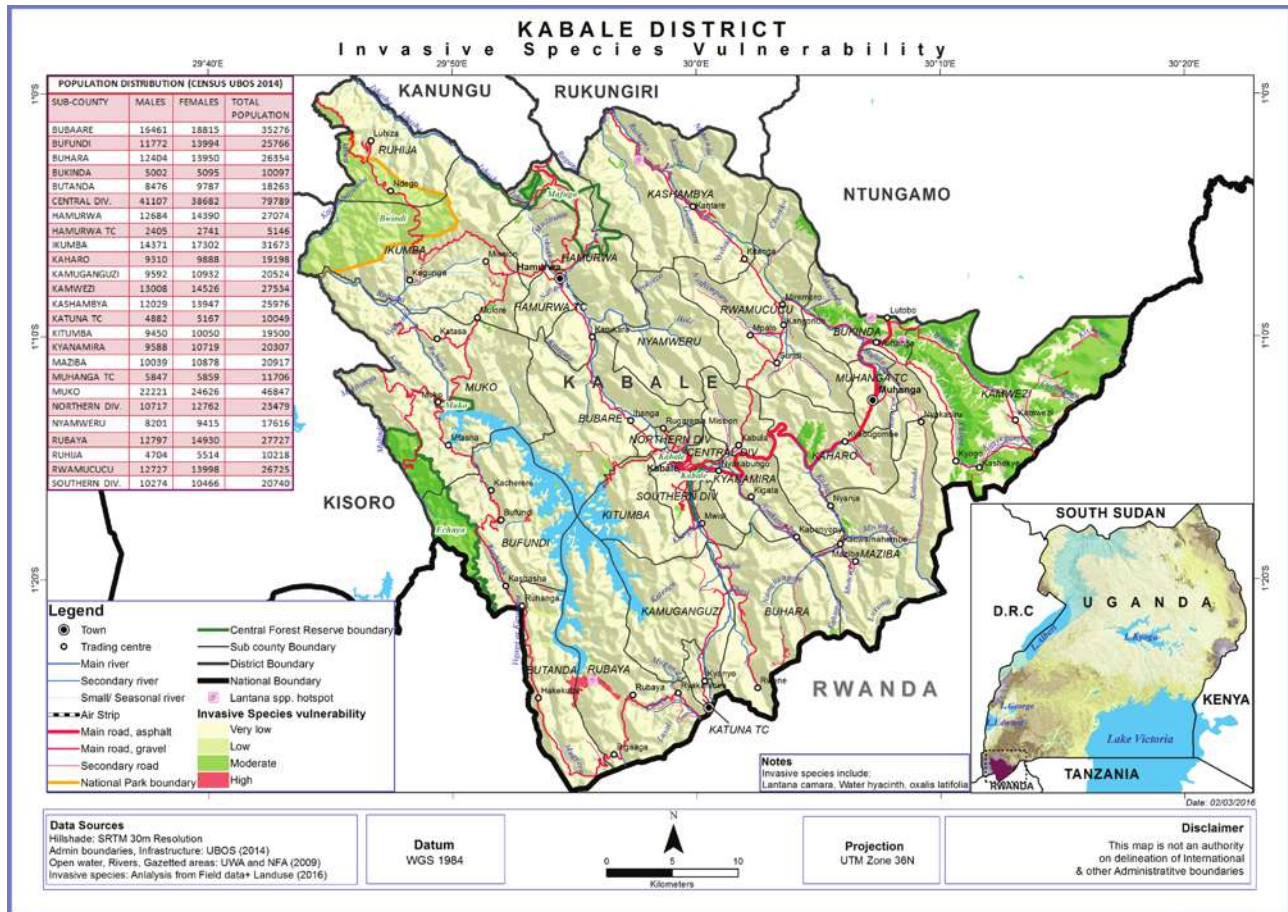
Figure 16: Invasive species vulnerability, Kabale District

4.4 Human Induced and Technological Hazards

4.4.1 Bush and forest fires

It was reported that bush fires were a serious problem in Kabale District and have destroyed most planted trees such as eucalyptus and pine. Incidences of forest fires were reported in Mafuga central forest reserve in Mpungu parish, Hamurwa sub-county. Other incidences of bush fires were reported in Kashasha and Nyamabare villages in Ikumba and Kamwezi sub-counties especially during the dry seasons (Figure 17).
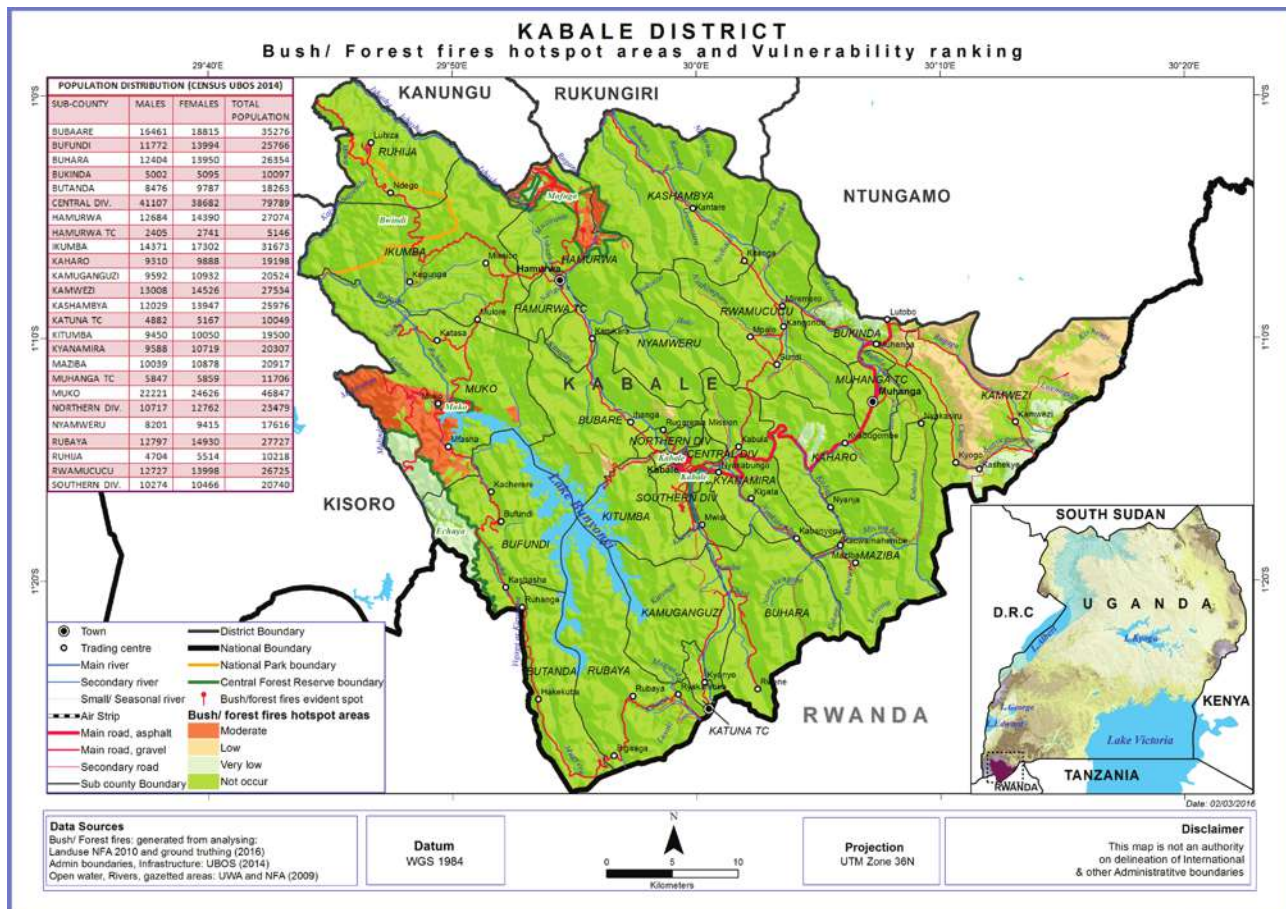
Figure 17: Bush/Forest fires Hotspot Areas, Kabale District

4.4.2 Land conflicts

Results from the participatory assessments indicated that land conflicts were the most common problem in Kabale District. It was noted that these land conflicts are usually among family members and are the main causes of domestic violence in the district. It was also reported that some people grab government land and thereafter claim its ownership. The entire district is affected by land conflicts (Figure 18).
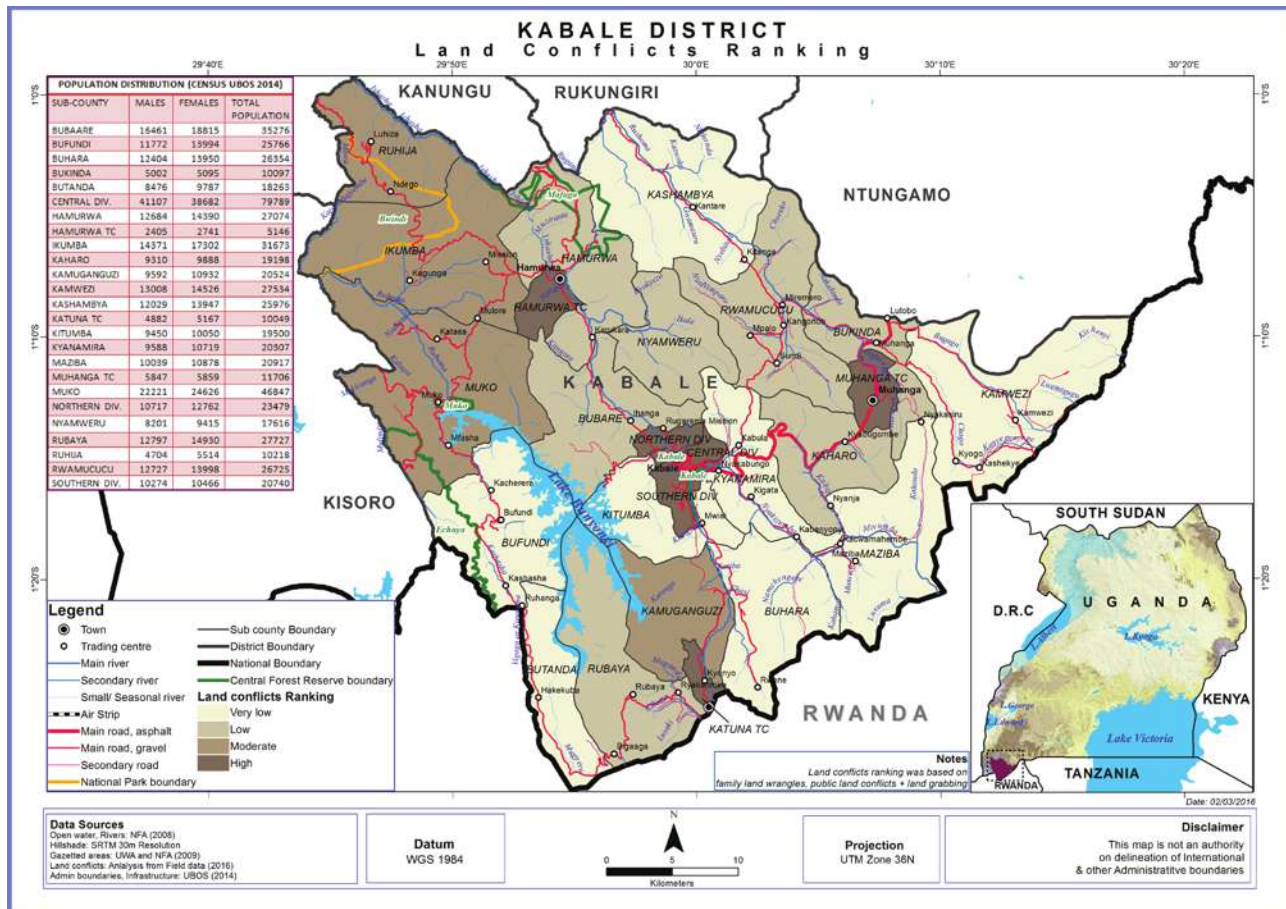
Figure 18: Land Conflicts Ranking, Kabale District

4.4.3 Environmental Degradation

Participatory assessments indicated that the most common forms of environmental degradation in Kabale District were; over cultivation of land leading to soil exhaustion, conversion of wetlands into agricultural land, stone quarrying, sand excavation and brick making in Kitumba sub-county,deforestation, car washing bays in the Municipality and at Hisesero in Muko sub-county and uncontrolled iron ore mining Hamurwa sub-county. It was observed that the lack of soil conservation practices on the hill slopes in Bufundi, Butanda, Rubaya, Kitumba, Bubaare , Muko and Kamuganguzi sub-counties have increasingly caused siltation of Lake Bunyonyi. It was also observed that most of the wetlands in Kabale District especially along the Kabale-Kisoro road have been converted into farm land (Figure 19).
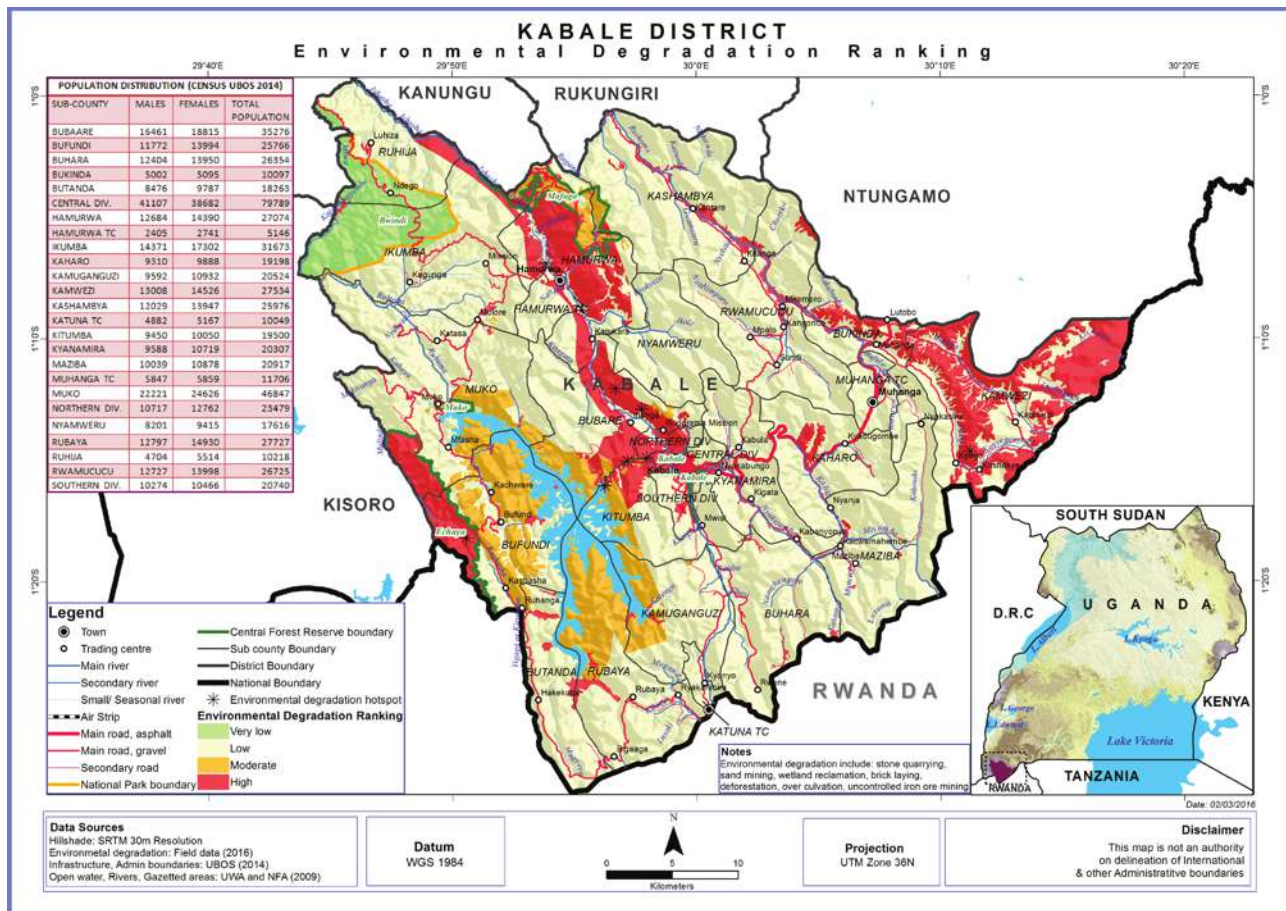
Figure 19: Environmental Degradation Ranking, Kabale District

4.4.4 Road and Water Accidents

Participants reported that accidents mostly occur along Kabale-Katuna and Kabale-Mbarara highways. Recent fatal incidences of road accidents were reported at Kyonyo village where a bus collided with a trailer and many people died. It was also noted that water accidents were very common on Lake Bunyonyi (Figure 20).

Plate 3: *Conversion of wetlands into crop land, Hamurwa Sub-county*

Plate 4: *Artisanal Iron Mining in Hamurwa Sub-county*

Plate 5: *Stone quarrying activities in Bubaare Sub-county*

Plate 6: *Brick making activities in Southern Division*

Plate 7: *Massive tree logging in Ikumba Sub-county*
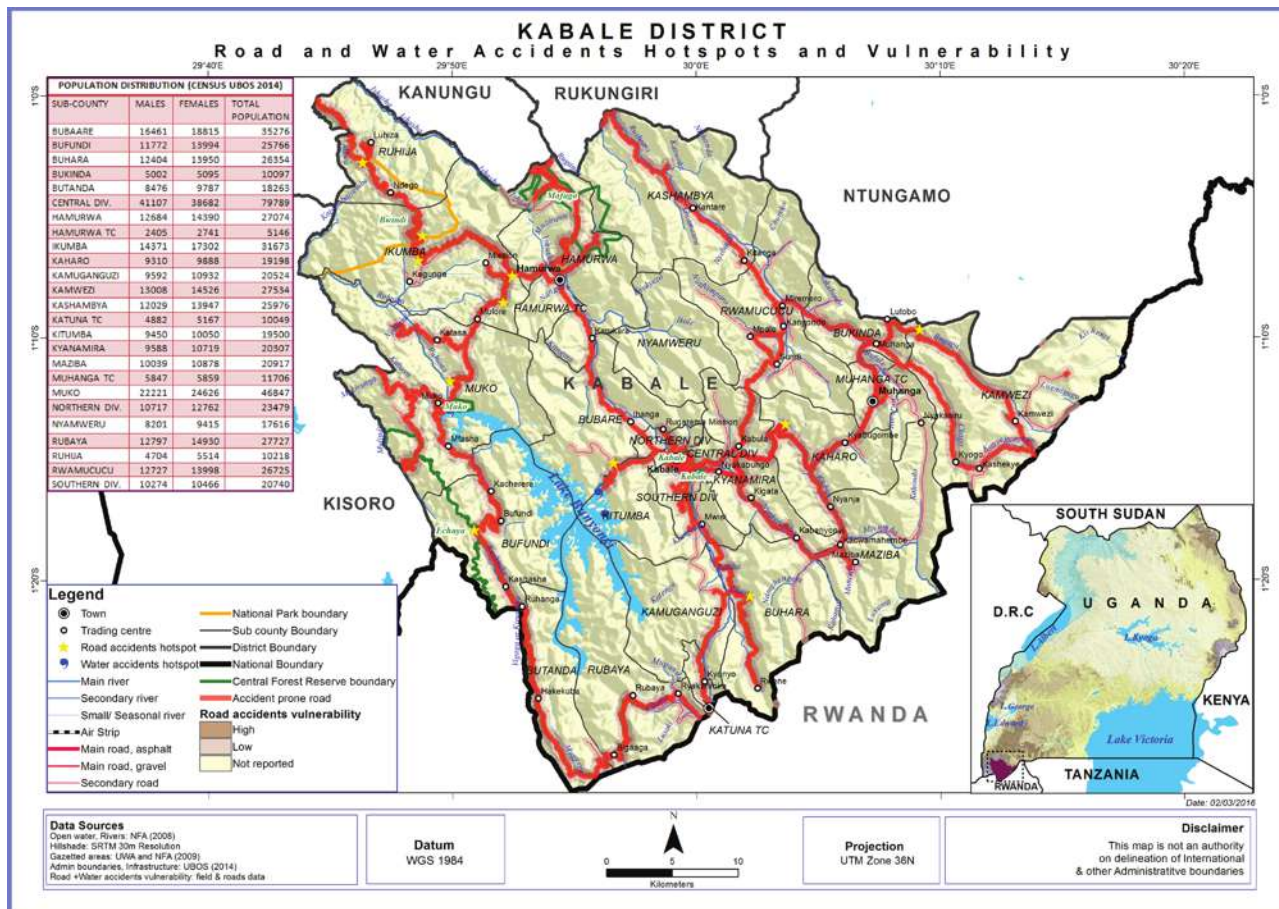
Figure 20: Road and Water Accidents Hotspots and Vulnerability, Kabale District

4.5 VULNERABILITY PROFILE

Vulnerability depends on low capacity to anticipate, cope with and/or recover from a disaster and is unequally distributed in a society. The vulnerability profile of Kabale District were assessed based on exposure, susceptibility and adaptive capacity at community (village), parish, sub-county and district levels highlighting their sensitivity to a certain risk or phenomena. Indeed, vulnerability was divided into biophysical (or natural including environmental and physical components) and social (including social and economic components) vulnerability. Whereas the biophysical vulnerability is dependent upon the characteristics of the natural system itself, the socio-economic vulnerability is affected by economic resources, power relationships, institutions or cultural aspects of a social system. Differences in socio-economic vulnerability can often be linked to differences in socio-economic status, where a low status generally means that you are more vulnerable.

Vulnerability was assessed basing on two broad criteria i.e. socio-economic and environmental components of vulnerability. Participatory approach was employed to assess these vulnerability components by characterizing the exposure agents, including hazards, elements at risk and their spatial dimension. Participants also characterized the susceptibility of the district including identification of the potential impacts, the spatial disposition and the coping mechanisms. Participants also identified the resilience dimension at different spatial scales (Table 2).

Table 3 (Vulnerability Profile) shows the relation between hazard intensity (probability) and degree of damage (magnitude of impacts) depicted in the form of hazard intensity classes, and for each class the corresponding degree of damage (severity of impact) is given. It reveals that climatological and meteorological hazards in form of drought and hailstorms predispose the community to high vulnerability state. The occurrence of pests and diseases and lightning, also create a moderate vulnerability profile in the community (Table 3). Table 4 shows Hazard assessment for Kabale District.

Table 2: Vulnerability Profile for Kabale District

	PROBABILITY	SEVERITY OF IMPACTS	RELATIVE RISK	VULNERABLE SUB COUNTIES
	Relative likelihood this will occur	*Overall Impact (Average)*	*Probability x Impact Severity*	
Hazards	1 = Not occur 2 = Doubtful 3 = Possible 4 = Probable 5 = Inevitable	1 = No impact 2= Low 3=medium 4 = High	0-1= Not Occur 2-10= Low 11-15=Medium 16-20= High	
Floods	4	4	16	The most affected sub-counties: Butanda Buhara Kitumba Kyanamira, Rubaya Bufundi,Kaharo, Maziba,Nyamweru and Bukinda
Droughts	2	2	4	The most affected sub-county is Kamwezi
Soil erosion, rock falls and landslides	5	4	20	All subcounties
Hail storms, Lightning and strong winds	4	3	12	The most affected sub-counties: Central Division, Butanda, Bubaare, Ikumba, Muko, Nyamweru and Ruhija
Bush fires	3	2	6	The most affected sub-counties: Mafuga in Hamurwa and Ikumba
Crop pests and diseases	4	3	12	The most affected sub-counties: Kaharo, Maziba, Bufundi, Hamurwa, Nyamweru, Kashambya, Bukinda Kamwezi and Rwamucucu
Livestock pests and diseases	4	3	12	The most affected sub-counties: Rubaya Kitumba, Maziba, Bubaare, Nyamweru and Kamwezi
Human Diseases outbreaks	5	2	10	The most affected sub-counties: Central , Southern and, Northern Divisions, Katuna TC, Muhanga TC, Hamurwa TC
Land conflicts	4	3	12	The most affected sub-counties: Central Division, Southern Division, Northern Division, Katuna TC, Muhanga TC, Hamurwa, Ikumba, Ruhija, Muko
Vermin and Wild-life animal attacks	5	4	20	The most affected sub-counties: Hamurwa, Ikumba, Ruhija and Muko
Earthquakes and faults	3	1	3	Enitre district
Road accidents	4	2	8	The most affected sub-counties: Central Division, Katuna TC, and Bukinda
Environmental degradation	4	4	16	The most affected sub-counties: Central Division, Southern Division, Northern Division, Katuna TC, Muhanga TC, Kitumba, Butanda, Bufundi, Hamurwa, Buhara, Bubaare, Rubaya and Muko
Invasive species	3	2	6	The most affected sub-counties: Buhara and Rubaya

Table 3: Components of Vulnerability in Kabale District

Vulnerability	Exposure			Susceptibility		Resilience	
	Hazards	Elements at Risk	Geographical Scale	Susceptibility	Geographical Scale	Coping strategies	Geographical Scale
	Landslides, Rock falls and Soil erosion	- Human and livestock adjacent to hill slopes - Crops on hill slopes - Infrastructure e.g. houses, schools, roads adjacent to hill slopes	Parish	- Loss of lives - Complete crop failure - Destruction of infrastructure e.g. homes, and schools	Parish	-Migration -Sensitization by both government and non-governmental agencies -Better Farming Methods like Fanya chin Fanya Juu – Planting Calliandra Planted Alongside Terraces, SLM plans	Parish
	Earth quakes	- Infrastructure e.g. houses, schools	District	- Loss of lives - Destruction of Infrastructure e.g. houses, schools	District	-No much measure so far -Proper house Designs, Sensitisation	District
	Floods	- Livestock adjacent to flood plain - Crops on flood plain - Infrastructure e.g. houses, schools, roads adjacent to flood plain	Parish	- Livestock loss - Destruction of crops - Destruction of infrastructure e.g. houses, schools, roads, bridges adjacent to flood plain	Parish	-Migration -Sensitization on wetland conservation -Dig trenches	Parish
	Drought	- Livestock - Crops - Human population	Village	- Hunger & poverty - Livestock loss - Crop failure - Shortage of pasture - Shortage of water	Village	-Migration -Sensitization on tree planting -Buy food from elsewhere	Village
	Hailstorms, strong winds and Lightning	- Human and livestock populations - Crops - Infrastructure e.g. houses, schools, health centres	Parish	- Loss of lives - Destruction of crops - Destruction of infrastructure e.g. houses, schools, roads adjacent to flood plain	Parish	-Plant Trees that act as Wind Breakers and Climate Modifiers	Parish
	Crop Pests and Diseases	-Crops	District	- Complete crop Failure, Food insecurity,	District	- Spraying - Cut and burry affected crops -Sensitization on crop disease management	District
	Livestock Pests and Diseases	-Livestock (cattle, goats etc.)	District	- Loss of livestock - Reduced livestock productivity	District	- Vaccination - Burry and burn animals that have died from infection - Quarantine	District
	Human Disease outbreaks	- Human Population	District	- Loss of lives, labor shortage, loss of income	District	- Mass Immunization - Use of mosquito nets, sensitization programs	District
Socio-economic component	Invasive species	-indigenous species -Animals, pastures	District	- Outcompete the indigenous spp., suppress growth of indigenous spp - Loss of indigenous spp. - Complete crop Failure - suppress growth of pasture	District	- Cut and burn -Sensitization on Invasive species management	District

Hazard	Elements at risk	Level	Effects	Level	Interventions	Level
Bush fires	- Livestock - Crops - Infrastructure e.g. houses, schools	Sub-county	- Loss of livestock - Shortage of pasture - Destruction of crops - Destruction of infrastructure e.g. houses, schools	Sub-county	-Sensitization, byelaw enforcement	Sub-county
Road accidents	- Human population - Infrastructure adjacent to accident black spots e.g. houses, schools etc.	Sub-county	- Loss of lives - Destruction of vehicles - Destruction of Infrastructure adjacent to accident black spots e.g. houses, schools etc.	Sub-county	-Humps on roads -Signage on speed limits -Sensitization on traffic rules	Sub-county
Land conflicts	- Human population	Village	-Loss of lives -Family violence and break outs	Village	- Community dialogue - District court in charge of land issues. -Proper surveying and Titling	Village
Vermin and Wildlife animal attacks	- Human population - Livestock - Crops	Parish	-Loss of lives -Livestock loss -Crop destruction	Parish	- Report to UWA - Guard gardens -Poison -Hunt and kill -Fence water collection points with Wildlife animals	Village
Environmental degradation	- Human and livestock populations - Crops - Natural vegetation	Sub-county	-Crop failure -Shortage of pasture -Shortage of water -Decline of water quality, decline in productivity,	Sub-county	-Sensitization on wetland conservation -Sensitization on tree planting as climate modifiers -Setting bye-laws enforcement. Sustainable land management programs	Sub-county
Landslides, Rock falls and Soil erosion	- Human and livestock adjacent to hill slopes - Crops on hill slopes - Infrastructure e.g. houses, schools, roads adjacent to hill slopes	Parish	- Loss of lives - Complete crop failure - Destruction of infrastructure e.g. homes, and schools	Parish	-Migration -Sensitization by both government and non-governmental agencies	
Earth quakes	- Infrastructure e.g. houses, schools	District	- Loss of lives - Destruction of Infrastructure e.g. houses, schools	District	-No much measure so far	
Floods	- Livestock adjacent to flood plain - Crops on flood plain - Infrastructure e.g. houses, schools, roads adjacent to flood plain	Parish	- Livestock loss - Destruction of crops - Destruction of infrastructure e.g. houses, schools, roads adjacent to flood plain	Parish	-Migration -Sensitization on wetland conservation -Dig trenches	
Drought	- Livestock - Crops - Human population	Village	- Hunger & poverty - Livestock loss - Crop failure - Shortage of pasture - Shortage of water	Village	-Migration -Sensitization on tree planting -Buy food from elsewhere, storage structures, grow food security crops	

Category	Hazard	Elements at risk	Level	Impacts	Level	Interventions
Environmental component	Hailstorms, strong winds and Lightning	- Human and livestock populations - Crops - Infrastructure e.g. houses, schools, health centres	Parish	- Loss of lives - Destruction of crops - Destruction of infrastructure e.g. houses, schools, roads adjacent to flood plain	Parish	Plant trees as windbreakers, lighting conductors at schools
	Livestock Pests and Diseases	-Livestock (cattle, goats etc.)	District	- Loss of livestock - Reduced livestock productivity	District	- Vaccination - Burry and burn animals that have died from infection - Quarantine
	Human Disease outbreaks	- Human Population	District	- Loss of lives	District	- Mass Immunization - Use of mosquito nets
	Invasive species	-indigenous species -Animals	District	- Outcompete the indigenous spp., suppress growth of indigenous spp - Loss of indigenous spp. - Complete crop Failure - suppress growth of pasture	District	- Cut and burn -Sensitization on Invasive species management
	Bush fires	- Livestock - Crops - Infrastructure e.g. houses, schools	Sub-county	- Loss of livestock - Shortage of pasture - Destruction of crops - Destruction of infrastructure e.g. houses, schools	Sub-county	-Sensitization
	Road accidents	- Human population - Infrastructure adjacent to accident black spots e.g. houses, schools etc.	Sub-county	- Loss of lives - Destruction of vehicles - Destruction of Infrastructure adjacent to accident black spots e.g. houses, schools etc.	Sub-county	-Humps on roads -Signage on speed limits -Sensitization on traffic rules
	Environmental degradation	- Human and livestock populations - Crops - Natural vegetation	Sub-county	-Crop failure -Shortage of pasture -Shortage of water -Decline of water quality	Sub-county	-Sensitization on wetland conservation -Sensitization on tree plating -Setting bi-laws. -Developing Land use Plans

Note: This table presents relative risk for hazards to which the community was able to attach probability and severity scores.

Key for Relative Risk

🟥	High
🟧	Medium
🟩	Low
	Not reported/ Not prone

Table 4: Hazard Risk Assessment

Hazard	Central Division	Northern Division	Southern Division	Buhara	Butanda	Kaharo	Kamuganguzi	Katuna T.C	Kitumba	Kyanamira	Maziba	Rubaya	Bubaare	Bufundi	Hamurwa	Hamurwa T.C	Ikumba	Muko	Nyamweru	Ruhija	Bukinda	Kamwezi	Kashambya	Muhanga T.C	Rwamucucu
Floods	M	M	M	H	H	M	H	M	H	H	M	H	M	H	M	M	M	M	M	H	M	H	M	M	M
Drought	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Landslides, Rock falls and Erosion	M	M	M	H	H	H	M	M	M	M	M	H	M	H	M	M	H	M	H	M	H	M	M	M	M
Strong winds, Hailstorms and Lightning	H	M	M	M	H	L	L	L	L	L	L	L	L	H	L	L	L	H	H	H	H	L	L	L	L
Crop pests and Diseases	M	M	M	M	M	H	M	M	M	M	H	M	M	H	H	M	M	H	M	M	H	H	H	M	H
Livestock pests and Diseases				L	L	L	L		H	L	H	H	H	L	L		L	L	H	L	L	H	L		L
Human disease outbreaks	H	H	H	L	L	L	L	H	L	L	L	L	L	L	L	H	L	L	L	L	L	L	L	H	L
Vermin and Wildlife animal attacks																	H	H		H					
Land conflicts	H	H	H	M	M	M	M	H	M	M	M	M	M	M	M	M	H	H	H	M	H	M	M	H	M
Bush fires															H			H							
Environmental degradation	H	H	H	M	H	L	H	L	H	M	M	H	H	H	H	M	M	H	M	L	M	M	L	M	M
Earthquakes and faults	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L	L
Water Accidents				H				H					H		H			H							
Road accidents	H	M	M				H									M					H			M	
Invasive species				M							M		L										L		

Key

H	High
M	Medium
L	Low
	Not reported/ Not prone

4.5.1 Gender and Age groups mostly affected by Hazards

Table 5: Gender and age groups mostly affected by hazards

Hazard	Gender and Age mostly affected
Drought	Affects mostly women and children since most water wells dry up increasing distance for fetching water
Erosion	All age groups and gender are affected
Hailstorms Lightning	All gender and age groups Children in schools are mostly affected
Crop pests and Diseases	All gender and age groups
Livestock pests and Diseases	African swine fever affects mostly women as most pigs belong to women but overall all groups are equally affected
Human disease outbreaks	Malaria mostly women and children HIV especially prominent in girl child Diarrhea and pneumonia in children
Vermin and Wildlife animal attacks	All gender and age groups
Land conflicts	All gender and age groups
Bush fires	All gender and age groups
Environmental degradation	All gender and age groups
Road accidents	All gender and age groups

4.5.2 Coping Strategies

In response to the various hazards, participants identified a range of coping strategies that the community employs to adjust to, and build resilience towards the challenges. The range of coping strategies are broad and interactive often tackling more than one hazard at a time and the focus of the communities leans towards adaptation actions and processes including social and economic frameworks within which livelihood and mitigation strategies take place; ensuring extremes are buffered irrespective of the direction of climate change and better positioning themselves to better face the adverse impacts and associated effects of climate induced and technological hazards (Table 2).

Table 6: Coping strategies to the Multi-hazards in Kabale District

No	Multi-Hazards		Coping strategies
1	Geomorphological or Geological	Landslides, Rock falls and Erosion	• Migration to safe areas • Terracing/ contour farming • Plant trees to control water movement on hill slopes • Mulching in banana plantations • Plant grass strips on production land
2		Earthquakes and faults	• Designs of houses (pillars) • Early warning system • Vigilance • Sensitization • Emergency response mechanisms
3	Climatological or Meteorological	Floods	• Digging up of trenches in the flood plains • Planting trees to control water movement to flood plains • Migration to other areas • Seek for government food aid • Restoration of Wetlands as Catchment Areas.
4		Drought	• Leave wetlands as water catchments • Plant trees as climate modifiers • Buy food elsewhere in case of shortage • Buy water from the nearby areas • Food Storage especially dry grains • Plant drought resistant crops
5		Strong winds, Hailstorms and Lightning	• Plant trees as wind breakers • Use of stakes against wind in banana plantations • Use of ropes to tire banana against wind • Installation of Lightning conductors • Stay indoors during rains • Changing building designs and roof types • Removal of destroyed crops • Request for aid from the Office of the Prime Minister • Installation of Lightning conductors on newly constructed schools

6		Crop pests and Diseases	• Spraying pests • Cutting and burying BBW affected crops • Burning of affected crops • Vigilance
7		Livestock pests and Diseases	• Spraying pests • Vaccinations • Burying animals that have died from infection • Quarantine • Community sensitization
8	Ecological or Biological	Human epidemic Diseases	• Mass immunisation • Visiting health centres • Use of mosquito nets • Promote sanitation and Hygiene in homes • Community sensitization
9		Vermin and Wild-life animal attacks	• Guarding the gardens • Poisoning • Hunt and kill • Report to UWA • Hugo group • Mauritius thorns • Plant tea as buffer • Dig trenches • Chain link • Plant red pepper as buffer • Recommend vermin guards
10		Invasive species	• Uproot • Spray with herbicides (e.g 2-4-D) • Biological control (e.g beetles) • Cut and burn • Sensitization on Invasive species management • Blacklisting exotic species

11		Land conflicts	• Community dialogues • Report to court • Migration • Resettlement • Surveying and titling • Strengthen Land management structures • Sensitization on land ownership • Proper demarcation (live fencing)
12		Bush fires	• Stop the fires in case of fire outbreak • Fire lines (may be constructed, cleared grass) • Fire breaks planted along gardens e.g. euphorbia spp. • Vigilance especially in dry seasons where most burning is done • Bye-laws • Sensitization on dangers of fires
13	Human induced or technological	Road accidents	• Construction of humps • Road Signage including speed limits • Separate lanes on sharp corners • Sensitisation • Widen narrow roads • Plant trees on road reserve, as road guards • Deployment of Traffic officers
14		Environmental degradation	• Leave wetlands as water catchments • Plant appropriate tree species as climate modifiers • Sensitization • Bye-laws • Enforcement • Gazatte and demarcate wetlands • Restore wetlands and other fragile ecosystems • EIA for new developments • No land titles for wetland areas • Cancellation of existing wetland land titles • Developing land use plans and enforce them

GENERAL CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The multi-hazard vulnerability profile output from this assessment was a combination of spatial modeling using socio-ecological spatial layers (i.e. DEM, Slope, Aspect, Flow Accumulation, Land use, vegetation cover, hydrology, soil types and soil moisture content, population, socio-economic, health facilities, accessibility, and meteorological data) and information captured from District Key Informant interviews and sub-county FGDs using a participatory approach. The level of vulnerability was assessed at sub-county participatory engagements and integrated with the spatial modeling in the GIS environment.

Results from the participatory assessment indicated that Kabale district has over the past two decades increasingly experienced hazards including rock falls, soil erosion, floods, drought, hailstorms, strong winds, Lightning, crop pests and diseases, livestock pests and diseases, human disease outbreaks, vermin, wildlife animal attacks, invasive species, bush fires and land conflicts putting livelihoods at increased risk. Generally landslides and flooding were identified as most serious problem in Kabale district with almost all sub-counties being vulnerable to the hazards. The limited adaptive capacity (and or/resilience) and high sensitivity of households and communities in Kabale district increase their vulnerability to hazard exposure necessitating urgent external support.

Hazards experienced in Kabale district can be classified as:

i. Geomorphological or Geological hazards including; landslides, rock falls, soil erosion and earth quakes.

ii. Climatological or Meteorological hazards including; floods, drought, hailstorms, strong winds and Lightning.

iii. Ecological or Biological hazards including; crop pests and diseases, livestock pests and diseases, human disease outbreaks, vermin and wildlife animal attacks and invasive species.

iv. Human induced or Technological hazards including; bush fires, road accidents land conflicts.

However, reducing vulnerability at community, local government and national levels should be a threefold effort hinged on:

i. Reducing the impact of the hazard where possible through mitigation, prediction, earlywarning and preparedness.

ii. Building capacities to withstand and cope with the hazards and risks.

iii. Tackling the root causes of the vulnerability such as poverty, poor governance, discrimination, inequality and inadequate access to resources and livelihood opportunities.

5.2 Policy-related Recommendations

The following recommended policy actions targeting vulnerability reduction include:

i. The government should improve enforcement of policies aimed at enhancing sustainable environmental health.

ii. The government through MAAIF should review the animal diseases control act because of low penalties given to defaulters.

iii. The government should establish systems to motivate support of political leaders toward

government initiatives and programmes aimed at disaster risk reduction.

iv.   The government should increase awareness campaigns aimed at sensitizing farmers/ communities on disaster risk reduction initiatives and practices.

v.   The government should revive disaster committees at district level and ensure funding of disaster and environmental related activities.

vi.   The government through UNRA and the District Authority should fund periodic maintenance of feeder roads to reduce on traffic accidents.

vii.   The government through MAAIF and the District Production Office should promote drought and disease resistant crop seeds.

viii. The government through OPM and Meteorology Authority should increase importation of Lightning conductors and also reduce taxes on their importation.

ix.   The government through OPM and Meteorology Authority should support establishment of disaster early warning systems.

x.   The government through MWE increase funding and staff to monitor wetland degradation and non-genuine agro-inputs.

xi.   The government through OPM should improve communication between the disaster department and local communities.

xii.   The government through MWE should promote Tree planting along road reserves.

xiii. The government through MAAIF should fund and recruit extension works at sub-county level.

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Focus group discussion at Kabale district Headquarters

Focus group discussion at Hamurwa Town Council headquarters

FOCUS GROUP DISCUSSION GUIDE FOR DISTRICT DISASTER RISK MANAGEMENT FOCAL PERSONS

Interviewer Team Name(s)	District:	GPS Coordinates	
	Sub- county:	X:	
	Parish:	Y:	
	Village:	Altitude	

No.	Name of Participants	Designation	Contact	Signature

Introduction

i. You have all been requested to this session because we are interested in learning from you. We appreciate your rich experiences and hope to use them to strengthen service delivery across the district and the country as whole in a bid to improve access to information on Hazards and early warning.

ii. There is no "right" or "wrong" answers to any of the questions. As a Focus Group Discussion leader, I will try to ask all people here today to take turns speaking. If you have already spoken several times, I may call upon someone who has not said as much. I will also ask people to share their remarks with the group and not just with the person beside them, as we anxious to hear what you have to say.

iii. This session will be tape recorded so we can keep track of what is said, write it up later for our report. We are not attaching names to what you have to what is said, so whatever you say here will be anonymous and we will not quote you by name.

iv. I would not like to keep you here long; at most we should be here for 30 minutes- 1 hour.

Section A: Geomorphological or Geological Hazards (Landslides, rock falls, soil erosion and earth quakes)

1. Which crops are majorly grown in your area of jurisdiction?

2. Which domestic animals are dominant in your area of jurisdiction?

3. What challenges are faced by farmers in your area of jurisdiction?

4. Have you experienced landslides and rock falls in the past 10 years in your area of jurisdiction?

5. Which villages, parishes or sub-counties have been most affected by landslide and rock falls?

6. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

7. Which crops are majorly affected by landslides and rock falls in your area of jurisdiction?

8. In which way are the crops affected by landslides and rock falls?

9. Which domestic animals are majorly affected by landslides and rock falls in your area of jurisdiction?

10. In which way are the domestic animals affected by landslides and rock falls?

11. Which agricultural practices are being adopted by farmers in a bid to mitigate the above challenges?

12. What are the relevant government's interventions focusing at helping farmers mitigate the challenges mentioned?

13. Do you have any earth faults or earth cracks as lines of weakness in your area of jurisdiction?

14. Have you experienced any earth quakes in the past 10 years in your area of jurisdiction?

15. Which particular villages, parishes or sub-counties have been majorly affected by earth quakes in your area of jurisdiction?

16. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

17. What impacts have been caused by earth quakes?

18. To what extent have the earth quakes affected livelihoods of the local communities in your area of jurisdiction?

19. Which mitigation measures have been adopted local communities in a bid to mitigate the above challenges?

20. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

Section B: Meteorological or climatological hazards (Floods, Droughts, Lightning, strong winds, hailstorms)

21. Have you experienced floods in the past 10 years in your area of jurisdiction?

22. Which villages, parishes or sub-counties have been most affected by floods?

23. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

24. Which crops are majorly affected by floods in your area of jurisdiction?

25. In which way are the crops affected by floods?

26. Which domestic animals are majorly affected by floods in your area of jurisdiction?

27. In which way are the domestic animals affected by floods?

28. Which agricultural practices are being adopted by farmers in a bid to mitigate the above challenges?

29. What are the relevant government's interventions focusing at helping farmers mitigate the challenges mentioned?

30. Have you experienced drought in the past 10 years in your area of jurisdiction?

31. Which villages, parishes or sub-counties have been most affected by drought?

32. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

33. Which crops are majorly affected by drought in your area of jurisdiction?

34. In which way are crops affected by drought?

35. Which domestic animals are majorly affected by drought in your area of jurisdiction?

36. In which way are the domestic animals affected by drought?

37. Which agricultural practices are being adopted by farmers in a bid to mitigate the above challenges?

38. What are the relevant government's interventions focusing at helping farmers mitigate the challenges mentioned?

39. Have you experienced hailstorms or Lightning in the past 10 years in your area of jurisdiction?

40. Which villages, parishes or sub-counties have been most affected by hailstorms or Lightning?

41. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

42. What impacts have been caused by hailstorms or Lightning?

43. To what extent have the hailstorms or Lightning affected livelihoods of the local communities in your area of jurisdiction?

44. Which mitigation measures have been adopted local communities in a bid to mitigate the above challenges?

45. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

Section C: Biological hazards (Crop pests and diseases, Livestock pests and Diseases, Invasive species, vermin and wild-life animal attacks)

46. Have you experienced any epidemic animal disease outbreaks in the past 10 years in your area of jurisdiction?

47. Which villages, parishes or sub-counties have been most affected by epidemic animal disease outbreaks?

48. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

49. Specify the epidemic animal disease outbreaks that have majorly affected animals in your area of jurisdiction?

50. Which domestic animals are majorly affected by epidemic animal disease outbreaks in your area of jurisdiction?

51. In which way are the domestic animals affected by epidemic animal disease outbreaks?

52. Which mitigation practices are being adopted by farmers in a bid to mitigate the above epidemic animal disease outbreaks?

53. What are the relevant government's interventions focusing at helping farmers mitigate the epidemic animal disease outbreaks mentioned?

54. Have you experienced any crop pests and disease outbreaks in the past 10 years in your area of jurisdiction?

55. Which villages, parishes or sub-counties have been most affected by epidemic animal disease outbreaks?

56. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

57. Specify the crop pests and disease outbreaks that have majorly affected animals in your area of jurisdiction?

58. Which crops are majorly affected by crop pests and disease outbreaks in your area of jurisdiction?

59. In which way are the crops affected by crop pests and disease outbreaks?

60. Which mitigation practices are being adopted by farmers in a bid to mitigate the above crop pests and disease outbreaks?

61. What are the relevant government's interventions focusing at helping farmers mitigate the crop pests and disease outbreaks mentioned?

62. Have you experienced any epidemic human disease outbreaks in the past 10 years in your area of jurisdiction?

63. Specify the epidemic human disease outbreaks that have majorly affected animals in your area of jurisdiction?

64. In which way are the humans affected by epidemic human disease outbreaks?

65. Which mitigation measures have been adopted by local communities in a bid to mitigate the above epidemic human disease outbreaks?

66. What are the relevant government's interventions focusing at helping local communities mitigate the epidemic human disease outbreaks mentioned?

67. Do you have any national park or wildlife reserve in your area of jurisdiction?

68. Have you experienced wildlife attacks in the past 10 years in your area of jurisdiction?

69. Which particular villages, parishes or sub-counties have been majorly affected by wildlife attacks in your area of jurisdiction?

70. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

71. What impacts have been caused by wildlife attacks?

72. To what extent have the wildlife attacks affected livelihoods of the local communities in your area of jurisdiction?

73. Which mitigation measures have been adopted local communities in a bid to mitigate the above challenges?

74. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

75. Are there invasive species in your area of jurisdiction?

76. Specify the invasive species in your area of jurisdiction?

77. Which villages, parishes or sub-counties have been most affected by invasive species in your area of jurisdiction?

78. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

79. Which crops or animals are majorly affected by invasive species in your area of jurisdiction?

80. In which way are the crops or animals affected by invasive species?

81. Which mitigation practices are being adopted by farmers in a bid to mitigate the above invasive species?

82. What are the relevant government's interventions focusing at helping farmers mitigate the invasive species mentioned?

Section D: Human induced or Technological hazards (Land conflicts, bush and forest fires, road accidents, water accidents and environmental degradation)

83. Have you experienced environmental degradation in your area of jurisdiction?

84. What forms of environmental degradation have been experienced in your area of jurisdiction?

85. Which villages, parishes or sub-counties have been most affected by environmental degradation?

86. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

87. What impacts have been caused by environmental degradation?

88. Which measures have been adopted by local communities in a bid to mitigate the above challenges?

89. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

90. Have you experienced land conflicts in the past 10 years in your area of jurisdiction?

91. Which particular villages, parishes or sub-counties have been majorly affected by land conflicts in your area of jurisdiction?

92. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

93. What impacts have been caused by land conflicts?

94. To what extent have the land conflicts affected livelihoods of the local communities in your area of jurisdiction?

95. Which conflict resolution measures have been adopted local communities in a bid to mitigate the above challenges?

96. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

97. Have you experienced Road accidents in the past 20 years in your area of jurisdiction?

98. Which roads have experienced Road accidents?

99. What impacts have been caused by Road accidents?

100. To what extent have the Road accidents affected livelihoods of the local communities in your area of jurisdiction?

101. Which conflict resolution measures have been adopted local communities in a bid to mitigate the above challenges?

102. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

103. Have you experienced any serious bush and or forest fires in the past 10 years in your area of jurisdiction?

104. Which particular villages, parishes or sub-counties have been majorly affected by bush and or forest fires in your area of jurisdiction?

105. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

106. What impacts have been caused by serious bush and or forest fires?

107. To what extent have the serious bush and or forest fires affected livelihoods of the local communities in your area of jurisdiction?

108. Which mitigation measures have been adopted local communities in a bid to mitigate the above challenges?

109. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

FOCUS GROUP DISCUSSION GUIDE FOR LOCAL COMMUNITIES

Interviewer Team Name(s)	District:	GPS Coordinates	
	Sub- county:	X:	
	Parish:	Y:	
	Village:	Altitude	

No.	Name of Participants	Village/ Parish	Contact	Signature

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viii.   I would not like to keep you here long; at most we should be here for 30 minutes- 1 hour.

Section A: Geomorphological or Geological Hazards (Landslides, rock falls, soil erosion and earth quakes)

1.   Which crops are majorly grown in your community?

2.   Which domestic animals are dominant in your community?

3.   What challenges are faced by farmers in your community?

4. Have you experienced landslides and rock falls in the past 10 years in your community?

5. Which villages and parishes have been most affected by landslide and rock falls?

6. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

7. Which crops are majorly affected by landslides and rock falls in your community?

8. In which way are the crops affected by landslides and rock falls?

9. Which domestic animals are majorly affected by landslides and rock falls in your community?

10. In which way are the domestic animals affected by landslides and rock falls?

11. Which agricultural practices are being adopted by farmers in a bid to mitigate the above challenges?

12. What are the relevant government's interventions focusing at helping farmers mitigate the challenges mentioned?

13. Do you have any earth faults or earth cracks as lines of weakness in your community?

14. Have you experienced any earth quakes in the past 10 years in your community?

15. Which particular villages, parishes or sub-counties have been majorly affected by earth quakes in your community?

16. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes that have been most affected?

17. What impacts have been caused by earth quakes?

18. To what extent have the earth quakes affected livelihoods of the local communities in your community?

19. Which mitigation measures have been adopted local communities in a bid to mitigate the above challenges?

20. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

Section B: Meteorological or climatological hazards (Floods, Droughts, Lightning, strong winds, hailstorms)

21. Have you experienced floods in the past 10 years in your community?

22. Which villages and parishes have been most affected by floods?

23. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

24. Which crops are majorly affected by floods in your community?

25. In which way are the crops affected by floods?

26. Which domestic animals are majorly affected by floods in your community?

27. In which way are the domestic animals affected by floods?

28. Which agricultural practices are being adopted by farmers in a bid to mitigate the above challenges?

29. What are the relevant government's interventions focusing at helping farmers mitigate the challenges mentioned?

30. Have you experienced drought in the past 10 years in your community?

31. Which villages and parishes have been most affected by drought?

32. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

33. Which crops are majorly affected by drought in your community?

34. In which way are crops affected by drought?

35. Which domestic animals are majorly affected by drought in your community?

36. In which way are the domestic animals affected by drought?

37. Which agricultural practices are being adopted by farmers in a bid to mitigate the above challenges?

38. What are the relevant government's interventions focusing at helping farmers mitigate the challenges mentioned?

39. Have you experienced hailstorms or Lightning in the past 10 years in your community?

40. Which villages and parishes have been most affected by hailstorms or Lightning?

41. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

42. What impacts have been caused by hailstorms or Lightning?

43. To what extent have the hailstorms or Lightning affected livelihoods of the local communities in your community?

44. Which mitigation measures have been adopted local communities in a bid to mitigate the above challenges?

45. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

Section C: Biological hazards (Crop pests and diseases, Livestock pests and Diseases, Invasive species, vermin and wild-life animal attacks)

46. Have you experienced any epidemic animal disease outbreaks in the past 10 years in your community?

47. Which villages and parishes have been most affected by epidemic animal disease outbreaks?

48. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

49. Specify the epidemic animal disease outbreaks that have majorly affected animals in your community?

50. Which domestic animals are majorly affected by epidemic animal disease outbreaks in your community?

51. In which way are the domestic animals affected by epidemic animal disease outbreaks?

52. Which mitigation practices are being adopted by farmers in a bid to mitigate the above epidemic animal disease outbreaks?

53. What are the relevant government's interventions focusing at helping farmers mitigate the epidemic animal disease outbreaks mentioned?

54. Have you experienced any crop pests and disease outbreaks in the past 10 years in your community?

55. Which villages and parishes have been most affected by epidemic animal disease outbreaks?

56. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

57. Specify the crop pests and disease outbreaks that have majorly affected animals in your community?

58. Which crops are majorly affected by crop pests and disease outbreaks in your community?

59. In which way are the crops affected by crop pests and disease outbreaks?

60. Which mitigation practices are being adopted by farmers in a bid to mitigate the above crop pests and disease outbreaks?

61. What are the relevant government's interventions focusing at helping farmers mitigate the crop pests and disease outbreaks mentioned?

62. Have you experienced any epidemic human disease outbreaks in the past 10 years in your community?

63. Specify the epidemic human disease outbreaks that have majorly affected animals in your community?

64. In which way are the humans affected by epidemic human disease outbreaks?

65. Which mitigation measures have been adopted by local communities in a bid to mitigate the above epidemic human disease outbreaks?

66. What are the relevant government's interventions focusing at helping local communities mitigate the epidemic human disease outbreaks mentioned?

67. Do you have any national park or wildlife reserve in your area of jurisdiction?

68. Have you experienced wildlife attacks in the past 10 years in your community?

69. Which particular villages and parishes have been majorly affected by wildlife attacks in your community?

70. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

71. What impacts have been caused by wildlife attacks?

72. To what extent have the wildlife attacks affected livelihoods of the local communities in your community?

73. Which mitigation measures have been adopted local communities in a bid to mitigate the above challenges?

74. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

75. Are there invasive species in your community?

76. Specify the invasive species in your community?

77. Which villages and parishes have been most affected by invasive species in your community?

78. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

79. Which crops or animals are majorly affected by invasive species in your community?

80. In which way are the crops or animals affected by invasive species?

81. Which mitigation practices are being adopted by farmers in a bid to mitigate the above invasive species?

82. What are the relevant government's interventions focusing at helping farmers mitigate the invasive species mentioned?

Section D: Human induced or Technological hazards (Land conflicts, bush and forest fires, road accidents, water accidents and environmental degradation)

83. Have you experienced environmental degradation in your community?

84. What forms of environmental degradation have been experienced in your community?

85. Which villages and parishes have been most affected by environmental degradation?

86. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

87. What impacts have been caused by environmental degradation?

88. Which measures have been adopted by local communities in a bid to mitigate the above challenges?

89. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

90. Have you experienced land conflicts in the past 10 years in your community?

91. Which particular villages and parishes have been majorly affected by land conflicts in your community?

92. As a way of ranking from Low, Medium, High and Very high, rank the villages and parishes that have been most affected?

93. What impacts have been caused by land conflicts?

94. To what extent have the land conflicts affected livelihoods of the local communities in your community?

95. Which conflict resolution measures have been adopted local communities in a bid to mitigate the above challenges?

96. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

97. Have you experienced Road accidents in the past 20 years in your community?

98. Which roads have experienced Road accidents?

99. What impacts have been caused by Road accidents?

100. To what extent have the Road accidents affected livelihoods of the local communities in your community?

101. Which conflict resolution measures have been adopted local communities in a bid to mitigate the above challenges?

102. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

103. Have you experienced any serious bush and or forest fires in the past 10 years in your community?

104. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or sub-counties that have been most affected?

105. What impacts have been caused by serious bush and or forest fires?

106. To what extent have the serious bush and or forest fires affected livelihoods of the local communities in your community?

107. Which mitigation measures have been adopted local communities in a bid to mitigate the above challenges?

108. What are the relevant government's interventions focusing at helping local communities mitigate the challenges mentioned?

FOCUS GROUP ATTENDANCE LIST FOR DISTRICT DISASTER RISK MANAGEMENT FOCAL PERSONS

Name of Participant	Designation	Contact
1. Mwebesa Beda	District Production Officer	0772358052
2. Twebaze Alex	District Planner	0772370506
3. Ayesiga Rhona		0772610298
4. Kyomukama Adios	Acting District Natural Resources Officer	0772421774
5. Kabagambe Bernard	Senior Veterinary Officer	0782665031
6. Mugisha James	Principal Assistant Secretary	0772676149
7. Matsiko M. Abert	Chief Administrative Officer	0703111298

FOCUS GROUP DISCUSSION ATTENDANCE LIST FOR LOCAL COMMUNITIES

Name of Participant	Village/Parish	Contact
1. Tugume Robinah	Hamurwa Town Council	0772524142
2. Muhwezi James	Hamurwa Town Council	0772310123
3. Nabaasa Daniel	Hamurwa Town Council	0773047862
4. Kirarira Ali	Ntaraga	0783941074
5. Tumutegyereze Marion	Mushanje	0777585741
6. Monday Wine	Nyamabale	0778502771
7. Biretwomugisha Benon	Kashaasha	0779141658
8. Arineitwe Jeturida	Nyaruhanga	0784854047
9. Tumukuratire Jesure	Kashaasha	0772703176
10. Tibatubuuka Stanley	Nyakabungo	-
11. Tumuheirwe Assumpta	Nyamabale	0773141325
12. Turinawe Eugenia	Nyakabungo	0775220545
13. Kagambo Benson	Kashaasha	0782921389
14. Turyahikayo Baker	Nyamabale	0772895094
15. Rumanzi Petero	Nyaruhanga	-
16. Karabahite	Nyaruhanga	-

Name of Participant	Village/Parish	Contact
17. Friday Gloria	Nyamabare	0777408851
18. Ayebazibwe Smollen	Mushanje	0780828340
19. Zigeri Johnson	Ikumba	0782891833
20. Kyomuhangi Lydia	Bugandara	0782605675
21. Kamugisha Deus	Bugandara	0773449634
22. Kiconco Oliver	Muchahi	0772086071
23. Nteze George	Muchahi	0774954973
24. Tushabomwe Jacenta	Bubaare	0774935460

SPATIAL DATA COLLECTION SHEET FOR HAZARD VULNERABILITY AND RISK MAPPING

Observer Name: Date:	District: Sub- county: Parish: Village:	Coordinates	
		X:	
		Y:	
		Altitude	

Slope characterization		**Bio-physical characterization**		**Vegetation characterization**		**Land use type (tick)** Bush
Slope degree (e.g 10, 20, …)		Soil Texture		Veg. cover (%)		Grassland
Slope length (m) (e.g 5, 10, …)		Soil Moisture		Tree cover (%)		Wetland
Aspect (e.g N, NE…)		Rainfall		Shrubs cover (%)		Tree plantation Natural forest
Elevation (e.g high, low…)		Drainage		Grass / Herbs cover (%)		Cropland Built-up area Grazing land
Slope curvature (e.g concave, covex…)		Temperature		Bare land cover		Others

Area Description (Susceptibility ranking: landslide, mudslide, erosion, flooding, drought, hailstorms, Lightning, cattle disease outbreaks, human disease outbreaks, land conflicts, wildlife conflicts, bush fires, earthquakes, faults/ cracks, pictures, any other sensitive features)

Available online: http://www.necoc-opm.go.ug/