THE REPUBLIC OF UGANDA

Buikwe District

Hazard, Risk and Vulnerability Profile

2016

ACKNOWLEDGEMENT

On behalf of Office of the Prime Minister, I wish to express my sincere appreciation to all of the key stakeholders who provided their valuable inputs and support to this Multi-Hazard, Risk and Vulnerability mapping exercise that led to the production of comprehensive district Hazard, Risk and Vulnerability (HRV) profiles.

I extend my sincere thanks to the Department of Relief, Disaster Preparedness and Management, under the leadership of the Commissioner, Mr. Martin Owor, for the oversight and management of the entire exercise.

The HRV assessment team was led by Ms. Ahimbisibwe Catherine, Senior Disaster Preparedness Officer supported by Ogwang Jimmy, Disaster Preparedness Officer and the team of consultants (GIS/DRR specialists); Dr. Bernard Barasa, and Mr. Nsiimire Peter, who provided technical support.

Our gratitude goes to UNDP for providing funds to support the Hazard, Risk and Vulnerability Mapping. The team comprised of Mr. Steven Goldfinch – Disaster Risk Management Advisor, Mr. Gilbert Anguyo - Disaster Risk Reduction Analyst, and Mr. Ongom Alfred-Early Warning system Programmemer.

My appreciation also goes to Buikwe District Team.

The entire body of stakeholders who in one way or another yielded valuable ideas and time to support the completion of this exercise.

Hon. Hilary O. Onek

Minister for Relief, Disaster Preparedness and Refugees

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 etc. 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: District Agricultural Officer, District Natural Resources Officer, District Health Inspector and District Planner while at sub-county level Key informants included: Sub-county and Parish Chiefs, Community Development mobilisers and health workers.

FGDs were carried out in five 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 Najja,Ngogwe,NjeruT.C,Nyenga,Ssi-Bukunja Sub-counties. 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-days regional data verification and validation workshop was organized by UNDP for the region. This involved key District DDMC focal persons for the purpose of creating local/district ownership of the profiles.

Multi-hazards experienced in Buikwe 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 Buikwe 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, road accidents and land conflicts putting livelihoods at increased risk. Floods,hailstorms, lightning, strong winds, crop pest and diseases, livestock and human diseases were identified as the most serious disasters in Buikwe District with almost all Sub-counties being vulnerable to the hazards. This is because the area is generally flat with no remarkable hills and part of it is a wetland.

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 Programmemes 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 OPM and Meteorology Authority 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 facilitate them.

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ACRONYMS

BBW	Banana Bacterial Wilt
AIDS	Acquired Immune Deficiency Syndrome
CAO	Chief Administrative Officer
DIA	District Internal Assessment
DDP	District Development Plan
HDW	Hand Dug wells
HLG	Higher Local government
HIV	Human Immuno Virus
LLG	Lower Local Government
LGMSD	Local Government Management service delivery
LRDP	Luweero - Rwenzori Development Project
LST	Local Service Tax
NDP	National Development Plan
OWC	Operation Wealth Creation
PPP	Public Private Partnership
UPE	Universal Secondary Education
USE	Universal Secondary Education
YLP	Youth Livelihood Programmeme
ARI	Acute Respiratory Infections
CBOs	Community Based Organizations
CSOs	Civil Society Organizations
DEAP	District Environment Action Plan
DPTC	District Technical Planning Committee
DTT	District Technical Team
ENR	Environment and Natural Resources
LEC	Local Environment Committee
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
STIs	Sexually Transmitted Infections
UBOS	Uganda Bureau of Statistics

UNCCD	United Nations Convention on Climate Change and Desertification
UNCCD	United Nations Convention on Combating Desertification
UNEP	United Nations Environment Programmeme
UNFCCC	United Nations Framework Convention on Climate Change
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 Programme
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 toward 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 as well as 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 report details methodological approach for HRV profiling and mapping for Buikwe District in Central 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 Buikwe District, Central 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 Buikwe 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 five sections: Section 1 provides Introduction on the assignment. Section 2 elaborates on the overview of Buikwe District. Section 3 focuses on the methodology employed. Section 4 elaborates the Multi-hazard, Risks and Vulnerability profile and Coping strategies for Buikwe District. Section 5 describes Conclusions and policy related recommendations.

OVERVIEW OF BUIKWE DISTRICT

2.1 Location

Buikwe District was carved out of Mukono District on 1st July 2009. The District lies between longitudes 00^0 21' N and latitudes 33^0 02' E. It is bordered by Kayunga District to the north, Jinja District to the East, Buvuma District the Southeast, the Republic of Tanzania to the South and Mukono District to the West. The district has 8 sub-counties and 4 Town Councils namely; Buikwe, Kawolo, Najja, Najjembe, Ngogwe, Nyenga, Ssi-Bukunja and Wakisi and Buikwe, Lugazi, Njeru, and Nkokonjeru Town Councils.

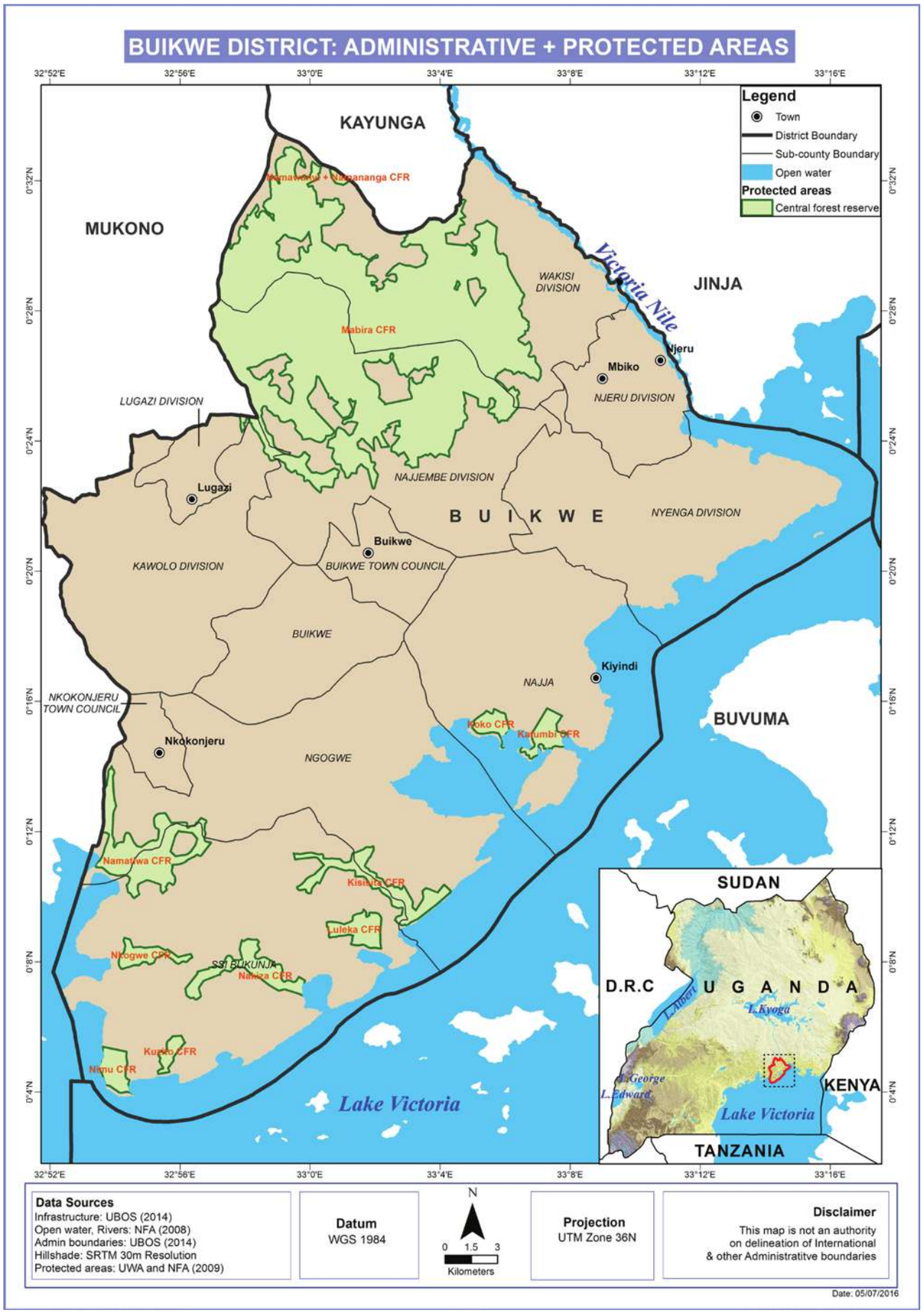


Figure 1: Administrative Boundaries and Gazetted areas, Buikwe District

2.1.1 Geomorphology

The northern part of the District is flat but the southern region consists of sloping land with great many undulations; 75% of the land is less than 60^{o} in slope. Most of Buikwe District lies on a high plateau (1000-1300) above sea level with some areas along Sezibwa River below 760m above sea level, Southern Buikwe is a raised plateau (1220-2440m) drained by River Sezibwa and River Musamya.

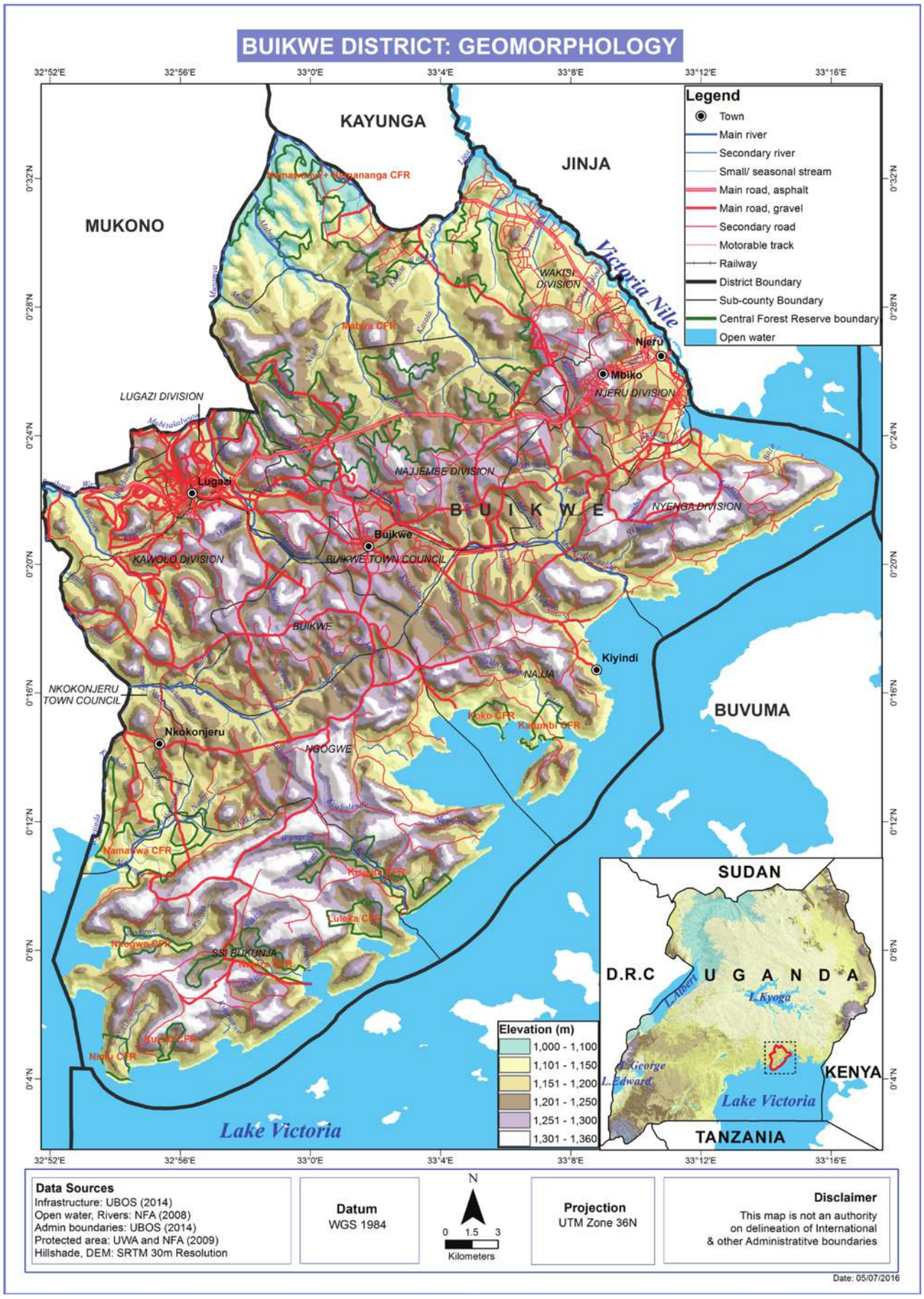


Figure 2: Geomorphology, Buikwe District

2.1.2 Soils and Geology

Soil types	Location by sub-county,
Buganda catena	Najjembe, Kawolo and Lugazi
Kyebe catena	Ngogwe, Nyenga, Njeru and Buikwe
Kifu series	Buikwe, Nyenga, Najjembe, Wakisi and Kawolo
Sango series	Buikwe, Najja, Ssi, Nkokonjeru and Ngogwe

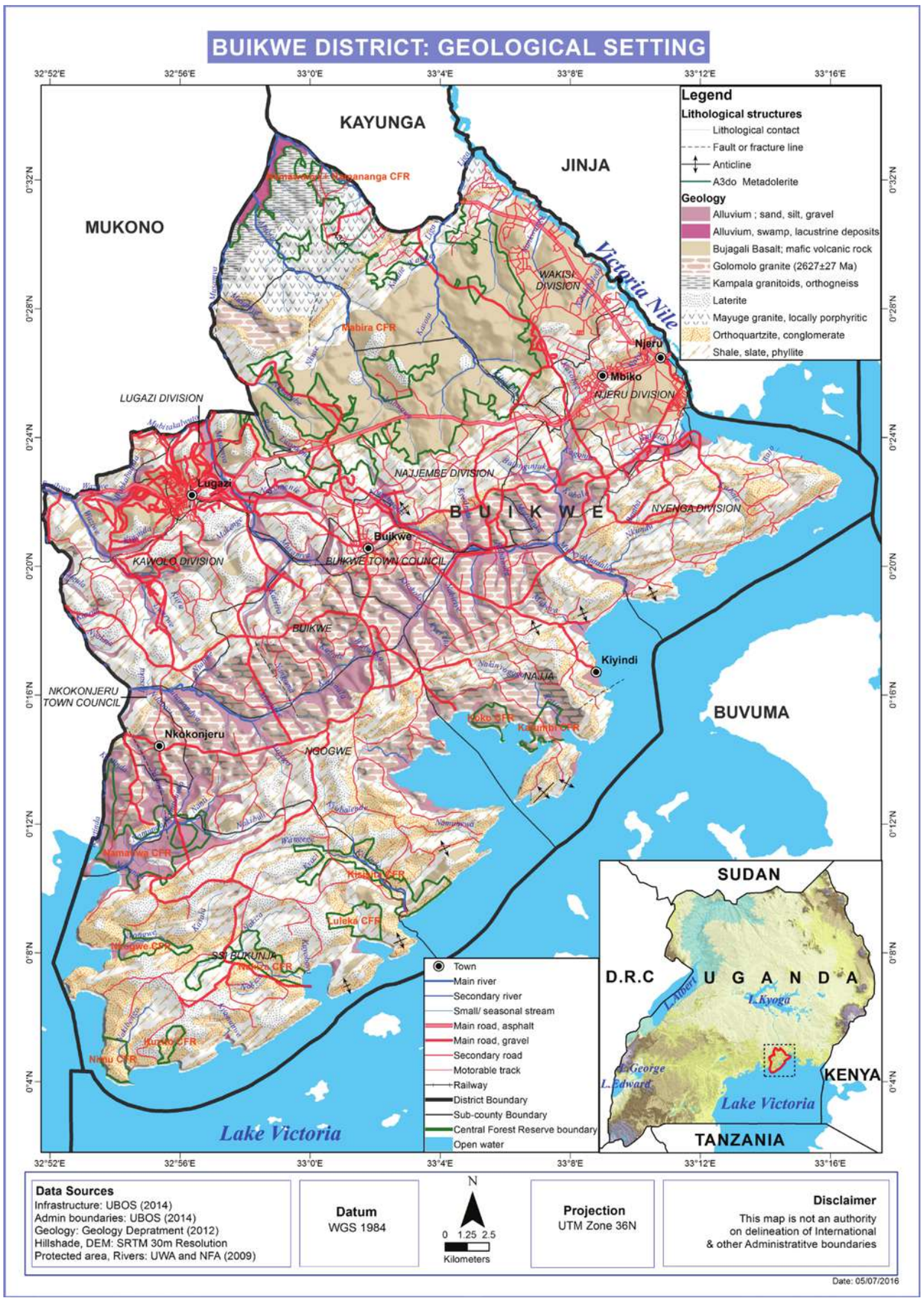


Figure 3: Geology and Lithological Structures, Buikwe District

2.1.3 Vegetation and Land use Stratification

Generally, the vegetation cover is of forest and savannah mosaic characterized by patches of dense forest in the South and scattered trees in shrubs and grassland of the North. Natural forests on private land and Government-controlled forests are a characteristic of this region. The wetland vegetation comprise of typha, miscanthus, hyparrhenia species, some cyperaceous and creepers, mostly convolvulaceae. Swamp forest tree species such as pseudospondias microcarpa, mitrogyra species, tarbementana, ficus spp, bridelia micrautha and phoenix reclinata shrub vegetation include some edible plants such as psidium guava and afromonium augustifolium. The several species found in the District are utilized by the local community for food, fuel, building materials, medicines and raw materials especially for crafts.

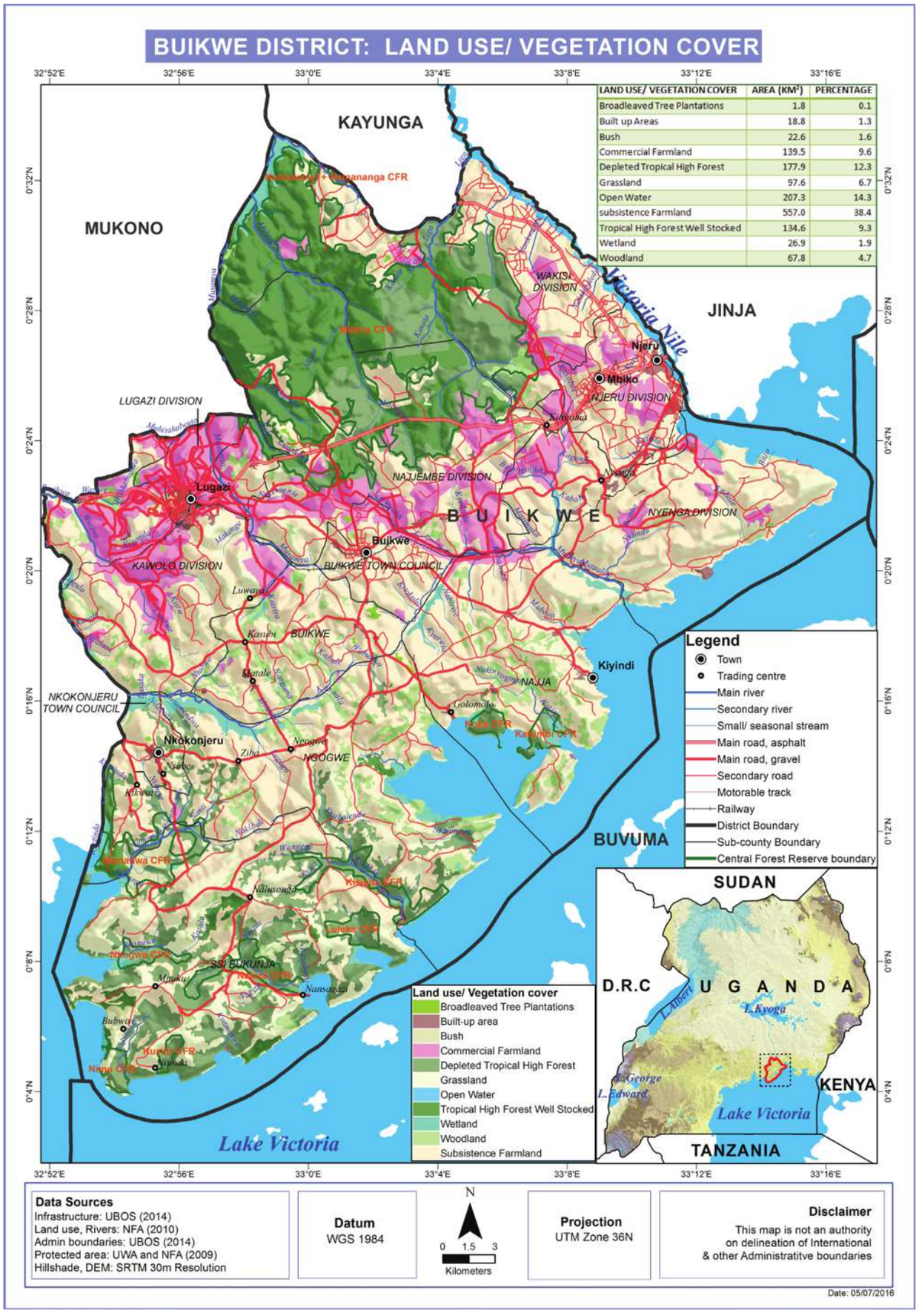


Figure 4: Land use Stratification, Buikwe District

2.1.4 Temperature and Humidity

Temperatures in Buikwe District range between 16^{o} C and 28^{o} C throughout the year.

2.1.5 Wind

2.1.6 Rainfall

The mean annual rainfall is 11,000mm distributed over 106 rain days, with peaks in March –May and September – November. Both relief and climate provide good potentials for investment in production of cash and food crops, horticulture and floriculture on a commercial basis. Existing commercial farms in the District also provide a good background for experience sharing for those investors who want to venture in such areas.

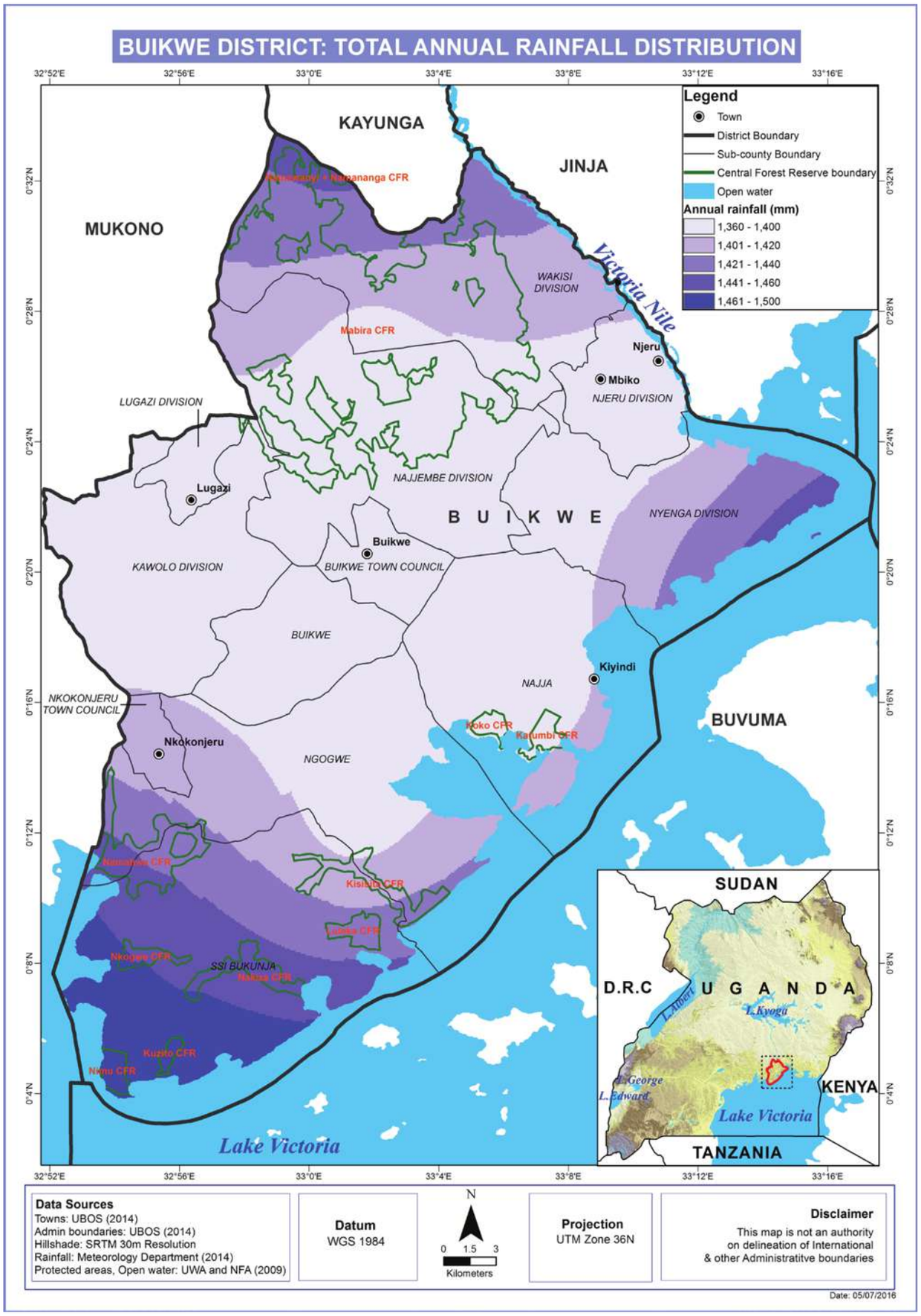


Figure 5: Total Annual Rainfall Distribution, Buikwe District

2.1.7 Hydrology

Buikwe District is well endowed with natural resources ranging from tropical and plantation forests in particular Mabira forest; and the largest fresh water inland Lake Victoria in the country with 52 landing sites - where fishing takes place for local consumption and sale. There are also three rivers namely Nile, Musamya, Sezibwa and other small streams.

2.1.8 Population

According to the National Population and Housing Census (2014) results, Buikwe District had a total population 436,406 people. Results also showed that most of the people in Buikwe District reside in rural areas (290,234 (66.5%) compared to (146,172 (33.5%) who reside in urban centers. The gender distribution was reported to be males: 213,443 (48.9%) and females: 222,963 (51.1%). About 95.1% (415,115) of the population form the household population and only 4.9% (21,291) is Non-household. Njeru Town Council had the highest population of 81,052 people while Nkokonjeru Town Council had the least population of 9,004 people (Figure 6). Table 1 shows the population distribution per sub-county for the different gender.

Table 1: Population Distribution in Buikwe District

	HOUSEHOLDS		POPULATION		
Sub-County	***Number***	***Average Size***	***Males***	***Females***	***Total***
Buikwe Town Council	3859	4.3	7881	8752	16633
Kawolo	9692	4.0	20242	20154	40396
Lugazi Town Council	9849	3.6	19057	20426	39483
Najjembe	8165	4.0	16798	16612	33410
Njeru Town Council	16502	4.2	38765	42287	81052
Nkokonjeru Town Council	2273	3.7	4228	4776	9004
Wakisi	9262	4.4	20091	20941	41032
Buikwe	3965	4.4	8613	9034	17647
Ssi Bukunja	6643	3.8	13012	12596	25608
Ngogwe	8080	4.4	17997	18129	36126
Najja	10307	4.5	22481	23871	46352
Nyenga	10804	4.5	24278	25385	49663

Source: UBOS Census 2014

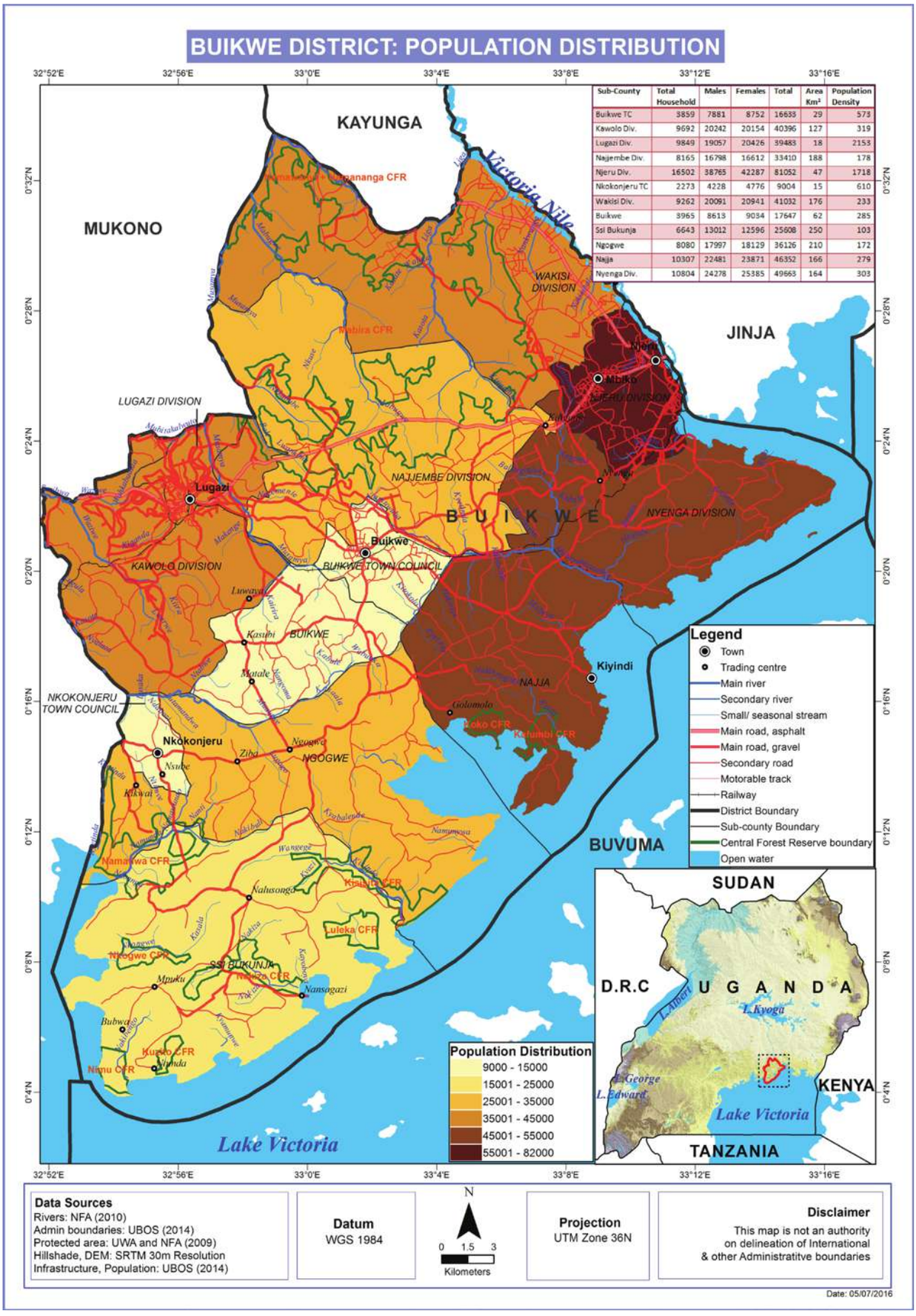


Figure 6: Population Distribution, Buikwe District

2.1.9 Economic activities

Over 80% of the District is agricultural based characterized by commercial and subsistence farmers. Commercial farming exists with SCOUL and Kasaku Tea Estates and these provide labor to quite a number of people especially from West Nile. More farmers are now engaged in crop production with the growing of coffee, banana, maize cassava and beans being dominant.

Participants reported that fishing is the largest economic activity in the Buikwe District. Given that almost three quarters of Buikwe's surface area is under water, this provides an adequate fish catchments area. To date a big number of fish processing industries in Kampala are fed by fish from the landing sites of Senyi and Kiyindi being the most vibrant. These have functional Beach Management Units though they still lack basic standards like landing jets, clean water and sanitation and challenged by unprecedented growth in makeshift structures along the shoreline.

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, floods, landslides, human, animal and crop diseases, pests, wildlife animal attacks, earthquakes, fires and 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, one Key Informant Interview comprising of three respondents (District Environment Officer, District Production Officer and District Agricultural Officer) was held at Buikwe District Headquarters (). At Sub-county level key informants included: Sub-county and Parish Chiefs and Community Development Officers.

FGDs were carried out in four purposively selected sub-counties that were ranked with the highest vulnerability. FGDs comprising of an average of 12 respondents (crop farmers, local leaders and cattle keepers) were conducted at Nyenga sub-county, Wakisi Sub-county, Buikwe Sub-county and Ngogwe Sub-county. 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 Mbale 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 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 Buikwe 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

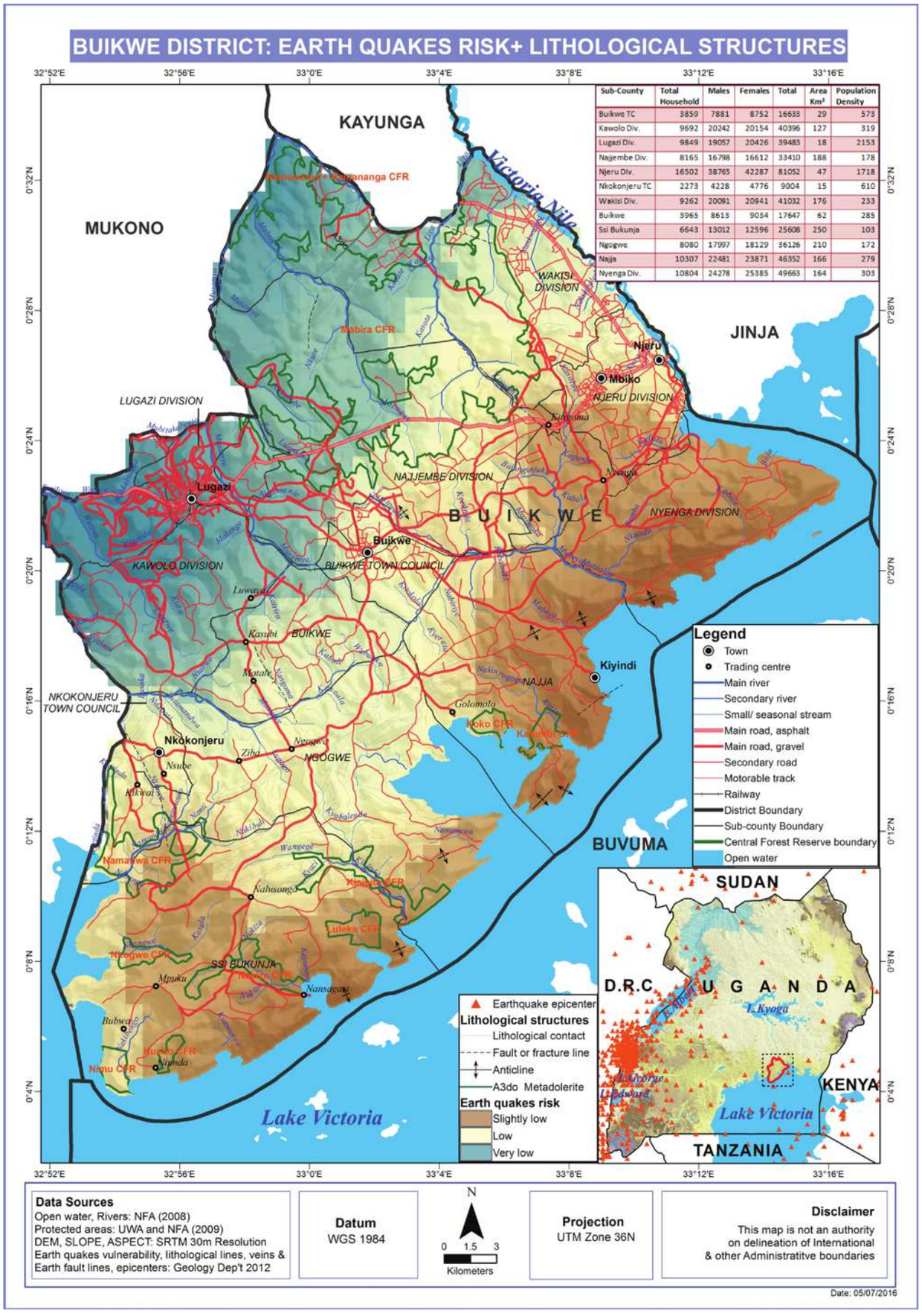
4.1.1 Landslides, Rock falls and soil erosion

Results from the participatory assessments indicated that there were incidences of rock fall at a heavy stone quarry in Nyenga and Ngogwe Sub-counties due to stone blasting using explosives instead of the recommended wet crashing. Flying stones from this stone quarry damages houses and also destroys crops. Cases of soil erosion were reported in hilly areas as well as lakeshore areas during heavy rains. Lakeshore areas were reported to have bare land as a result of some agriculture practice along lakeshores which exposes the soils to severe soil erosion. A WASH project Latrine constructed by ICEIDA collapsed early 2016 due to the soil wash away, sandy soils where the latrine was constructed are susceptible to collapse especially during heavy down pour. Soil erosion also causes silting of rivers and streams, washing away crops and causing soil fertility loss and consequent poor crop yield. The most affected crops due to soil erosion include maize, beans and cassava. It was indicated that livestock are also affected by soil erosion by washing away pasture and silting water source points. Figure 7 presents soil erosion prone areas generated by spatial modelling integrating field observations and 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).

Figure 7: Rock falls and Soil erosion prone areas, Buikwe District

4.1.2 Earthquakes and faults

Participants of the focus group discussion indicated that earthquakes weren't a serious problem in Buikwe District. However, it was observed that the entire district only experiences minor tremors experience on average once in 5 years. Faults have been on the on the increase due to stone blasting activities in Nyenga and Ngogwe Sub-counties. Figure 8 indicates areas where faults exist as vulnerable areas where earthquakes have more impact and the ranking is dependent on the distance from the faults and lithological veins.



Sub-County	Total Household	Males	Females	Total	Area Km²	Population Density
Buikwe TC	3859	7881	8752	16633	29	573
Kawolo Div.	9692	20242	20154	40396	127	319
Lugazi Div.	9849	19057	20426	39483	18	2153
Najjembe Div.	8165	16798	16612	33410	188	178
Njeru Div.	16502	38765	42287	81052	47	1718
Nkokonjeru TC	2273	4228	4776	9004	15	610
Wakisi Div.	9262	20091	20941	41032	176	233
Buikwe	3965	8613	9034	17647	62	285
Ssi Bukunja	6643	13012	12596	25608	250	103
Ngogwe	8080	17997	18129	36126	210	172
Naja	10307	22481	23871	46352	166	279
Nyenga Div.	10804	24278	25385	49663	164	303

Figure 8: Earth quakes Vulnerability, Fault lines, Buikwe District

4.2 Climatological and Meteorological Hazards

4.2.1 Floods

Results from the focus group discussions revealed that floods are one of the biggest challenges in the District especially during the rainy seasons. River floods were reported along Sezibwa in Ngogwe sub-county and other incidences of flooding are experienced along Lake Victoria shoreline due to rise in water levels such as areas along the Lake in Nyenga and Ssi-Bukunja (Kisisita area) Sub-counties. In early 2016, the Nyenga – Nile road was cut off due to heavy rains and floods. Kiyindi and Senyi landing sites were reported to flood every rainy season due to lake water level rise causing poor sanitary conditions as latrines get flooded with water and resultant poor hygiene and disease outbreaks. Participants observed that floods wash away and at times submerge crops such as tomatoes, cabbages, rice, yams, sweet potatoes and maize thus causing food insecurity and considerable economic losses. Figure 9 presents flood prone areas generated by spatial modelling integrating field observations and 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).

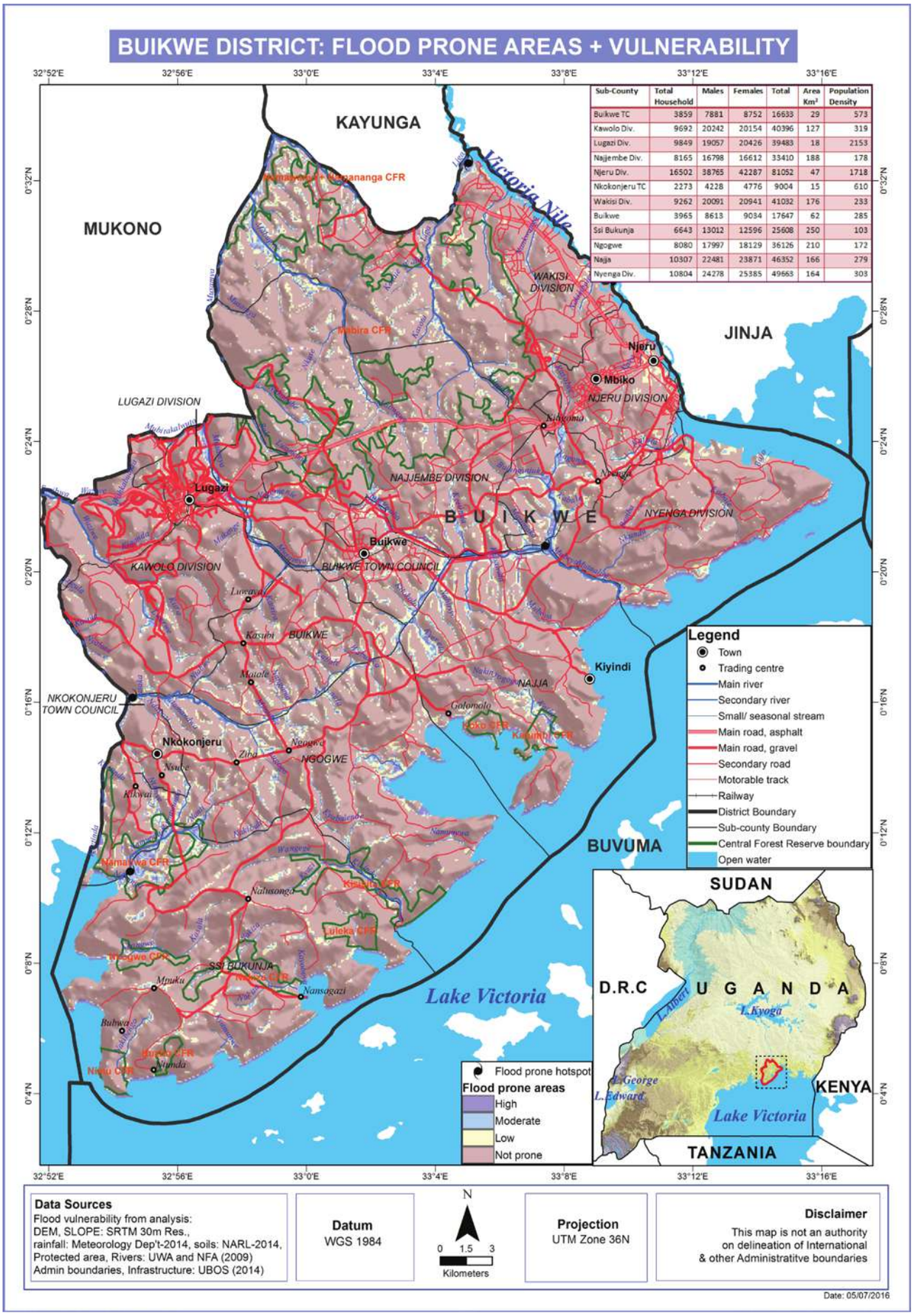
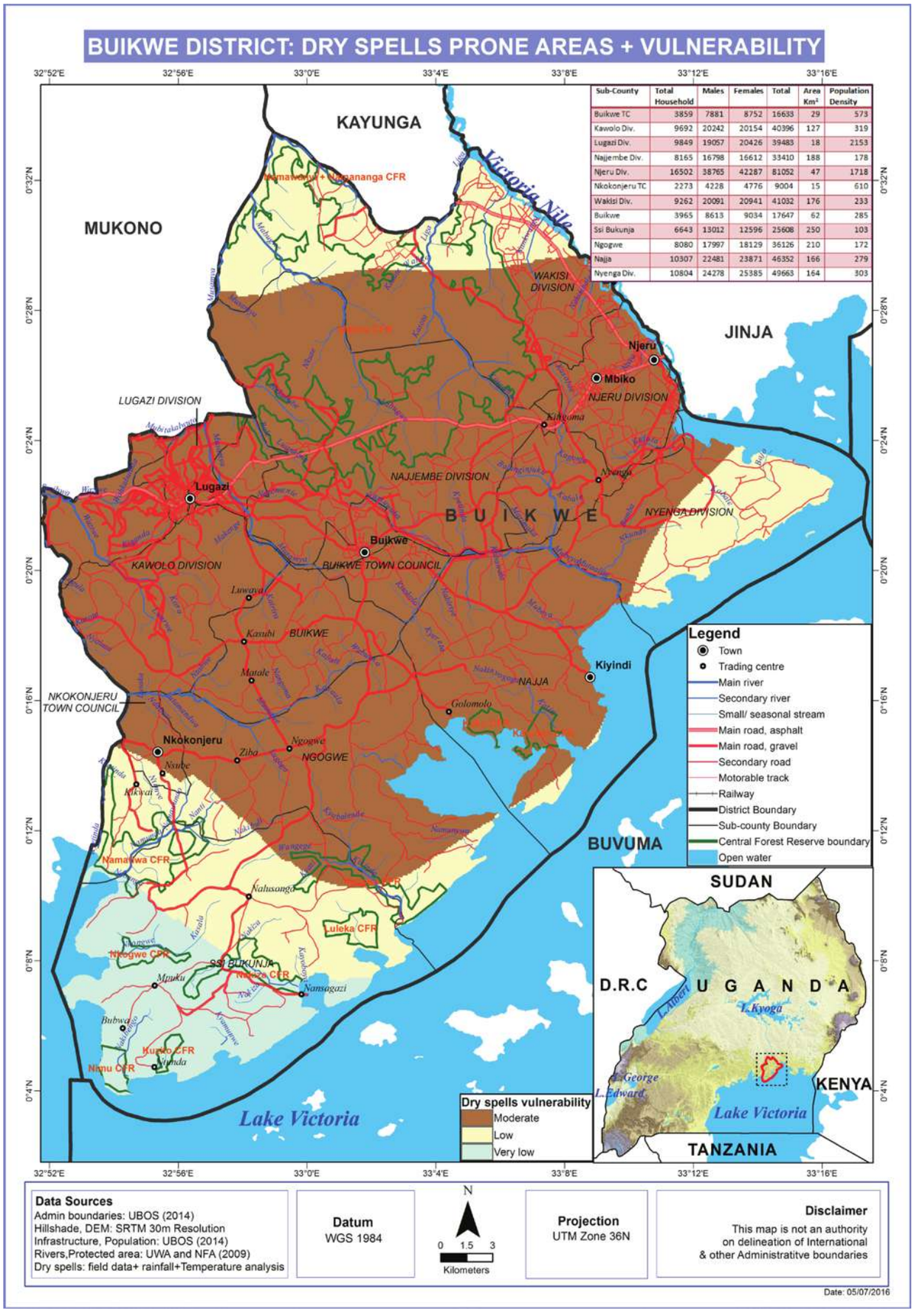


Figure 9: Flood prone areas and ranking, Buikwe District

4.2.2 Prolonged Dry spells

Participatory assessments through focus group discussions indicated that prolonged dry spells are not a serious problem in Buikwe District, although the District experiences minor dry spells causing the drying up of water sources areas far off Mabira forest. Participants observed that dry spells usually cause scarcity of water and pastures resulting into low milk and crop production and increased incidences of pests and diseases. The dry spells are attributed to climate change trends where rainy seasons area becoming unpredictable. Some of the areas falling under the rainfall shadow include: Najja, Lukalu and Kiyindi villages in Najja Sub-county. Dry spell vulnerability map generated from Rainfall and Temperature (Uganda National Meteorological Authority, 2014) using spatial modeling using socio-ecological spatial data using the Standardized Precipitation Index (Figure 10).



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Nyenga Div.	10804	24278	25385	49663	164	303

Figure 10: Dry spells prone areas and Vulnerability Ranking, Buikwe District

4.2.3 Hailstorms

Results from the participatory assessments indicate that hailstorms are a common occurrence at beginning of rainy seasons affecting almost the entire District. Participants observed that hailstorms come along with strong winds that destroy crops especially maize, cassava and banana plantations thus causing food insecurity and farmers have to replant in case the crops are destroyed. The most affected sub-counties include Ngogwe, and Buikwe (Figure 11).

4.2.4 Strong winds

The participants of the focus group discussions reported that strong winds are experienced at the onset of the rainy seasons. It was observed that strong winds blow off roof tops of houses as well as also uproot trees as well as banana plantations. Like Hailstorms, strong winds also affect the entire district. Incidences of strong winds were reported in Kiyaji village, Buikwe Sub-county where they destroyed crops and property in 2015. Strong cyclic winds (*ensoke*) were reported to be a serious threat at landing sites of Nyenga, Najja, Ngogwe and Ssi-Bukunja Sub-counties. The marine rescue boat at Kiyindi Landing site is always on standby in case of any such incidences.

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. Results from the participatory assessments indicated that there have been increased incidences of lightning occurrences in Buikwe District. Participants reported that in 2014, lightning struck Kalagala and Luwumbo Primary schools in Ngogwe and Buikwe Sub-counties respectively.

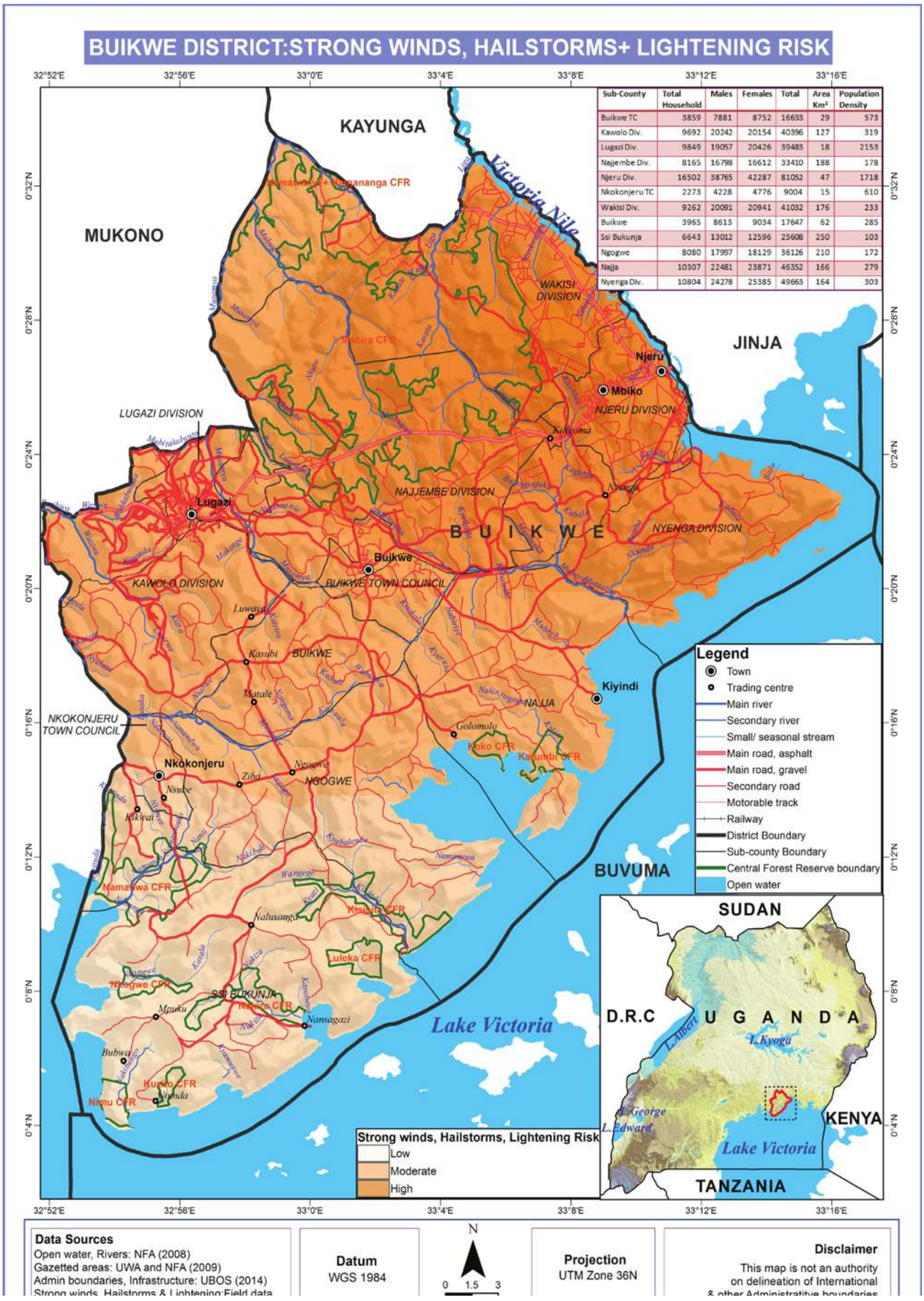

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Figure 11: Strong winds, Hailstorms and Lightning Hotspots and Vulnerability, Buikwe District

4.3 Ecological and Biological Hazards

4.3.1 Crop Pests and Diseases

Participatory assessments through focus group discussions indicated that the entire Buikwe District was vulnerable to crop pests and diseases. Banana and coffee plantations were the most affected by crop pests and diseases. The most prominent crop diseases are indicated as below in Table 2. It was reported that almost the entire District is affected by crop pests and diseases but especially Sub-counties of Ssi-Bukunja and Ngogwe (Figure 12).

Table 2: Common Crop diseases and pests

CROP	DISEASES	PESTS
Banana	Fusarium wilt, Banana Bacterial Wilt, sigatoka	Banana weevils and Nematodes
Coffee	Coffee wilt,	Coffee twig borer
Maize	Maize streak virus, maize smut	Weevils, maize stalk borer
Beans	Bean root rot, bean coral rot, bean anthracnose,	Weevils, aphids
Tomato	Blight	
G. nuts	Rosette disease	Aphids and Shrimps
Cassava	Cassava mosaic, Cassava Brown Streak Disease	Mites
Sweet potatoes	Viral disease	Weevils and caterpillars

Source: Department of Agriculture 2015

Some of the interventions on crop pests and diseases include: use of manure to make soils fertile, planting clean materials, cutting, burying and burning affected crops and planting of disease resistant varieties. Banana bacterial wilt has been reduced by early removal of the male bud, cutting and burying of the affected banana plants as well as promoting clean planting materials (Tissue culture plants). The government intervention of training farmers has been done by the crop extension officers especially on most BBW control measures and spraying. The District has 6 crop extension officers and District Plant Doctors. Government has provided of 1 million coffee seedlings for replanting given that coffee has been main cash crop in the district, but farmers can't afford to buy drugs for spraying. CABI established plant clinics, Sasakawa Global 2000, YARD, One Acre Fund, World vision, CARITAS- Lugazi Diocese, JICA are partners also involved in supporting farmers to control crop pests and

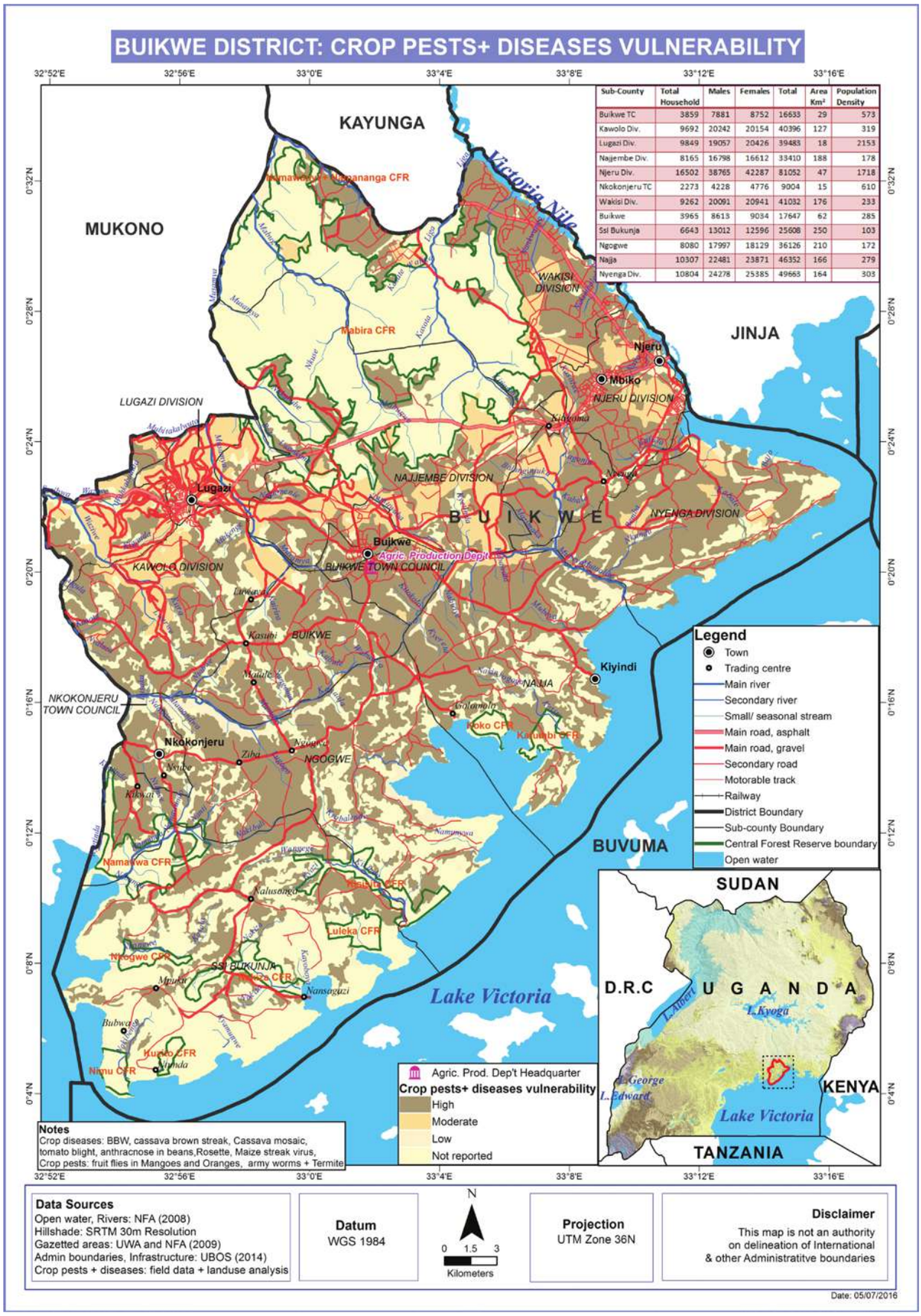

Figure 12: Crop Pests and Diseases Vulnerability, Buikwe District

4.3.2 Livestock Pests and Diseases

Results from the focus group discussions indicated that livestock parasites and diseases are a serious problem in Buikwe District especially during rainy seasons. Table 3 indicates the common livestock parasites, vectors and diseases in the sub-counties where they have been reported. Figure 13 indicates the livestock parasites, vectors and diseases vulnerability in Buikwe district.

Table 3: Common Livestock Diseases and PARASITES

LIVESTOCK	DISEASE	PARASITES/VECTORS	LOCATION
Cattle, goats, sheep, dogs, pigs	Foot and mouth disease, rabies, East coast fever, lumpy skin diseases, African swine fever, brucellosis, Nagana, jiggers	Tsetse flies, intestinal worms and flukes, ticks	Wakisi, Kawolo, Najjembe, Buikwe, Ssi-Bukunja, Ngogwe, Najja and Nyenga
Poultry	Newcastle, Fowl pox, Fowl typhoid, ,coccidiosis	Mites, Intestinal worms	Entire district

Source: Department of Production 2015

Some of the interventions on Livestock parasites and diseases include: massive vaccination organized by Buikwe District Local Government implemented by Veterinary Department, Environment management and quarantine. The District has 4 Veterinary Officers, 12 entomologists and 8 Fisheries Officers although some Sub-counties do not have any. The district has three operational animal clinics established in 3 Sub-counties of Najjembe (Kizigo Village-Kizigo Parish), Kawolo (Luyanzi-Towa Village-Kiteza Parish) and Buikwe (Kikoma Village-Ssugu Parish).

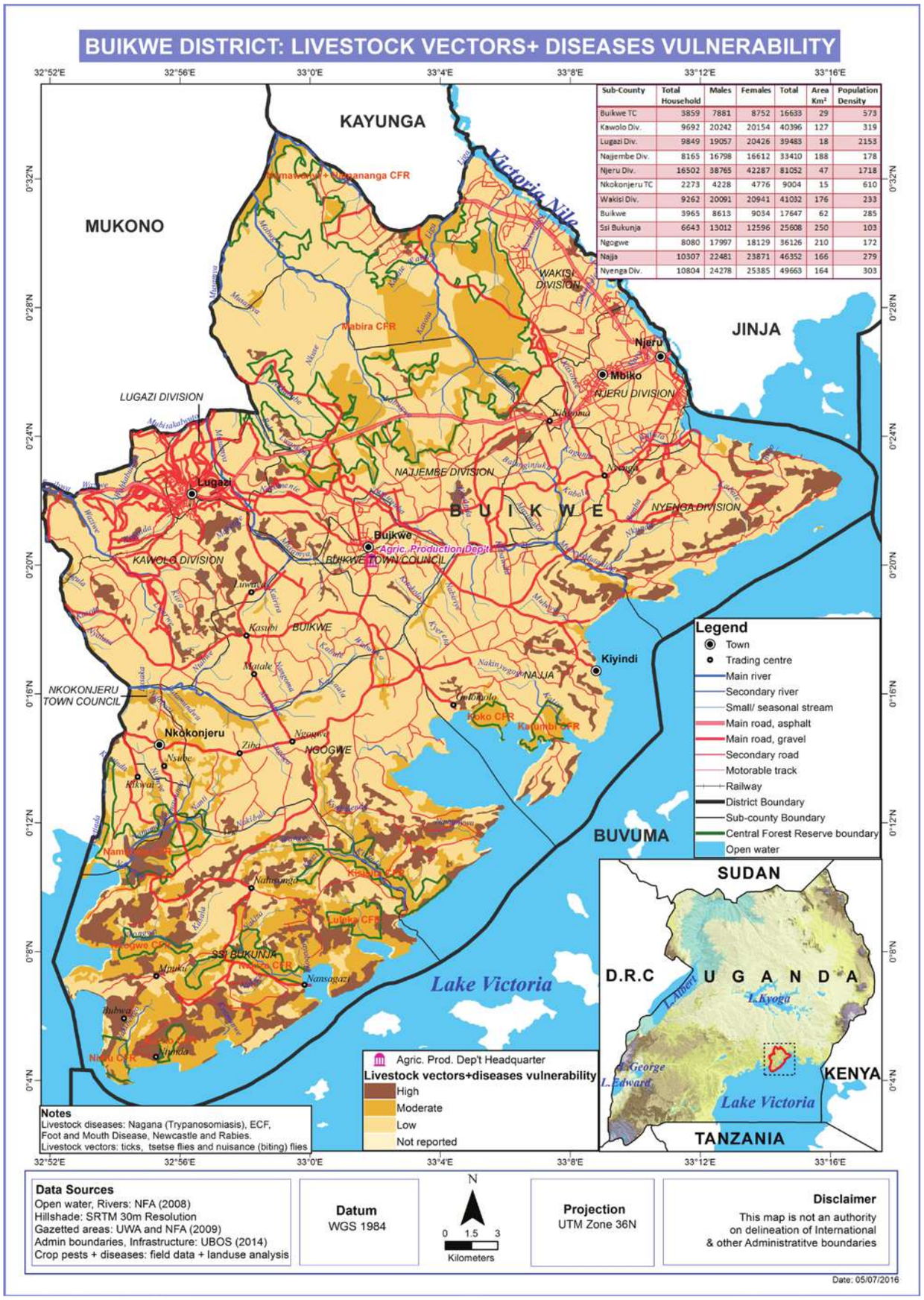

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Figure 13: Livestock Parasites, Vectors and Diseases Vulnerability, Buikwe District

4.3.3 Human Diseases outbreaks

The major diseases responsible for most deaths in the District are malaria, pneumonia, anemia, and other types of meningitis, septicemia, gastro-intestinal disorders, respiratory tract infections (RTI), diarrhoea, and HIV/ AIDS. The most recent human disease outbreak in Buikwe District is diarrhea and bilharzia especially at the landing sites. Figure 14 indicates the Human Disease Outbreaks Vulnerability.

Diagnosis in OPD(FY 2014/2015)	%	**Diagnosis in OPD(FY 2015/2016)**	
Malaria	32.4	Malaria	34.6
No pneumonia- cough or cold	25.1	No pneumonia- cough or cold	32.2
Intestinal worms	55.5	Intestinal worms	7.0
Pneumonia	5.6	Pneumonia	6.9
Skin diseases	3.2	Diarrhea	4.9
Diarrhea	2.9	Skin diseases	4.1
Urinary tract infections	2.6	Urinary tract infections	3.7
Other eye conditions	1.9	Other eye conditions	2.5
Other STIs	1.8	Ear Nose and throat conditions	2.5
Ear Nose and throat conditions	1.7	Other STIs	1.6

The sanitation and hygiene situation is not any better at some of the landing sites because there are no public latrines. This has increased the habit of open defecation resulting into sanitation related epidemics such as cholera, dysentery and diarrhoea.

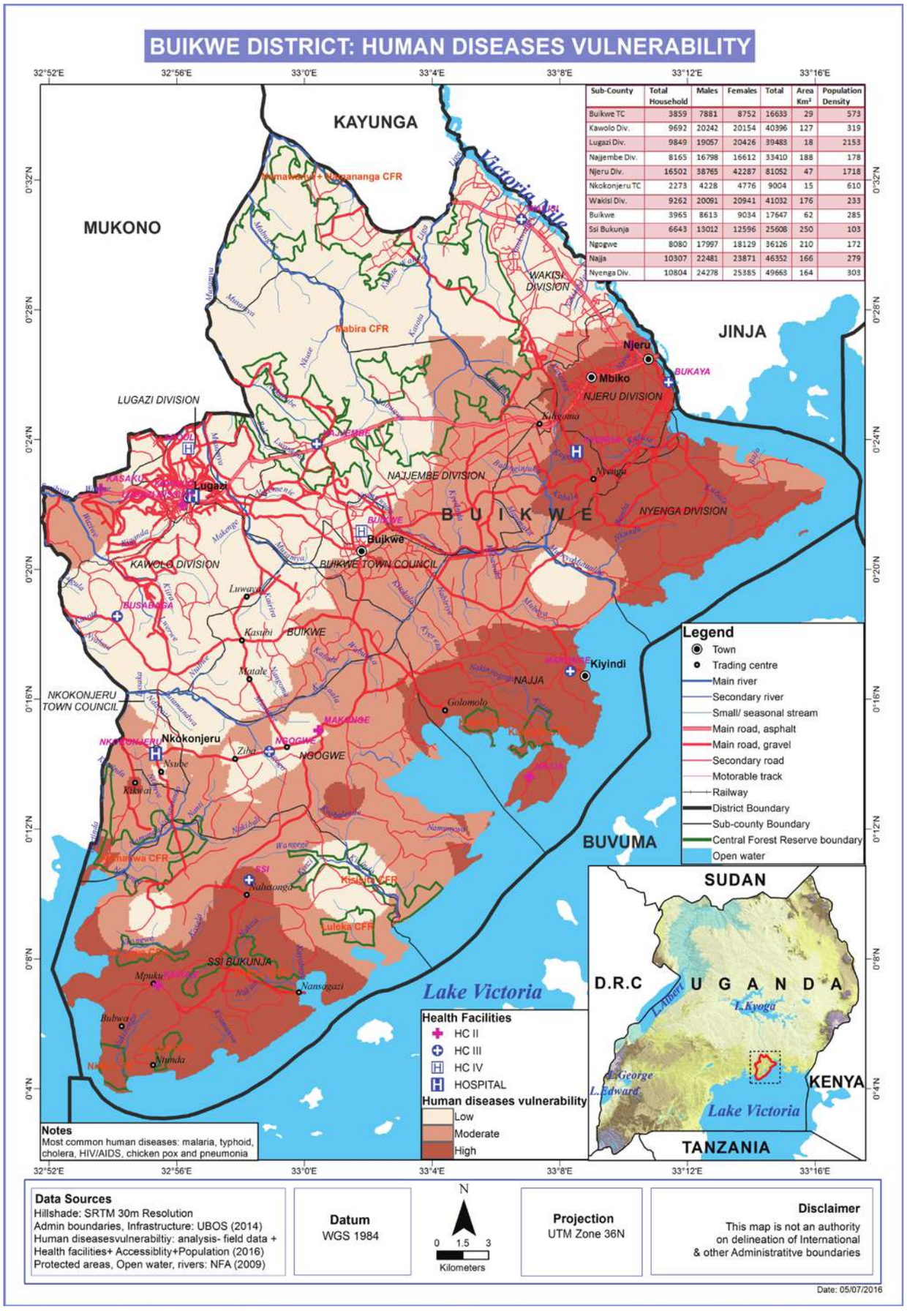

Figure 14: Human Disease Outbreaks, Buikwe District

4.3.4 Vermin and Wild-life Animal Attacks

Participatory assessments through focus group discussions indicated cases of vermin and wildlife animal attacks in Buikwe District. Wild-life attacks of primates, crocodiles and hippos were reported in the sub-counties of Nyenga, Najja, Ssi-Bukunja and Ngogwe where monkeys have been reported to destroy crops. In the recent past, 1 person was killed by a crocodile at Muvo- Kigugo Village, Ssi-Bukunja Sub-county. This area is known as a breeding area for crocodiles. Other incidences of crocodile attacks were reported in Nansagazi Village also in Ssi-Bukunja Sub-county. Some of the vermin reported include squirrels and mole rats also common along the forest reserves strewn all through the District. District vermin guards and UWA are occasionally called upon to chase the wild animals in case of an attack. In addition UWA has gazetted vermin such as monkeys and bush pigs. Figure 15 indicates Vermin, Wild-life animal attacks vulnerability in Buikwe District.

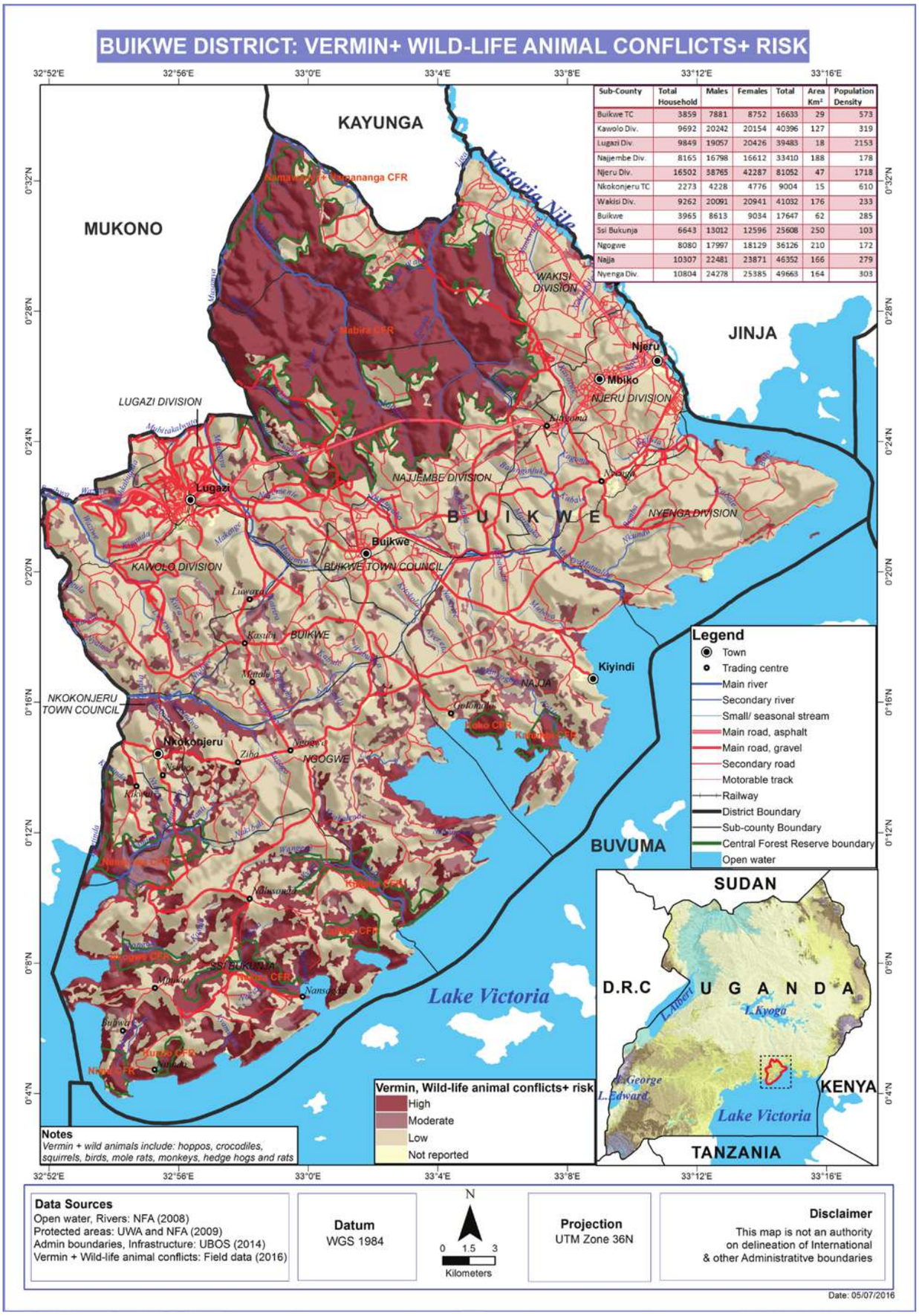

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Figure 15: Vermin, Wild-life animal attacks, Buikwe District

4.3.5 Invasive species

Results from the discussions indicated that Paper mulberry, *Lantana camara* and water hyacinth are the most common invasive species in Buikwe District. Paper mulberry has become a colonizer excluding all other plants especially evident in forests. Some of the intervention by National Forestry Authority on Paper mulberry is the current campaign of cutting it for fire wood. Participants also mentioned that *Lantana camara* normally dominates grazing lands and thus destroying pastures that would have been palatable for animals. Water hyacinth wide spread along the Lake Victoria and along the Nile River covering the open waters and affecting fish in the waters in the entire district. Figure 16 indicates Invasive Species Ranking in Buikwe District.

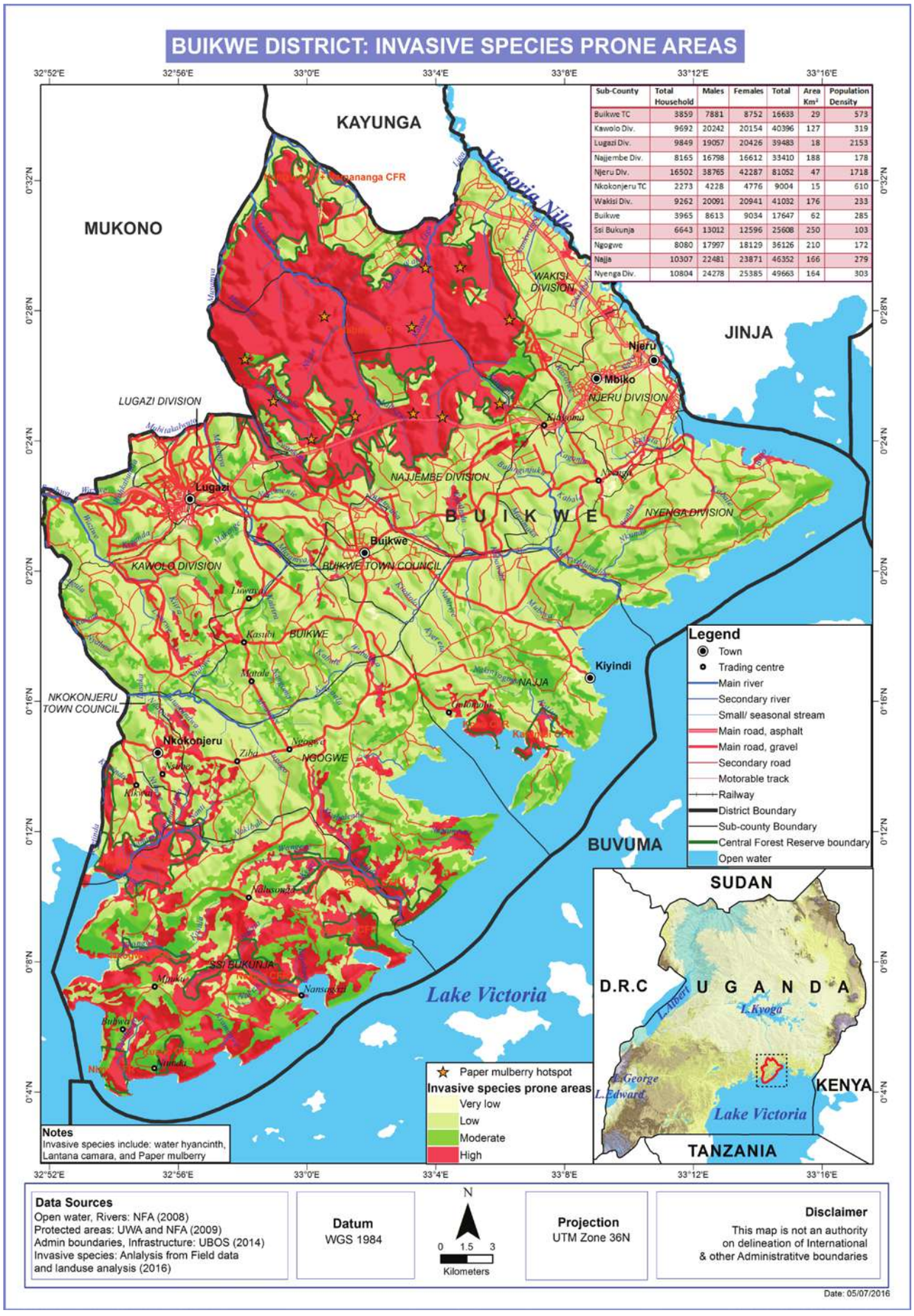

Figure 16: Invasive Species Ranking, Buikwe District

4.4 Human Induced and Technological Hazards

4.4.1 Bush and Forest Fires

Results from the participatory assessments indicated that fires including bush fires, forest fires, house fires and sugar cane fires were a serious problem in Buikwe District. Sugar cane harvesting using fires and burning of hastes was highlighted as one of the causes of fires in the district. In 2015, there was a serious fire in Koko forest that resulted from a hunting activity. Other cases of forest fires were reported in Kafuba forest in 2014 and also a school fire that burnt Kitega Parents' Primary School in 2015. Participants indicated that the main causes of fires in the District are hunting activities, agricultural practice of preparing land for crop farming and some incidences of management fires for sugar cane plantations. Figure 17 indicates fire risk areas and ranking in Buikwe District.

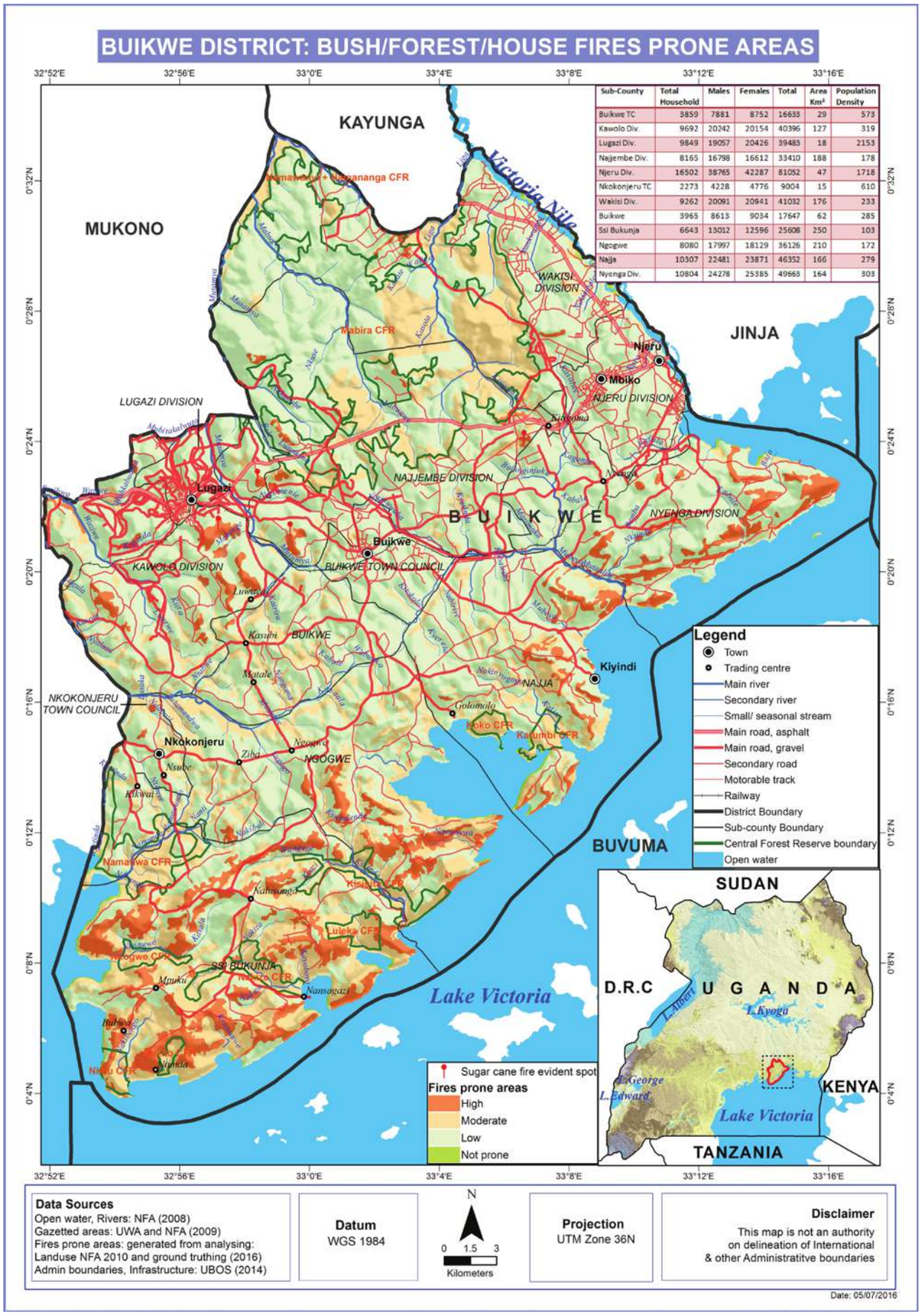

Figure 17: Fires Risk areas and Vulnerability Ranking, Buikwe District

4.4.2 Land conflicts

Participants indicated that land disputes were a serious problem in the entire Buikwe District. Most of the land conflicts in Buikwe District are between land lords and squatters (Tenants). Community and forest gazetted areas, boundary shifting of forest reserves yet forest reserves gazetted in 1932. Other forms of land conflicts in Buikwe District include inter-District boundary conflict between Buikwe and Mukono and also Buikwe and Jinja along the Bujagali dam souring the relationship between districts and causing loss of revenue. Figure 18 indicates land conflicts ranking in Buikwe District.

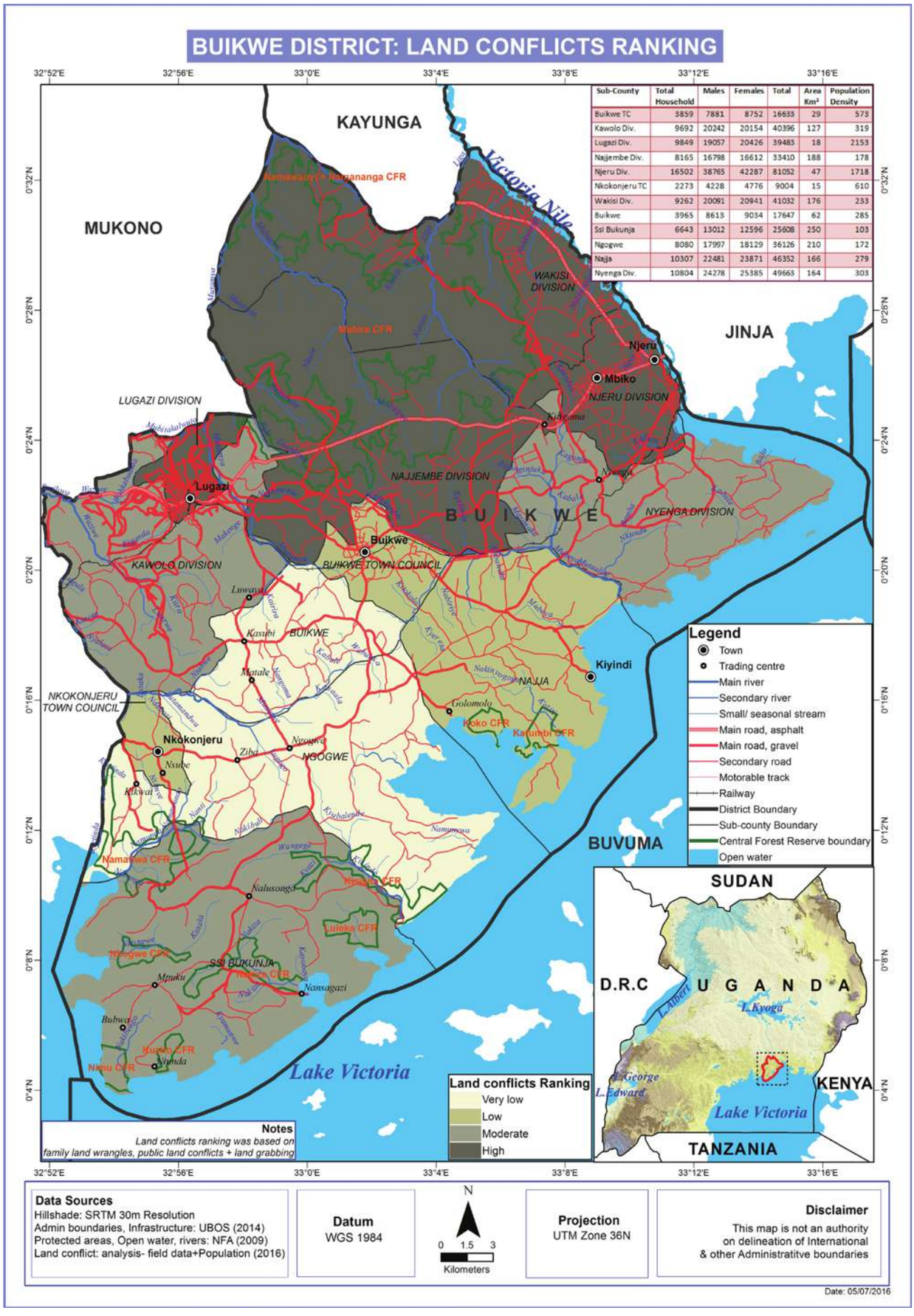

Figure 18: Land Conflicts Ranking, Buikwe District

4.4.3 Environmental Degradation

The district is richly endowed with natural resources ranging from land, wetlands, fisheries, minerals, forest/trees, wildlife (biodiversity), rivers and lakes. Tremendous pressure is currently exerted on these resources in an increasing way and the main drivers include high population growth, wetland reclaimation and conversion for agriculture, deforestation, brick making and sand mining. Deforestation in central forest reserves especially in Ssi-Bukunja as a result of few NFA staff (only one staff for the whole District in Mabira) on ground and people cut trees at night. Natural forests have been cut for wood fuel, timber, charcoal burning, brick making, tea factory using wood fuel and sugar cane growing (MEHTA). In addition to forest clearance, the sugar cane industry (SCOUL) produces lots of effluents onto R. Musamya, and also GM sugar in Mbiko. Other factories polluting the environment include steel scrap factories (7 factories), Nile breweries discharging effluents into the Nile and Bagasse shoot and air pollution.

Most of the wetlands are threatened with degradation and others with conversion into agriculture (sugar cane and rice growing) as well as settlements and 60% of wetlands are used for papyrus harvesting and 13% has been reclaimed and used for human settlement and other activities such as agriculture and livestock.

Cases of sand mining in wetlands and local brewing associated with use of wetland water for cooling but also discharge of effluents from the brewing. Sand mining along lake shore leaving open pits that usually fill up with water becoming accident prone spots, source of stagnant water as breeding ground for mosquitos. Soil degradation and exhaustion due to over cultivation is another form of environmental degradation in the District and as a result use of fertilizers especially for sugar cane growing, fertilizers end in fresh water streams flowing through the sugar cane estates and contaminate the water not safe for domestic use especially by down-stream users.

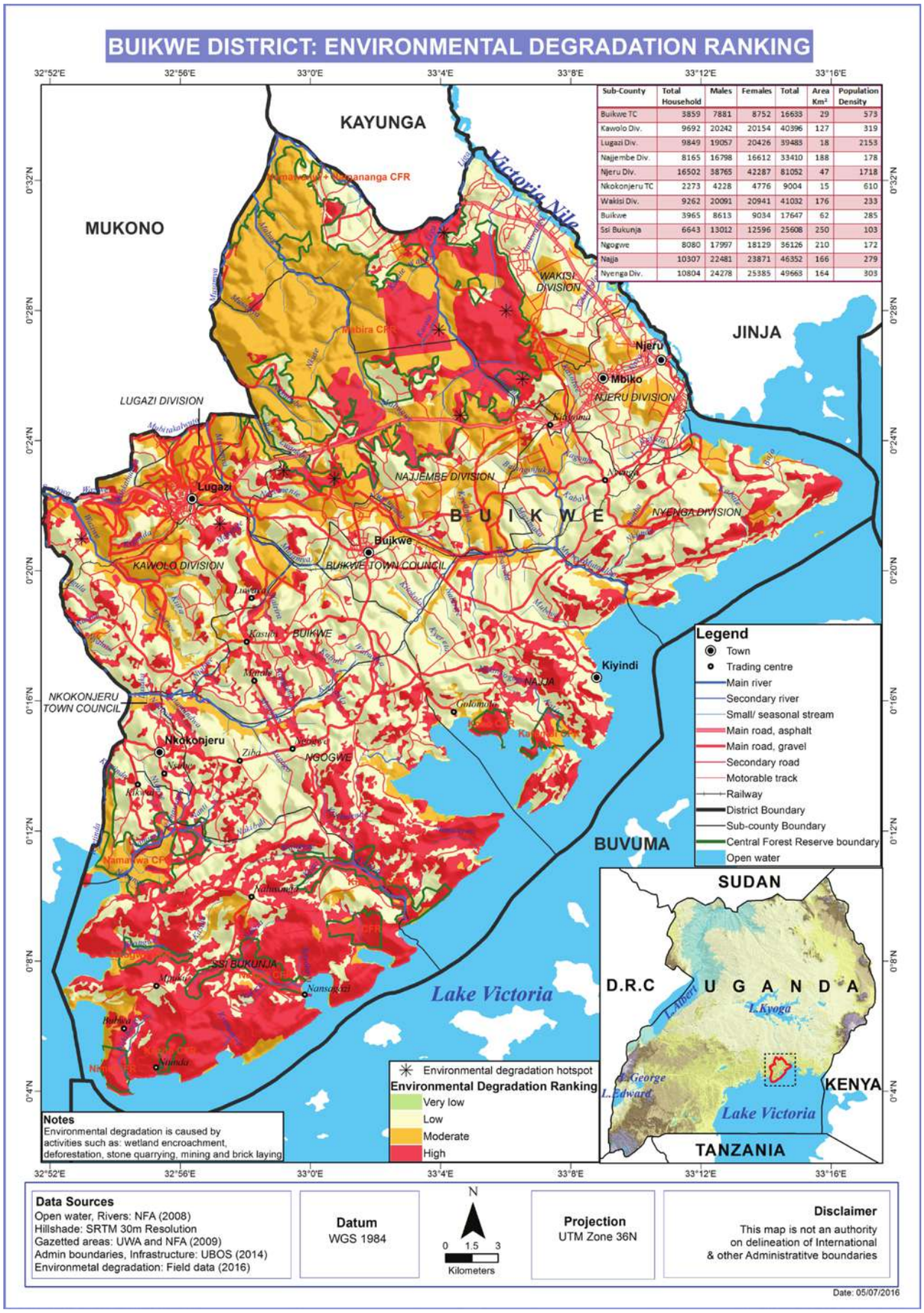

Figure 19: Environmental Degradation Ranking, Buikwe District

4.4.4 Road and Water Accidents

It was reported that road accidents such as head on collisions and vehicles overturning are common along Kampala –Jinja road. Boda-boda and vehicle accidents reported as the most common forms of road accidents in Buikwe District. Most of the black spots were reported to be along Kampala - Jinja road in Mabira forest. Reports showed that Buikwe registered the highest number of accidents on the Kampala- Jinja highway. Although there are traffic officers along the Kampala –Jinja highway, most accidents are due to over speeding and mechanical failures. The road surface is not even with potholes, and drivers usually come in free-wheeling making hard to brake consequently causing accidents.

Water accidents were reported to be on the increase especially during wet seasons (October – November) where strong winds become common on Lake Victoria causing engine failures and boats to capsize. The most prone areas are the open waters where waves gather momentum and getting stronger causing boats to capsize. Figure 20 indicates accident hotspots and risk areas in Buikwe District. Other forms of water accidents were reported to be caused by submerged rocks under water which are sometimes closer to the water level and are a threat to motorized boats and non-motorized boats. These destroy boats especially along the shallow waters. Some incidences of boat engine crashing and non-motorized boat knocking of the submerged rocks were reported at Busagazi village in Najja Sub-county.

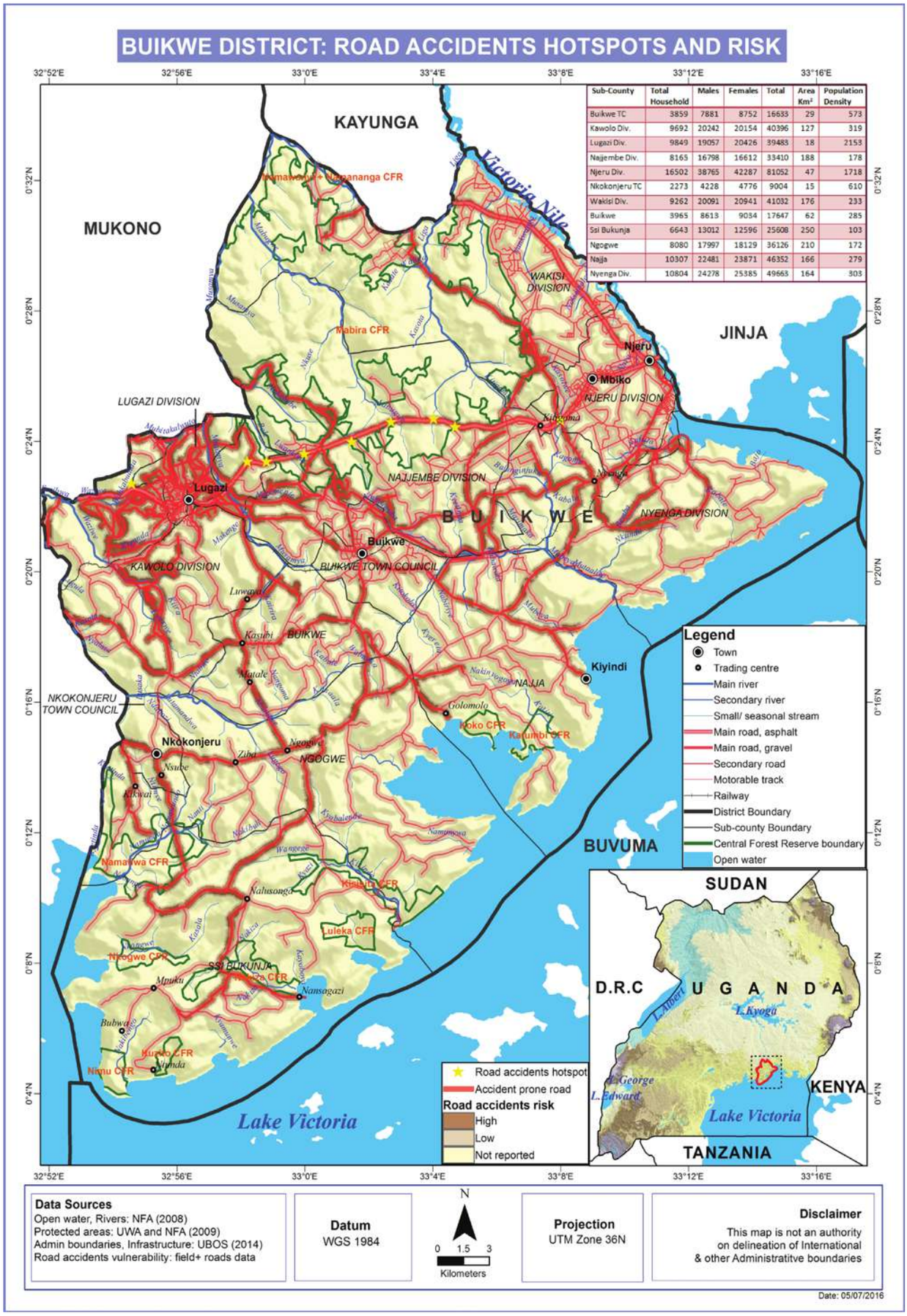

Figure 20: Road Accidents Hotspots and Vulnerability, Buikwe District

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 Buikwe 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 4).

Table 5 (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 5). Table 6 shows Hazard assessment for Buikwe District.

Table 4: Components of Vulnerability in Buikwe District

Vulnerability	Exposure			Susceptibility			Resilience
Socio-economic component	**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	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	District
	Floods	- Livestock adjacent to flood plain - Crops on flood plain - Infrastructure e.g. houses, schools, roads adjacent to flood plain	Parish	- Livestock loss - Foot rot - Destruction of crops - Destruction of infrastructure e.g. houses, schools, roads 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 - Spread of livestock epidemics - Livestock mortalities	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		Parish
	Crop Pests and Diseases	-Crops	District	- Complete crop failure	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 -Reduced incomes	District	- Vaccination - Burry and burn animals that have died from infection - Quarantine	District
	Human Disease outbreaks	- Human Population	District	- Loss of lives	District	- Mass Immunization - Use of mosquito nets	District
	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 -some are poisonous to livestock	District	- Cut and burn -Sensitization on Invasive species management - Spray with herbicides e.g 2,4 D	District

	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 -Loss of lives	Sub-county	-Sensitization - Fire control measures: firebreaks, fire lines and fire fighting equipments	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 -retards development	Village	- Community dialogue - District court in charge of land issues	Village
	Vermin and Wildlife animal attacks	- Human population - Livestock - Crops	Parish	-Loss of lives -Livestock loss -Crop destruction	Parish	- Report to UWA and Vermin Officer - 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 -increased incidences of env't related diseases	Sub-county	-Sensitization on wetland conservation -Sensitization on tree plating -Setting bi-laws	Sub-county
Environmental component	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	

	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		
	Crop Pests and Diseases	-Crops	District	- Complete crop Failure	District	- Spraying - Cut and burry affected crops -Sensitization on crop disease management	
	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	
	Land conflicts	- Human population	Village	-Loss of lives -Family violence and break outs	Village	- Community dialogue - District court in charge of land issues	
	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	
	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	

Table 5: Vulnerability Profile for Buikwe 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	3	3	9	Ngogwe, Nyenga and Ssi-Bukunja
Long dry spells	4	3	12	Najja, Ngogwe, Najjembe, Kawolo and Wakisi
Soil erosion, rock falls and landslides	4	3	12	Nyenga, Ngogwe, Kawolo, Njeru and Najja.
Hail storms, lightning and strong winds	3	3	9	Ngogwe, Buikwe, Nyenga, Najja and Ssi-Bukunja.
Bush fires	3	3	9	Kawolo, Ssi-Bukunja, Najja and Nyenga.
Crop pests and diseases	4	3	12	Ssi-Bukunja, Wakisi, Nyenga, Ngogwe, Buikwe and Nkokonjeru.
Livestock pests and diseases	4	2	8	Entire district.
Human Diseases outbreaks	4	4	16	Najja, Nyenga, Lugazi, Ssi-Bukunja and Njeru.
Land conflicts	3	3	9	Entire district.
Vermin and Wild-life animal attacks	4	3	12	Ssi-Bukunja, Nyenga and Najja.
Earthquakes and faults	2	1	2	Entire district.
Road accidents	4	4	16	Kawolo, Njeru and Najjembe.
Environmental degradation	4	4	16	Najja, Njeru, Najjembe, Ssi-Bukunja, Wakisi and Nkokonjeru.
Invasive species	3	4	12	Ssi-Bukunja, Njeru, Wakisi, Nkokonjeru, Ngogwe and Najja.

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 6: Hazard Risk Assessment

Hazard	Buikwe	Buikwe T.C	Kawolo	Lugazi T.C	Najja	Najjembe	Ngogwe	Njeru T.C	Nkokonjeru T.C	Nyenga	Ssi - Bukunja	Wakisi
Floods	M	L	L	L	H	L	H	H	L	H	H	L
Long dry spells	L	L	M	L	M	M	M	L	L	L	L	M
Rock falls and Erosion	L				L		M			M	L	L
Strong winds, Hailstorms and Lightning	M	L	L	L	M	L	M	L	L	M	M	L
Crop pests and Diseases	M	L	L	L	M	M	M	L	M	M	M	M
Livestock pests and Diseases	M	L	L	L	M	M	M	L	M	M	M	L
Human disease outbreaks	M	M	M	M	H	M	M	H	M	H	H	M
Vermin and Wildlife animal attacks	L	L	L	L	M	L	L	L	L	M	M	L
Land conflicts	L	L	M	L	L	M	L	L	L	L	M	M
Bush fires	L	L	L	L	L	L	L	L	L	L	L	L
Environmental degradation	L	L	M	L	H	H	M	H	M	M	H	M
Earthquakes and faults												
Road accidents	L	M	H	H	L	H	L	H	L	L	L	M
Invasive species	M	L	M	L	M	M	M	M	M	M	M	M

Key

H	High
M	Medium
L	Low
	Not reported/ Not prone

4.5.1 Gender and Age groups mostly affected by Hazards

Table 7: 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	All gender and age groups
Lightning	Children in schools are mostly affected
Crop pests and Diseases	All gender and age groups
Livestock pests and Diseases	All gender and age groups
Human disease outbreaks	All gender and age groups
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 6).

Table 8: Coping strategies to the Multi-hazards in Buikwe District

No	Multi-Hazards		Coping strategies
1	Geomorphological or Geological	Rock falls and Soil erosion	• Plant trees to control water movement on hill slopes • Mulching in banana plantations • Plant grass in banana plantations on hill slopes
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 safer areas • Seek for government food aid • Soil and water conservation measures
4		Prolonged Dry spells	• Leave wetlands as water catchments • Plant trees as climate modifiers • Buy food elsewhere in case of shortage • Pay for cost of water distribution • Food Storage especially dry grains • Plant drought resistant crops • Recommend water harvesting
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 • 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	Ecological or Biological	Crop pests and Diseases	• Spraying pests • Cutting and burying BBW affected crops • Burning of affected crops • Vigilance • Clean plant materials • Plant disease and pest resistant varieties
7		Livestock Parasites and Diseases	• Spraying parasites • Vaccinations • Burying animals that have died from infection • Quarantine
8		Human epidemic Diseases	• Mass immunisation • Visiting health centres • Use of mosquito nets
9		Vermin and Wild-life animal attacks	• Guarding the gardens • Poisoning • Hunt and kill • Recommend vermin guards
10		Invasive species	• Uproot • Spray with herbicides (e.g 2-4-D for broad-leaved plants) • Cut and burn • Sensitization on Invasive species management
11	Human induced or technological	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		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 and ordinances and enforcement • Sensitization on dangers of fires • Recommend controlled burning

13	Human induced or technological	Accidents (Road and Water)	• 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 • Vigilance for water accidents
14		Environmental degradation	• Leave wetlands as water catchments • Plant appropriate tree species as climate modifiers • Get Approval of the physical planning committee before construction • 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 Buikwe 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 prolonged dry spells and flooding were identified as most serious problem in Buikwe 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 Buikwe District increase their vulnerability to hazard exposure necessitating urgent external support.

Hazards experienced in Buikwe 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, early warning 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 Programmemes 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 (DDMCs) 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 (facilitate them) works at sub-county level.

REFERENCES

Jorn Birkmann (2006). Measuring Vulnerability to promote Disaster-Resilient Societies: Conceptual Frameworks and Definitions.

Buikwe District Local Government (2012). Five Year District Development Plan (2010/11 – 2014/15).

MWE (2013). *Water and Environment Sector Performance Report*: Ministry of Water and Environment, Kampala

MWE (2012). *Uganda National Climate Change Policy*, Ministry of Water and Environment, Kamapla, Final version for approval, 18 July 2012, p.2

UBOS (2014). National Housing Population Census 2014; Uganda Bureau of Statics, Kampala

UNDP-UNDRO (1991). Mitigation Strategies in Disaster Mitigation UN Disaster Management Training Programme

UNISDR (2009). UNISDR Terminology on Disaster Risk Reduction.

1. National Planning Authority; ***Uganda Vision 2040.***

2. National Planning Authority; ***National Development Plan (Uganda) for***

2015/2016 – 2019/2020.

3. National Planning Authority; ***National Development Plan (Uganda) for***

2010/11 – 2014/15.

4. National Planning Authority; ***Local Government Development Planning***

Guidelines (April 2014).

5. Ministry of Local Government (Uganda) - ***Guides on Development***

Planning for Local Governments: i) Formulation of a Development Plan

[Guide 1], (1998); ii) Project Planning and management [Guide 2],

(1999); iii) Project Cycle Management Manual (2000).

6. Ministry of Local government (Uganda); ***National Local Government***

capacity Building Policy (November 2013).

7. Local Government Finance Commission, Uganda;***Review of Local***

Government Financing - Financing, Management and Accountability for

Decentralized Service Delivery (October 2012).

8. Ministry of Health – Uganda; ***Annual Health Sector Performance Reports*** (2010/2011 - 2013/2014)

9. Global Health Net Work Uganda Five (5) Year Strategic Plan July 2010 – June 2015

10. Ministry of Health – Uganda; ***Health Sector Strategic and Investment Plan 2010/11-2014/15***.

11. Cardno / Strengthening Decentralisation for Sustainability Programmeme; ***Programmeme DMIP SURGE SUPORT FRAMEWORK STTA HANDBOOK*** (2012).

12. STAR–E & USAID (2011): ***Social service performance monitoring using Lot Quality Assurance Sampling (LQAS) Methodology***.

13. Tabulated results of indicators tracked in 53 Districts of Uganda

14. Uganda AIDS Commission (December 2011): ***National HIV and AIDS Monitoring and Evaluation Plan*** (2011/12-2014/15).

15. Uganda AIDS Commission: ***Guide for HIV/AIDS Strategic Planning in Local Governments*** (2013).

16. Uganda Bureau of Statistics (2012): ***Compendium of Statistical Concepts and Definitions (Fourth Edition)***

17. Uganda Bureau of Statistics (2012): ***Statistical Abstract***

18. USAID & Supporting Decentralisation for Sustainability (SDS) Programmeme (July 2011); ***Strengthening Decentralization for Sustainability [SDS]***

19. Professor Akin L. Mabogunje (2003); ***Access to Basic Services in African Local Governments: Understanding the Challenges and Starting Action.***

20. Ministry of Education and Spots; ***National Assessment of Progress in Education*** (2011)

21. ***CAFOD, Christian Aid, and TROCAIRE*** - Monitoring Government Policies (A toolkit for CSOs in Africa).

22. Ministry of Labour, Gender, and Social Development (Uganda); ***National Strategic Programmeme Plan of Interventions for Orphans and Other Vulnerable Children*** [2011/12 – 2015/16].

23. United Nations Development Programmeme; ***Millennium Development Goals Report for Uganda 2010.***

24. Uganda Bureau of Statistics; ***Uganda Demographic and Health Survey Reports*** (2006).

25. Uganda Bureau of Statistics; ***Uganda Demographic and Health Survey (2011).***

26. Icelandic International Development Agency (ICEIDA); ***Health Situation Analysis of Buikwe and Kalangala Districts, Uganda (December 2013).***

27. Icelandic International Development Agency (ICEIDA) and Buikwe District Local Government; ***The Institutional Capacity Assessment of Buikwe District for Period 2010/11 – 2013/14 (April 2014).***

28. Icelandic International Development Agency (ICEIDA) and Buikwe District Local Government; ***The Sub-WASH Strategic and Development for Fishing Community for 2014/15 – 2019/20 (November 2014).***

29. Icelandic International Development Agency (ICEIDA) and Buikwe District Local Government; ***The Sub-Education Strategy and Development Plan for Fishing Communities for 2014/15 – 2019/20 (March 2015).***

30. Buikwe District Local Government; ***Buikwe District Development Plan 2010/11-2014/15.***

31. Buikwe District Local Government; ***Buikwe District Capacity Building Plan*** (2010/11 – 2014/15).

32. Buikwe District Local Government; ***Buikwe District Revenue Enhancement Plan*** (2010/11 – 2014/15).

33. Buikwe District Local Government; ***Buikwe District Procurement Plan (2014/15).***

34. Buikwe District Local Government; ***Buikwe District Local Government Budgets – for FY 2010/11, 2011/12, 2012/13, 2013/14, and 2014/15***.

35. Buikwe District Local Government; ***Buikwe District Local Government Departmental Performance Reports – for FY 2010/11, 2011/12, 2012/13, and 2013/14***.

36. Auditor General - Uganda; ***Buikwe District Audited Accounts (2010/11 – 2013/14)***.

APPENDIX I: DATA COLLECTION TOOLS

FOCUS GROUP DISCUSSION GUIDE FOR DISTRICT DISASTER RISK MANAGEMENT FOCAL PERSONS

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

Introduction

v. 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 information on Hazards and early warning.

vi. 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.

vii. 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.

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?

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

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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?

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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?

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

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/

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