Buvuma 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 Refugees, under the leadership of the Commissioner, Mr. Martin Owor, for the oversight and management of the entire exercise.

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My appreciation also goes to Buvuma District Team:

1.   Kabaale Denis – District Forest Officer

2.   Nalunkuma Gladys - Ag. District Natural Resources Officer

3.   Kawule Prossy - Planning Unit

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 Buwoya, Busamuzi, Lubya 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 in Mbale as a central place within the region. This involved key district DDMC focal persons for the purpose of creating local/district ownership of the profiles.

Multi-hazards experienced in Buvuma 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 Buvuma 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. Soil erosion and human diseases were identified as most serious problems in Buvuma district with almost all sub-counties being vulnerable to the hazards. This is because the area is generally hilly hence very prone to soil erosion in case of heavy rains.

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

- Reducing the impact of the hazard where possible through mitigation, prediction, early warning and preparedness;

- Building capacities to withstand and cope with the hazards and risks;

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

The following were recommended policy actions targeting vulnerability reduction:

- The Government should improve enforcement of policies aimed at enhancing sustainable environmental health.

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

- The Government should establish systems to motivate support of political leaders toward government initiatives and programmes aimed at disaster risk reduction.

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

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

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

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

- The Government through OPM and Uganda National Meteorological Authoritty should increase importation of lightning conductors and also reduce taxes on their importation.

- The Government through OPM and Uganda National Meteorological Authoritty 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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AIDS	Acquired Immune Deficiency Syndrome
ARI	Acute Respiratory Infections
BBW	Banana Bacterial Wilt
CAO	Chief Administrative Officer
CBOs	Community Based Organizations
CSOs	Civil Society Organizations
DDMC	District Disaster Management Committee
DDP	District Development Plan
DEAP	District Environment Action Plan
DEM	Digital Elevation Model
DIA	District Internal Assessment
DLG	District Local Government
DPTC	District Technical Planning Committee
DRM	Disaster Risk Management
DTT	District Technical Team
DWD	Directorate of Water Development
DWRM	Directorate of Water Resources Management
ENR	Environment and Natural Resources
ENSO	El Niño Southern Oscillation
FGD	Focus Group Discussion
GIS	Geographical Information Systems
HDW	Hand Dug wells
HIV	Human Immuno Virus
HLG	Higher Local government
HRV	Hazard Risk Vulnerability
KII	Key Interview Informant
LEC	Local Environment Committee
LGMSD	Local Government Management service delivery
LLG	Lower Local Government

LRDP	Luweero - Rwenzori Development Project
LST	Local Service Tax
MAAIF	Ministry of Agriculture Animal Industry and Fisheries
MWE	Ministry of Water and Environment
NBSAP	National Biodiversity Strategy and Action Plan
NCCP	National Climate Change Policy
NDP	National Development Plan
NEMA	National Environment Management Authority
NGOs	Non-Governmental Organizations
OPM	Office of the Prime Minister
OWC	Operation Wealth Creation
PGIS	Participatory GIS
PPP	Public Private Partnership
SMCA	Spatial Multi-criteria Analysis
STIs	Sexually Transmitted Infections
STRM	Shuttle Radar Topography Mission
UBOS	Uganda Bureau of Statistics
UBOS	Uganda Bureau of Statistics
UNCCD	United Nations Convention on Climate Change and Desertification
UNCCD	United Nations Convention on Combating Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNRA	Uganda National Roads Authority
UPE	Universal Secondary Education
USE	Universal Secondary Education
UTM	Universal Transverse Mercator
WGS	World Geodetic System
YLP	Youth Livelihood Programme

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: *T*he 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).

CHAPTER 1

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 and profiles. Validation workshops were held in close collaboration with Ministries, District Local Government (DLG), Development Partners, Agencies and academic/research institutions. The developed maps show the geographical distribution of hazards and vulnerabilities up to sub-county level of each district. The analytical approach to identify risk and vulnerability to hazards in the pilot sub-regions visited of Rwenzori and Teso was improved in subsequent sub-regions.

This final draft report details methodological approach for HRV profiling and mapping for Buvuma 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 Buvuma 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 Buvuma 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 Chapters: Chapter 1 provides Introduction on the assignment. Chapter 2 elaborates on the overview of Buvuma district. Chapter 3 focuses on the methodology employed. Chapter 4 elaborates the Multi-hazard, Risks and Vulnerability profile and Coping strategies for Buvuma district. Chapter 5 describes Conclusions and policy related recommendations.

CHAPTER 2

OVERVIEW OF BUVUMA DISTRICT

2.1 Location

Buvuma District started its operations on 1st July 2010 being curved out of Mukono district, with a major aim of deepening service delivery in the Islands of Lake Victoria. Buvuma district is located in south central Uganda with an area coverage of 9,545sq.kms of which 4,221sq.kms is land area and the rest is covered by water. It is bordered by Mukono district in the Northwest, Buikwe in the North, Kalangala in the west and south, and Mayuge District in the east. It has an average altitude of 1,150 above sea level.

Buvuma is well endowed with rich biodiversity in terms of species richness and abundance. The district is surrounded by Lake Victoria a fresh water lake and several fresh springs like river Busoba, permanent and seasonal wetlands, fertile soils and generally reliable bimodal rainfall regime.

The District is divided into nine (9) administrative units of which eight (8) are rural Sub counties namely; Busamuzi, Bugaya, Bweema, Nairambi, Lubya, Lwajje, Buwooya, Lyabaana and one (1) Town council (Buvuma Town council). These are situated in the different 52 inhabitable detached islands. The District is further divided into 38 parishes and 224 villages (Figure 1).
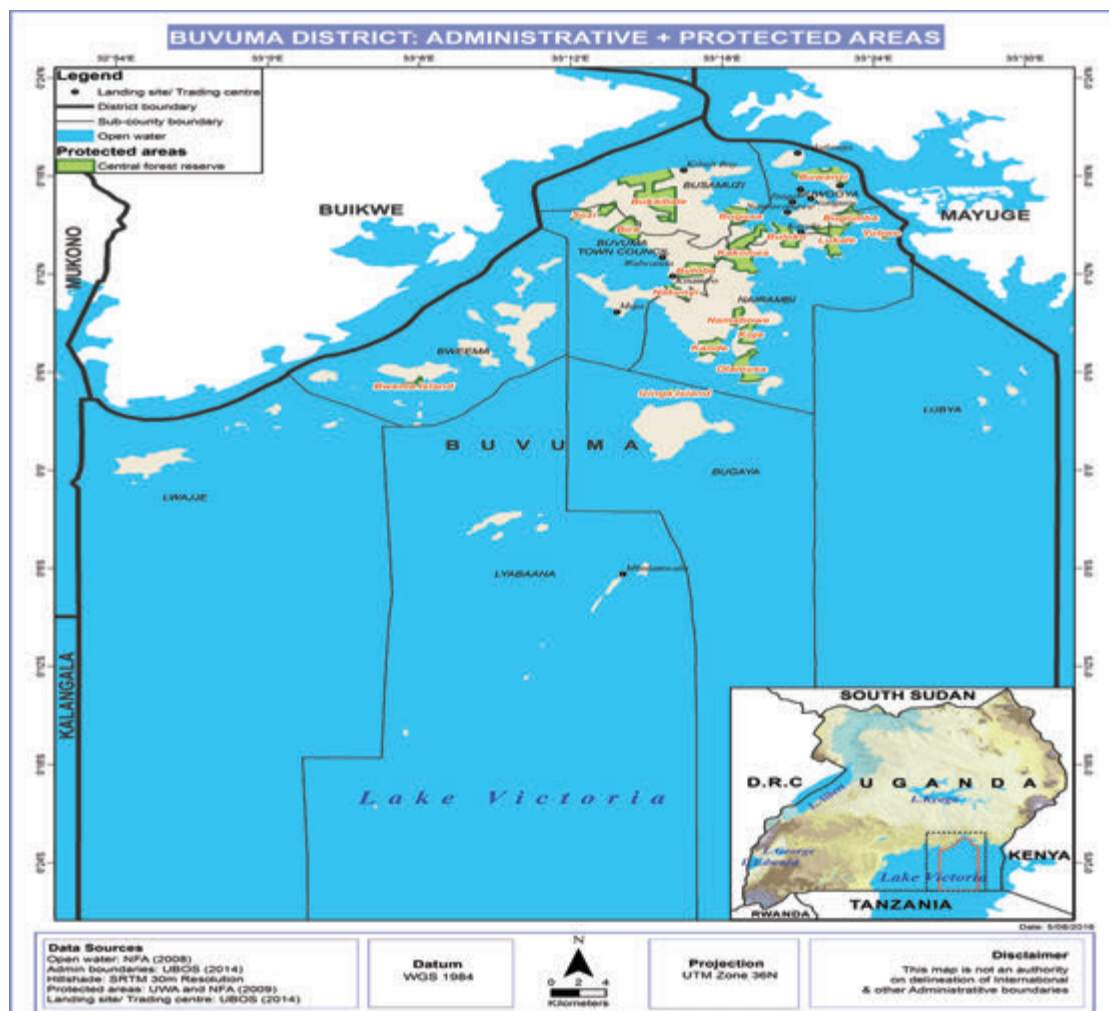
Figure 1: Administrative Boundaries and Gazetted areas, Buvuma District

2.1.1 Geomorphology

Most of Buvuma District lies on a high plateau, altitude ranging 1000-1300 m.a.s.l. The northern part of the District is flat but the southern region consists of sloping land with many undulations; 75% of the land is less than 60^0 degrees in slope. Buvuma Island in L. Victoria has 12% of land with 120 slopes.
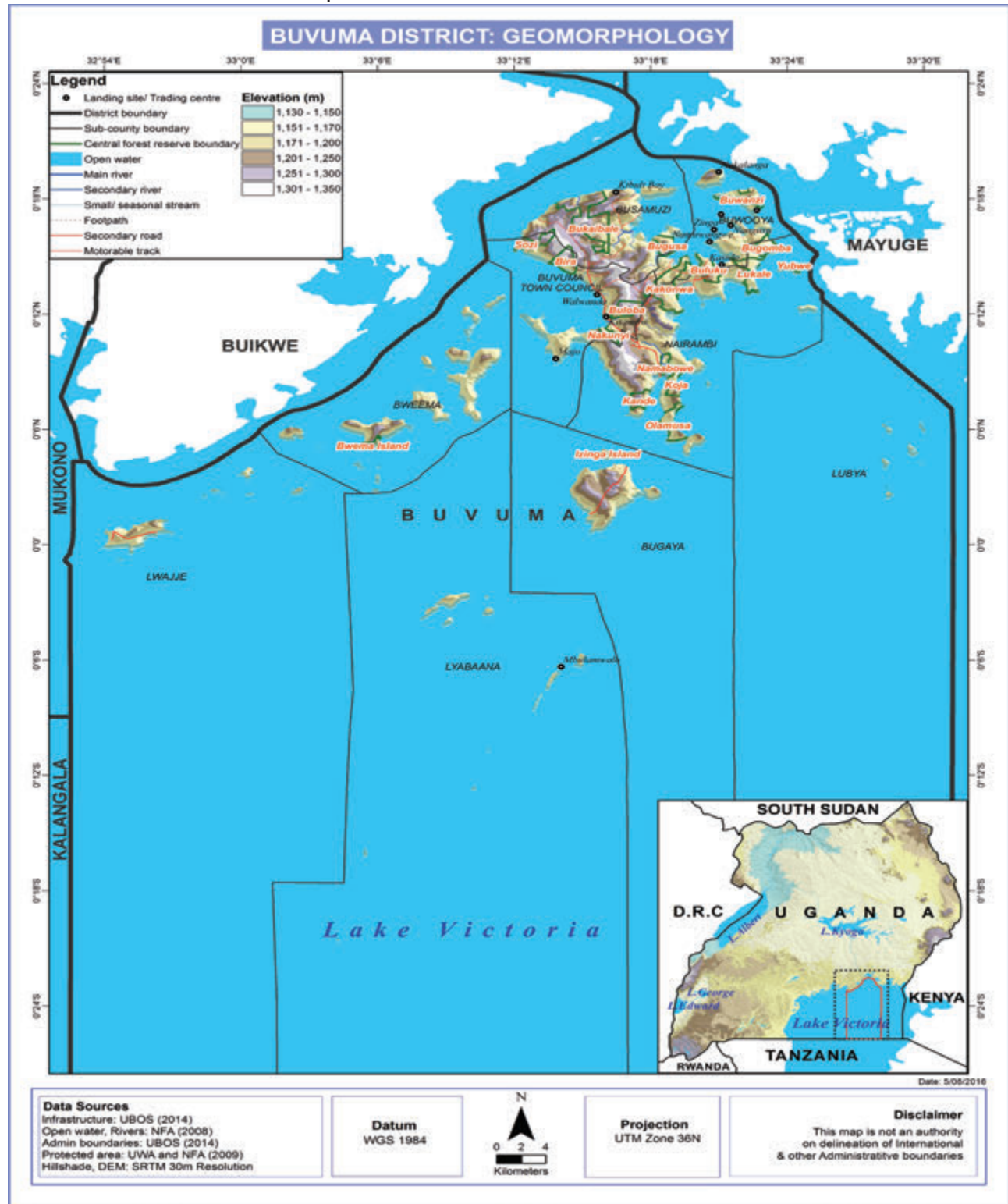
Figure 2: Geomorphology, Buvuma District

2.1.2 Soils and Geology
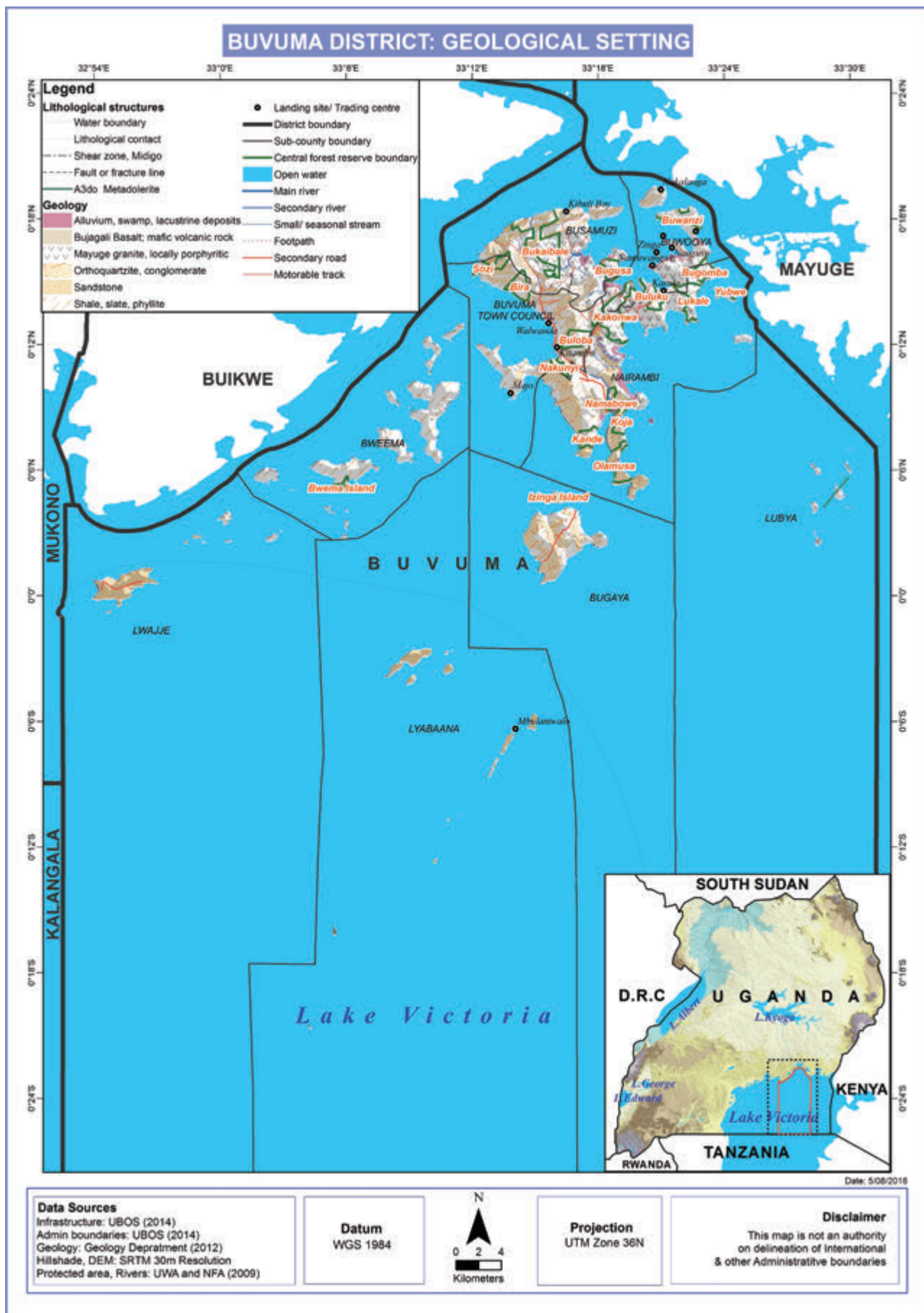
Figure 3: Geology and Lithological Structures, Buvuma District

2.1.3 Vegetation and Land use Stratification

Buvuma district has a vegetation cover of forest/savannah mosaic characterized by patches of dense forests in the south and scattered trees in shrubs and grasslands in the north. Natural forests on private land and government-controlled forests are a characteristic of the District. The indigenous species include Mesiopsis spp, Grivelia spp, Prunus africana etc. The wetland vegetation comprise of typha, miscanthus, hyparrhenia species, some cyperous and creepers, mostly convolvulaceae. Swamp forest tree species such as Pseudopodias microcarpa, Mitrogyra species, Tabonamontana, ficus spp., and Phoenix reclinata shrub vegetation include some edible plants such as Psidium spp (guava) and Afromomum augustifolium. Several species found here are utilized by the local community for food, fuel, building materials, medicines and raw materials for crafts. However due to an increasing district population size, the natural resources have been greatly affected through un-controlled timber lodging, charcoal burning, farming activities and settlement.

LAND USE/ VEGETATION COVER	AREA (KM²)	%AGE
Built up Areas	2.4	0.03
Bush	16.1	0.17
Depleted Tropical High Forest	33.0	0.35
Grassland	37.7	0.40
Impediments	1.2	0.01
Open Water	9209.3	96.80
Subsistence Farmland	65.7	0.69
Tropical High Forest Well Stocked	9.8	0.10
Wetland	11.6	0.12
Woodland	126.5	1.33
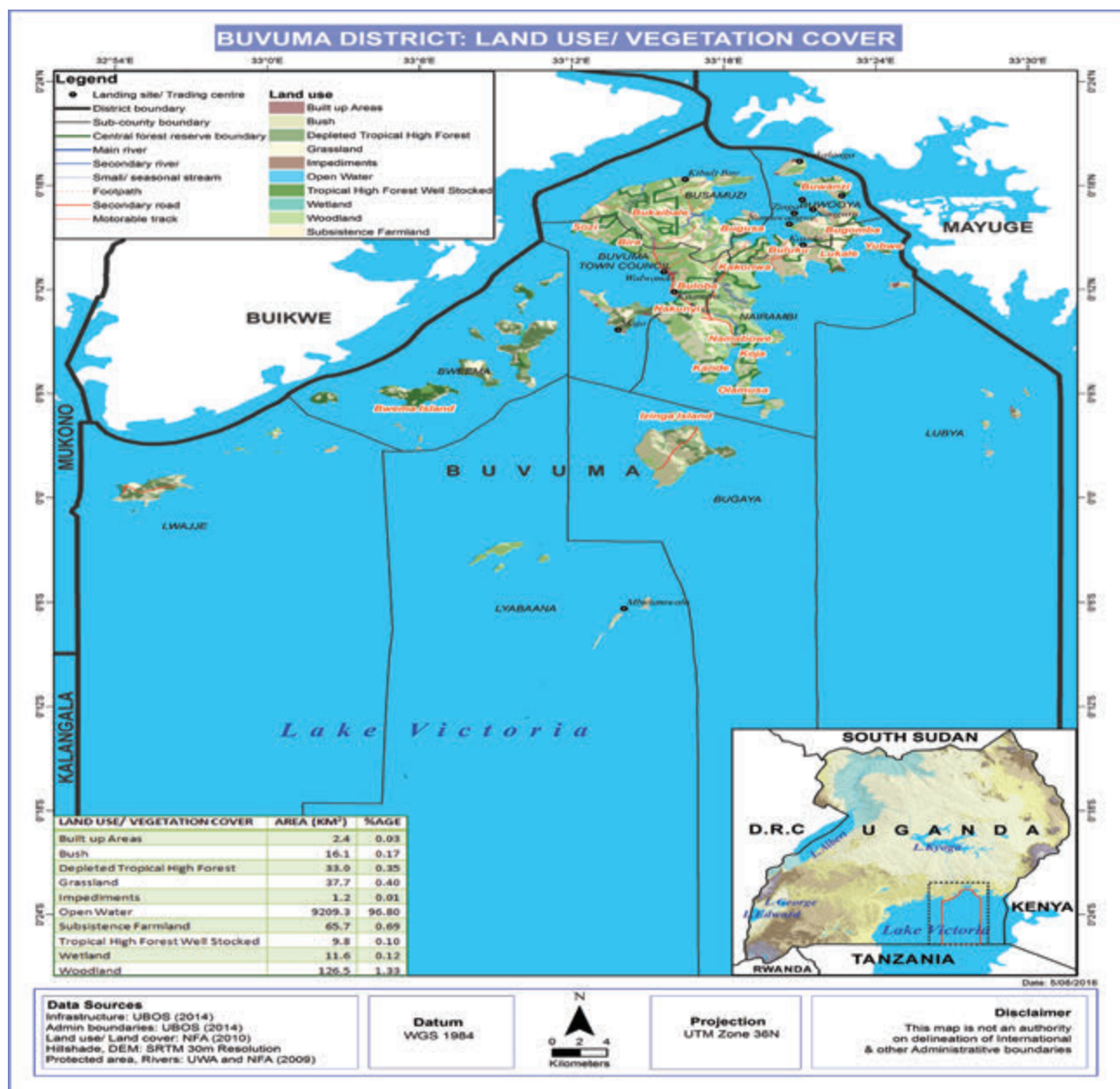
Figure 4: Land use Stratification, Buvuma District

2.1.4 Temperature and Humidity

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. Temperatures range between 19°C and 28°c throughout the year enabling agriculture throughout the year (Figure 5)
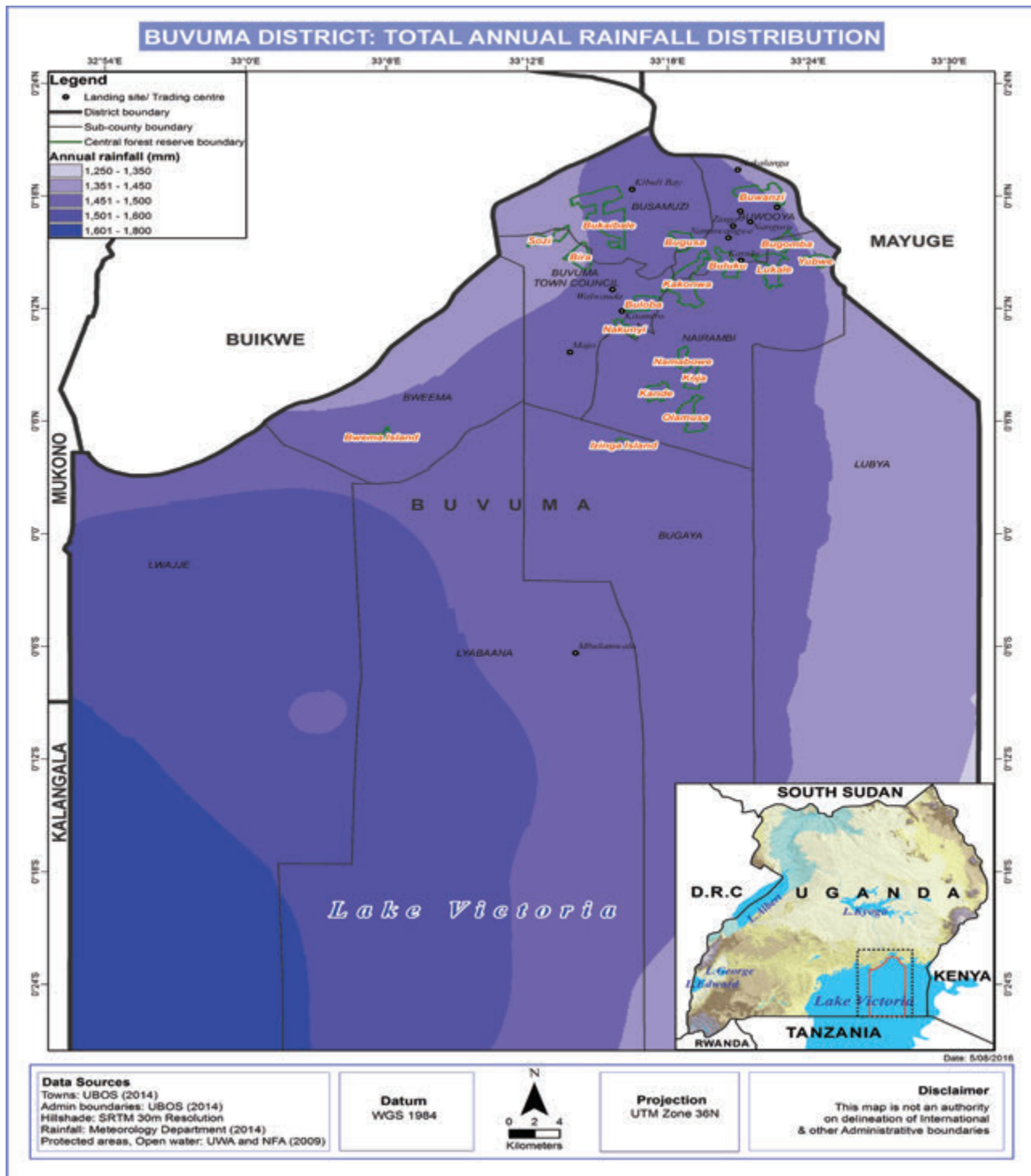
Figure 5: Total Annual Rainfall Distribution, Buvuma District

2.1.7 Hydrology

The district is richly endowed with natural resources ranging from land, wetlands, fisheries, minerals, forest/trees, wildlife (biodiversity), rivers and lakes.

Water bodies (rivers and the lake) and wetlands/swamps cover a total area of 4,002km². Hence, water bodies constitute 40% of the total area of the District. Figure 3 indicates drainage system in Buvuma district. Wetlands consist of a system of wetlands of major and small ecosystems that all eventually drain into L. Victoria and other rivers.

2.1.8 Population

According to the National Population and Housing Census (2014) results, Buvuma District had a total population 89,655 people. Results also showed that most of the people in Buvuma District reside in rural areas (99.9% compared to 0.1%) who reside in urban areas. The gender distribution was reported to be males: 3483 (53%) and females: 3066 (47%). About 82% of the population form the household population and 18% is Non-household. Nairambi had the highest population of 19,177 people while Lwajje sub-county had the least population of 4,436 people (Figure 6). Table 1 shows the population distribution per sub-county for the different gender.

Table 1: Population Distribution in Buvuma District

SUB-COUNTY	NUMBER OF HOUSEHOLDS	POPULATION			
		Male	*Female*	*Total*	*%age Population*
Bugaya	*1,534*	*2,685*	*2,185*	**4,870**	*5.4*
Busamuzi	*3,946*	*8,305*	*7,911*	**16,216**	*18.1*
Buwooya	*2,578*	*6,549*	*6,379*	**12,928**	*14.4*
Buvuma Town Council	*2,586*	*5,149*	*4,713*	**9,862**	*11.0*
Bweema	*2,808*	*4,781*	*3,926*	**8,707**	*9.7*
Lubya	*2,334*	*3,483*	*3,066*	**6,549**	*7.3*
Lwajje	*1,632*	*2,580*	*1,856*	**4,436**	*4.9*
Lyabaana	*2,608*	*4,446*	*2,464*	**6,910**	*7.7*
Nairambi	*5,155*	*9,968*	*9,209*	**19,177**	*21.4*
TOTAL	**25,181**	**47,946**	**41,709**	**89,655**	**100.0**

Source: UBOS Census 2014

The population and housing 2014 Census results showed a steady population growth of the District which stands at 6.7 thus being one of the highest in the country and above the national average. This calls for a consorted effort towards controlling the sky rocketing population as detailed in the table below. The most populated sub counties are Nairambi, Busamuzi and Buwooya. The least populated sub counties being Lwajje, Bugaya and Lubya.

Table 2: District Population distribution by parish

SUB-COUNTY	PARISH	POPULATION			
		No. of H/H	Male	Female	Total
Bugaya	**Buwaga**	**406**	**733**	**540**	**1,273**
	Buye	395	586	550	1,136
	Ndwasi	264	712	546	1,258
	Zzinga	469	654	549	1,203
Busamuzi	Busamuzi	1,101	2,355	2,232	4,587
	Kirongo	705	1,364	1,359	2,723
	Lunyanja	761	1,763	1,698	3,461
	Mawanga	1,379	2,823	2,622	5,445
Buvuma T/C	Buwanga Central Ward	344	661	640	1,301
	Buwanga Ward	379	1,012	992	2,004
	Mazzinga Ward	496	943	779	1,722
	Tome	659	1,198	1,110	2,308
	Walwanda	708	1,335	1,192	2,527
Buwooya	Bukinalwa	475	1,750	1,694	3,444
	Buwanzi	891	2,087	2,197	4,284
	Buwooya	744	1,796	1,772	3,568
	Lingira	468	916	716	1,632
Bweema	Buziru	1,123	2,226	1,940	4,166
	Bweema	518	744	598	1,342
	Malijja	622	921	758	1,679
	Mpatta	545	890	630	1,520
Lubya	Kirewe	580	825	712	1,537
	Labolo	207	357	270	627
	Lubya	963	1,357	1,214	2,571
	Namiti	584	944	870	1,814
Lwajje	Ddembe	542	818	611	1,429
	Kaserere	431	812	510	1,322
	Lukalu	523	788	601	1,389
	Lyabalume	136	162	134	296
Lyabaana	Liibu	761	1,921	728	2,649
	Muwama	519	809	584	1,393
	Samba	569	745	438	1,183
	Zziru	759	971	714	1,685
Nairambi	Buwanga	845	1,694	1,510	3,204
	Lufu	997	2,198	2,034	4,232
	Lukale	1,246	2,602	2,470	5,072
	Magyo	819	1,497	1,410	2,907
	Namugombe	1,248	1,977	1,785	3,762

Source: UBOS, Census 2014 population and Housing census results

Population size by Sub county

BUVUMA DISTRICT: POPULATION DISTRIBUTION

Legend
- Landing site/ Trading centre
- District boundary
- Sub-county boundary
- Main river
- Secondary river
- Small/ seasonal stream
- Footpath
- Secondary road
- Motorable track
- Central forest reserve boundary

Population Distribution
- 4300 - 4800
- 4801 - 6000
- 6001 - 7000
- 7001 - 10000
- 10001 - 16000
- 16001 - 19500

Sub-County	Total Household	Males	Females	Total	Area Km²	Population Density
Bugaya	1712	2668	2178	4846	1202	4
Busamuzi	3926	8305	7918	16223	143	113
Buvuma Town Council	2586	5115	4693	9808	136	72
Bweema	2808	4772	3920	8692	224	39
Lwajje	1631	2548	1826	4374	2258	2
Lyabaana	2485	4463	2435	6898	3004	2
Nairambi	5204	10004	9259	19263	255	75
Buwooya	2621	6836	6652	13488	73	185
Lubya	2330	3373	2995	6368	2317	3

Date: 5/08/2016

Data Sources
Rivers: NFA (2010)
Admin boundaries: UBOS (2014)
Protected area: UWA and NFA (2009)
Hillshade, DEM: SRTM 30m Resolution
Infrastructure, Population: UBOS (2014)

Datum WGS 1984

N
0 2 4
Kilometers

Projection UTM Zone 36N

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

Figure 6: Population Distribution, Buvuma District

Human settlement patterns

The population is distributed among the nine (9) sub counties on all the 52 inhabitable islands. The biggest number is habitable on Buvuma the main island with Nairambi, Busamuzi and Buwooya sub counties having over 50% of the total district population. On the main island there are inland settlements but concentration is more on landing sites where fishing and related activities take place. Off the main island, settlements are concentrated on scattered habitable islands owing to their geographical nature.

2.1.9 Economic activities

The biggest percentage of the population is engaged in fishing and related activities, this account for employment of over 60% of the population. The activities include but not limited to fish netting, fish drying/smoking, fish transportation, repairing of nets and boats and mongering. To support these activities a number of businesses and services are carried out on the landing sites on in the proximity, these include bars, restaurants, lodging services, general merchandise shops, drug shops, butchers, food commodity stalls among others that employ those that aren't involved directly in fishing especially at landing sites.

In the inland, the rural setting and the availability of fertile soils support subsistence agriculture which employs about 35% of the population. The growing of perennial, annual and cereal crops is evident on the mainland in addition to subsistence poultry and animal rearing. Besides subsistence agricultural, the availability of tropical rain forests supports timber logging and charcoal burning which employs about 5% of the population. However these forestry activities are not properly regulated leading to encroachment on gazetted forest reserves, soil erosion resulting from bare hills, silting of the lake and general degradation of the environment.

Fishing

This is the largest economic activity in the District. Given that almost three quarters of Buvuma'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 Buvuma.

CHAPTER 3

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 Buvuma 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 Buvima Town council (), and Nairambi 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 days 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 MULTI-HAZARD RISK, VULNERABILITY MAPPING

4. Multi-hazards

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

In the case of Buvuma 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 Rock falls and soil erosion

Results from the participatory assessments indicated that there were no reported incidences of rock falls in Buvuma district.

High cases of soil erosion reported in the sub counties of Buwoya, Nairambi and Busamuzi all on Buvuma main Island as a result of upland rice growing associated by cutting forests to plant rice, maize cassava etc. Soil erosion causes silting of rivers and streams, washing away crops and causing soil fertility loss and consequent poor crop yield. The most affected crops by 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).

Plate 1: Rocks in buvuma district

Some of the interventions include: soil and water conservation practices such as mulching, terracing, striping with stone and grass and training of farmers is being done by crop extension officers.

BUVUMA DISTRICT: SOIL EROSION PRONE AREAS

Legend

- Landing site/ Trading centre
- District boundary
- Sub-county boundary
- Main river
- Secondary river
- Small/ seasonal stream
- Footpath
- Secondary road
- Motorable track
- Central forest reserve boundary

Soil erosion prone areas
- Very low
- Low
- Moderate
- High

Sub-County	Total Household	Males	Females	Total	Area Km²	Population Density
Bugaya	1712	2668	2178	4846	1202	4
Busamuzi	3926	8305	7918	16223	143	113
Buvuma Town Council	2586	5115	4693	9808	136	72
Bweema	2808	4772	3920	8692	224	39
Lwajje	1631	2548	1826	4374	2258	2
Lyabaana	2485	4463	2435	6898	3004	2
Nairambi	5204	10004	9259	19263	255	75
Buwooya	2621	6836	6652	13488	73	185
Lubya	2330	3373	2995	6368	2317	3

Data Sources
Soil erosion prone areas: analysis-
DEM, SLOPE: SRTM 30m Res.,
rainfall: Meteorology Dep't-2014, soils: NARL-2014,
Protected area, Rivers: UWA and NFA (2009)
Admin boundaries, Infrastructure: UBOS (2014)

Datum
WGS 1984

N

0 2 4
Kilometers

Projection
UTM Zone 36N

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

Date: 5/08/2016

Figure 7: Rock falls and Soil erosion Prone areas, Buvuma District

4.1.2 Earthquakes and faults

Participants of the focus group discussion indicated that earthquakes weren't a serious problem in Buvuma district. However, it was observed that the entire district only experiences minor tremors. 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.

Figure 8: Earth quakes Vulnerability, Fault lines, Buvuma 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 especially during the rainy seasons along Lake Victoria due to water level increases. The 2016 MAM rains have affected most of the landing sites submerging homes in Kirongo in Busamusi S/C, Galamu, Kyanamu and Walwanda in Buvuma Town Concil, Kasaali in Nairambi S/C and Namatale in Bweema S/C. Flash floods wash away and at times submerge especially horticultural crops such as tomatoes, cabbages, rice, yams, sweet potatoes and maize thus causing food insecurity and considerable economic losses. The entire district is affected by rise in lake water levels given that the entire district is surrounded by Lake Victoria. 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).

Some of the interventions on floods include: constructing away from lake shore, shifting to upland areas especially during rainy seasons, digging trenches.

Plate 2: flooded areas in the district
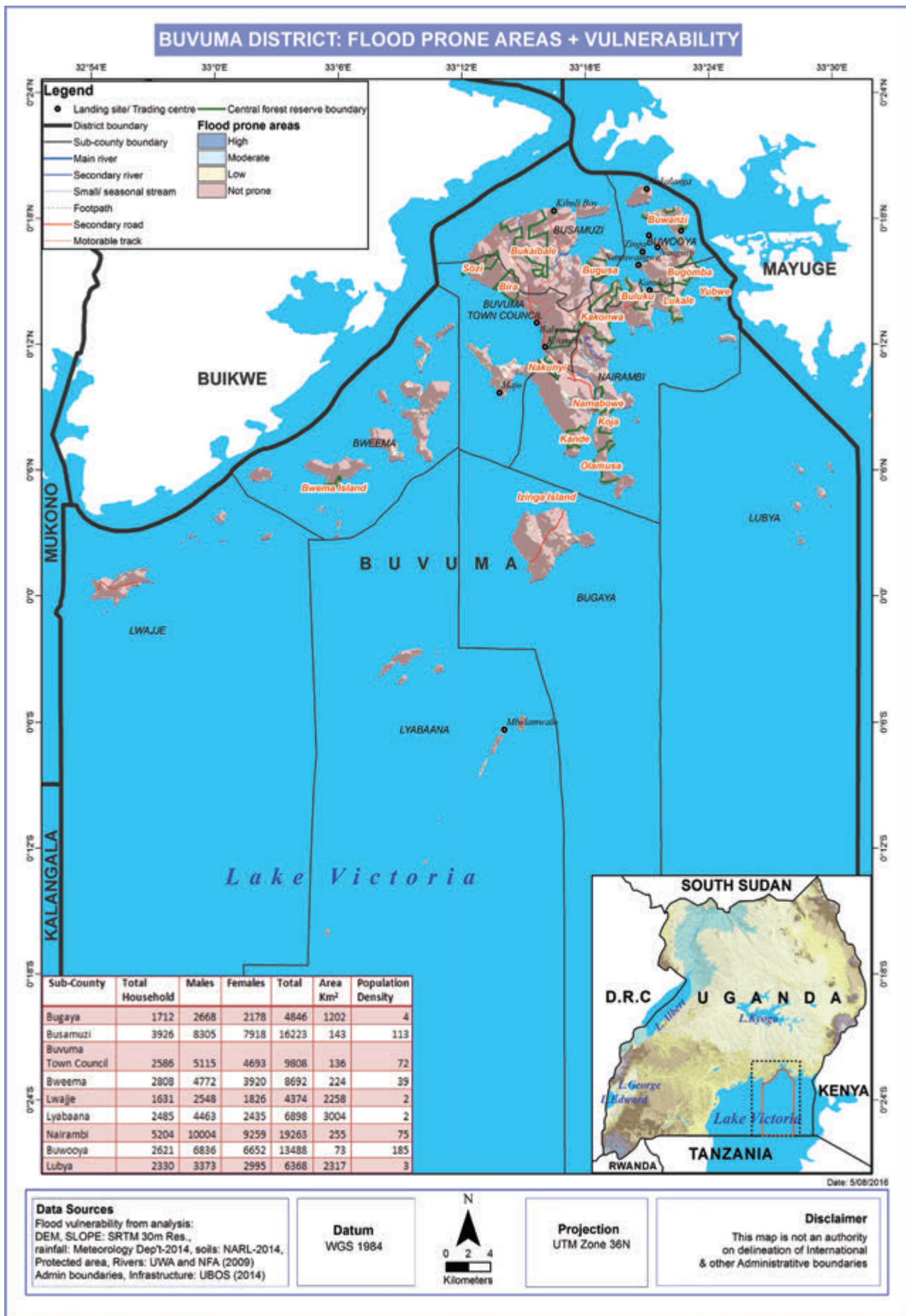
Figure 9: Flood prone areas and Ranking, Buvuma District

4.2.2 Prolonged Dry spells

Participatory assessments through focus group discussions indicated that prolonged dry spells is not serious problem in Buvuma district, although the district experiences minor dry spells causing dry up of the water sources. Participants observed that dry spells have caused scarcity of water and pastures, low milk and crop production and increased incidences of pests and diseases in the sub counties of Buwoya, Lubya andLwajje. The participants also mentioned that termite infestation on pastures is always high in the dry season especially in Buwoya and Busamuzi S/Cs

Some of the interventions on dry spells include: water harvesting especially at schools, health centers, markets, early planting, growing fast maturing crops, growing in wetter areas, and irrigation at small scale. Government through Buvuma District Local government has put emphasis on sensitization on storage of dry foods and early warning systems through radios.

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).

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

4.2.3 Hailstorms

Results from the participatory assessments indicate that hailstorms are common occurrence at beginning of rainy seasons affecting almost entre 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 of destroyed crops. The most affected sub-counties include Bugaya, Lyabaana, Lubya, Lwajje and Bweema (Figure 11).

4.2.4 Strong winds

The participants of the focus group discussions reported that strong winds are experienced during the dry spell and at the onset of the rainy seasons. It was observed that strong winds blow off roof tops of houses and also uproot trees and banana plantations. Like Hailstorms, strong winds also affect the entire district. Windstorm typhoon reported in July 2015 killed 60 people in Bugaya S/C when their boat capsized, strong cyclic winds (ensoke) killed people in 2013 in same sub-county, in Lubya sub-county 29 houses were destroyed in sub-county. Some of the intervention is the marine rescue boat at Kiyindi Landing site which is always on standby in case of any incidence. Also fishermen at landing sites are always on the lookout for fellow sailors especially during bad weather on the lake. The most affected are the offshore sub-counties of Bugaya, Lyabaana, Lubya, Lwajje and Bweema

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 Buvuma district. Participants reported that in 2013, lightning killed 6 in Kadinindi in Buvuma Town council and also lightning struck 15 cows in Nairambi sub-county in the same year.

The recent interventions on Lightning from Government include: the lightning arrestors' policy in the BOQ - every newly constructed public facilities must have a lightning arrestor, and also the old public facilities are expected to have lightning arrestor. In case of a disaster, OPM is usually alerted and sometimes provide relief.

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

Buvuma District

4.3 Ecological and Biological Hazards

4.3.1 Crop Pests and Diseases

Participatory assessments through focus group discussions indicated that the entire Buvuma 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 3. It was reported that almost entire district is affected by crop pests and diseases but especially in the main land sub-counties and Bugaya sub-county for giant loppers (Figure 12). Sigatoka is attributed to the low nutritive soils almost entire district.

Some of the interventions on crop pests and diseases include: use of manure to make soils fertile and planting of disease resistant varieties. Banana bacterial wilt has been reduced by removing the early bud and cutting and burying of the affected banana plants. The government intervention of training of farmers has been done by the Crop extension officers especially on most BBW control measures and spraying.

Table 3: 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, giant loppers/ caterpillars
Maize	Maize streak virus, maize smut, Lethal disease	Weevils, striga maize stalk borer
Beans	Bean root rot, bean collar rot, bean anthracanose,	Weevils, aphids
G. nuts	Rosette disease	Aphids and Shrimps
Cassava	Cassava mosaic, Cassava Brown Streak Disease	Mites, white flies
Sweet potatoes	Viral disease	Weevils and caterpillars
Rice	Rice blast	Birds

Source: Department of Agriculture 2015

Figure 12: Crop Pests and Diseases Vulnerability, Buvuma District

4.3.2 Livestock Parasites, Vectors and Diseases

Results from the focus group discussions indicated that livestock parasites and diseases are a serious problem in Buvuma district especially during rainy seasons. Table 5 indicates the common Livestock Parasites, Vectors and Diseases and sub-counties where they have been reported. Figure 13 indicates the Livestock Parasites, Vectors and Diseases Vulnerability of Buvuma district.

Some of the interventions on Livestock parasites and diseases include: massive vaccination organized by Buvuma District Local government implemented by Veterinary Department, environment management and quarantine. The district has 3 vet officers.

Table 4: Common Livestock Diseases and Pests

LIVESTOCK	DISEASE	PESTS	Location
Cattle, goats, sheep, dogs	Foot and mouth disease, rabies, East coast fever, lumpy skin diseases, rinder pest	Tsetse flies, intestinal worms and flukes, , ticks	Bugaya (Yumbe island), Kitamiro, Busamuzi, Buvuma Town council and Nairambi
Poultry	Newcastle, coccidiosis	Mites	Entire district
Pigs	Swine fever	Fleas, worms	Busamuzi, Nairambi, Bugaya, Lubya and Buvuma T/C

Source: Department of Production 2015

BUVUMA DISTRICT: LIVESTOCK VECTORS+ DISEASES VULNERABILITY

Sub-County	Total Household	Males	Females	Total	Area Km²	Population Density
Bugaya	1712	2668	2178	4846	1202	4
Busamuzi	3926	8305	7918	16223	143	113
Buvuma Town Council	2586	5115	4693	9808	136	72
Bweema	2808	4772	3920	8692	224	39
Lwajje	1631	2548	1826	4374	2258	2
Lyabaana	2485	4463	2435	6898	3004	2
Nairambi	5204	10004	9259	19263	255	75
Buwooya	2621	6836	6652	13488	73	185
Lubya	2330	3373	2995	6368	2317	3

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

4.3.3 Human Diseases outbreaks

This study has indicated the most recent human diseases outbreak in Buvuma district as cholera. Cases of cholera were reported in Bweema (Namatale) recorded in April 2016. Cholera index case reported on 29th April 2016 and 17 cases were recorded without reported deaths. The cholera outbreak was attributed to the poor safe water coverage and sanitary conditions in the district. Table 2 indicates the safe water coverage for the district by sub-county. It is indicated that the District still lags behind NMSDS as regards safe and clean water coverage which stands at 30%. The situation in the four sub-counties of Lubya, Lyabaana, Bweema and Lwajje is worse since there are no sources of safe and clean water and the population thus draws the water directly from the lake. It's is ironical that amidst plenty and fresh water provided by the Lake Victoria, District still grapples with low safe and clean water coverage.

The sanitation and hygiene situation is not any better in most landing sites there are no public latrines and the dwellers don't have the capacity to dig private latrines due to a hard underlying rock or high water table with soft soils. This bleeds the habit of open defection resulting into sanitation related epidemics such as cholera, dysentery and diarrhea.

Table 5: Safe water coverage summary sheet for Buvuma District

SUB-COUNTY	Total Pop. (2002 Census)	Functioning and Non-functioning No of water sources by Type																Total	Total Pop. Served	% Safe water coverage (2011)
		PS			SW			DBH			TS			RWT					
		F	NF	Total	F	NF	Total	F	NF	Total	F	NF	Total	F	NF	Total			
Busamuzi	14,648	8	0	8	15	3	18	12	0	12	0	0	0	2	1	3	41	5,350	36.52
Nairambi	17,802	2	1	3	0	0	0	12	0	12	15	0	15	0	0	0	30	8,822	50
Bwema	8,400	0	0	0	1	1	2	0	0	0	0	0	0	1	2	3	5	400	4.76
Bugaya	9,400	2	0	2	1	1	2	0	0	0	0	0	0	1	2	3	7	650	6.91
Buvuma Town council	3,650	3	0	3	1	0	1	6	0	6	10	0	10	0	0	0	20	1,940	53.15
Total	53,900	15	1	16	18	5	23	30	0	30	25	0	25	4	5	9	103	17,162	30.3

Functional water sources 88.66%

Non-functional water sources 11,34%

Source: Buvuma DDP 2015/2016

The most common human diseases in Buvuma district are malaria, diarrhea, respiratory tract infections (RTI) and HIV/ AIDS. Malaria was indicated as the leading cause of mortality in the district. HIV/ AIDS prevalence was indicated as high as 11.4% for entire district by UBOS. HIV/ AIDS was highest among fishermen in landing sites, camp areas of Nairambi S/C. Figure 14 indicates the Human Disease Outbreaks Vulnerability.

Some of the government interventions on Human diseases include: massive immunization for immunisable diseases, distribution of mosquito nets, case management for malaria, mass drug administration, mapping out the affected spot, determining affected population and procurement of drugs. Health services provision is done through the established 13 Health centres. The 13 health centres include: 1 Health centre IV, 3Health centre IIIs and 9Health centre IIs, however the distribution is only 15% out of the 52 islands, 3 Heath centers are located in the 3 islands do not have health centres. Other organizations include: WHO, UNICEF and MUWRP always intervening in Health issues particularly HIV/ AIDS.

BUVUMA DISTRICT: HUMAN DISEASES VULNERABILITY

Legend
- Landing site/ Trading centre
- District boundary
- Sub-county boundary
- Main river
- Secondary river
- Small/ seasonal stream
- Footpath
- Secondary road
- Motorable track
- Central forest reserve boundary

Health Facilities
- HC II
- HC III

Human diseases vulnerability
- Very low
- Low
- Moderate
- High

Notes
Most common human diseases: Malaria, typhoid, diarrhea, dysentery, cholera and HIV/AIDS

Sub-County	Total Household	Males	Females	Total	Area Km²	Population Density
Bugaya	1712	2668	2178	4846	1202	4
Busamuzi	3926	8305	7918	16223	143	113
Buvuma Town Council	2586	5115	4693	9808	136	72
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Lyabaana	2485	4463	2435	6898	3004	2
Nairambi	5204	10004	9259	19263	255	75
Buwooya	2621	6836	6652	13488	73	185
Lubya	2330	3373	2995	6368	2317	3

Date: 5/08/2016

Data Sources
Hillshade: SRTM 30m Resolution
Admin boundaries, Infrastructure: UBOS (2014)
Human diseasesvulnerabiltiy: analysis- field data + Health facilities+ Accessiblity+Population (2016)
Protected areas, Open water, rivers: NFA (2009)

Datum
WGS 1984

N
0 2 4
Kilometers

Projection
UTM Zone 36N

Disclaimer
This map is not an authority on delineation of International & other Administratitve boundaries
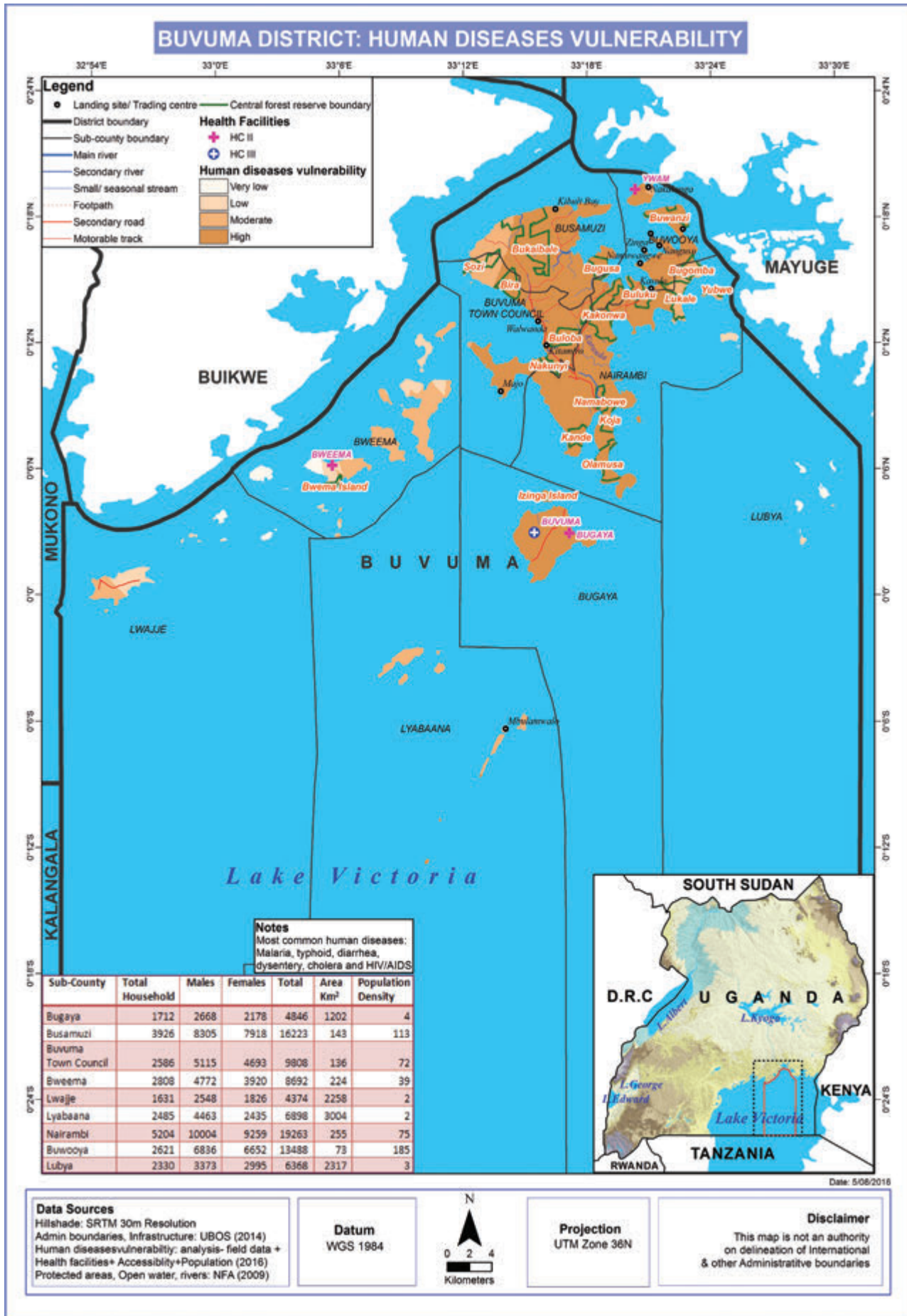
Figure 14: Human Disease Outbreaks Vulnerability, Buvuma District

Accessibility of Health services

Accessibility to health services is still a challenge to the District, the District comprised of 52 detached islands is served by only 11 Health Facilities of which; one is a District Referral Health Centre IV, three (3) sub county Health Centre III, five (5) Health centre II and two (2) government aided PNFP health centres. These serve a total population of 89,690 people in an average radius of over 5kms, though the distance is higher the detached islands. Table 6 indicates district health services and target population per parish.

Table 6: District Health Services Target Population per Parish

SUB-COUNTY	PARISH	POPULATION			0-59 Months (20.5%)	WCBA	PREGNANT WOMEN	Deliveries	OPD
		MALE	FEMALE	TOTAL					
BUGAYA	Buuye	733	540	1273	261	261	235	13	1273
	Buwaga	586	550	1136	233	233	210	12	1136
	Ndwasi	712	546	1258	258	258	232	13	1258
	Zinga	654	549	1203	247	247	222	12	1203
LYABAANA	Liibu	1921	728	2649	543	543	489	27	1921
	Muwama	809	584	1393	286	286	257	14	1393
	Samba	745	438	1183	243	243	219	12	1183
	Ziiru	971	714	1685	345	345	311	17	1685
BUSAMUZI	Busamuzi	2355	2232	4587	940	940	846	47	4587
	Kirongo	1364	1359	2723	558	558	502	28	2723
	Lunyanja	1763	1698	3461	710	710	639	36	3461
	Mawanga	2823	2622	5445	1116	1116	1004	59	5445
BUVUMA T/C	Buwanga	661	640	1301	267	267	240	13	1301
	Buwanga central	1,012	992	2,004	411	411	370	21	2004
	Mazinga	943	779	1722	353	353	318	18	1722
	Toome	1198	1110	2308	473	473	426	24	2308
	Walwanda	1335	1192	2527	518	518	466	26	2527
NAIRAMBI	Buwanga	1694	1510	3204	657	657	591	33	3204
	Luufu	2198	2034	4232	868	868	781	43	4232
	Lukale	2602	2470	5072	1040	1040	936	52	5072
	Magyo	1497	1410	2907	596	596	536	30	2907
	Namugombe	1977	1785	3762	771	771	694	39	3762
LUBYA	Kirewe	825	712	1537	316	316	284	16	1537
	Laboro	357	270	627	129	129	116	6	627
	Lubya	1357	1214	2571	527	527	474	26	2571
	Namitti	944	870	1814	372	372	335	19	1814
BWEEMA	Buziri	2226	1940	4166	854	854	789	43	4166
	Bweema	744	598	1342	275	275	248	14	1342
	Malijja	921	758	1679	344	344	310	17	1679
	Mpata	890	630	1520	312	312	281	16	1520
LWAJJE	Dembe	818	611	1429	293	293	264	15	1429
	Kaserere	812	510	1322	271	271	244	14	1322
	Lukalu	788	601	1389	285	285	257	14	1389
	Lyabalume	162	134	296	61	61	55	3	296

SUB-COUNTY	PARISH	POPULATION			0-59 Months (20.5%)	WCBA	PREGNANT WOMEN	Deliveries	OPD
		MALE	FEMALE	TOTAL					
BUWOOYA	Bukinalwa	1750	1694	3444	706	706	635	35	3444
	Buwanzi	2087	2197	4284	878	878	790	44	4284
	Buwooya	1796	1772	3568	731	731	658	37	3568
	Lingira	916	716	1632	335	335	302	17	1632
					18383			925	88927

Source: HMIS Buvuma District 2015

Table 7: State of health facilities in the District

SUB-COUNTY	HEALTH FACILITY	STATUS	CHALLANGES
BUGAYA	Bugaya III	Functional	• Maternity ward roof leaking and part of the roof ceiling collapsed • No female ward • Lack transport to conduct out reaches
LYABANA	Nkata II	Functional	• Maternity ward roof leaking and part of the roof ceiling collapsed • Injection/examination room roof leaking • Staff house not completed and windows lack glass • Water tanks for the health facility and staff house not installed • Health facility window glasses not in place
BWEEMA	Bweema II	Functional	• Medicine store lack roof ceiling • Maternity ward not designed for privacy and no running water • Doors not lockable since there are no locks • Solar system has broken down
LWAJJE	Lwajje III	Functional	• No staff accommodation • Maternity ward windows are not sealed with glass
NAMATALE	Bweema II	Functional	
BUSAMUZI	Busamuzi III	Functional	• No space for HIV/AIDs care • No waiting shade for patients

BUWOOYA	Buwooya II	Functional	• Maternity ward roof leaking and roof ceiling collapsing
	Lingira (NGO) II	Functional	
TOWN COUNCIL	Kitamiro IV	Functional	• No water in labor suit • Theatre has functional defects in (sterility, sterilization of instruments and linen since autoclave is not functional, theatre not sealed to the external environment, no functional solar system for night operations) • Instruments supplied not functional since there are not powered by national grid or solar • Infrastructure of the health facility cannot enable the use of instruments since there has been no modification for use • Importantly there is no mortuary rising a public health concern • Patients lack kitchens • No solar energy supply to vital points at the facility and staff houses • Lack of a functional ambulance for emergency referrals. • There is inadequate staff accommodation that compromises functionality • Lack of proper storage for medicines • Lack of a fence to the health facility to ensure personnel and interment security
LUBYA	Lubya II	Under construction	• No staff accommodation adequacy
	Namiti (NGO) II	Functional	

Source: HMIS Buvuma District 2015

4.3.4 Vermin and Wild-life Animal Attacks

Participatory assessments through focus group discussions indicated cases of vermin and wildlife animal attacks in Buvuma district. Wild-life attacks of primates and crocodiles were reported in the entire district excluding Bugaya where monkeys cannot stay. Crocodile attacks commonest in Bweema, Buvuma Town council around Kyanamu and Kitamiro, Bugabo in Buwooya S/C. 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, crocodiles and gazetted vermins such as monkeys and bush pigs in case of an attack. Figure 15 indicates Vermin, Wild-life animal attacks vulnerability.
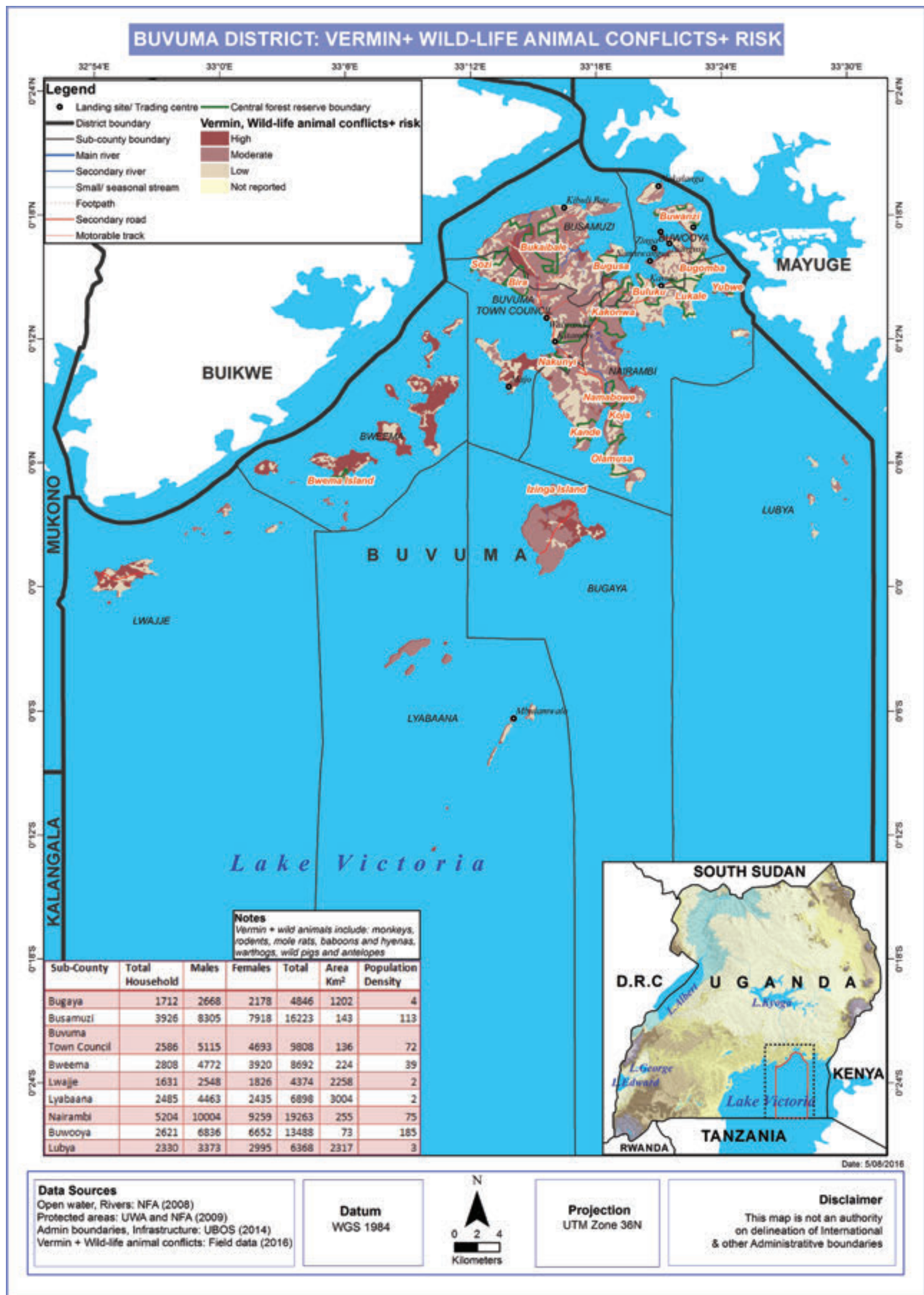
Figure 15: Vermin, Wild-life animal attacks vulnerability, Buvuma District

The map contains the following data table:

Sub-County	Total Household	Males	Females	Total	Area Km²	Population Density
Bugaya	1712	2668	2178	4846	1202	4
Busamuzi	3926	8305	7918	16223	143	113
Buvuma Town Council	2586	5115	4693	9808	136	72
Bweema	2808	4772	3920	8692	224	39
Lwajje	1631	2548	1826	4374	2258	2
Lyabaana	2485	4463	2435	6898	3004	2
Nairambi	5204	10004	9259	19263	255	75
Buwooya	2621	6836	6652	13488	73	185
Lubya	2330	3373	2995	6368	2317	3

Notes: Vermin + wild animals include: monkeys, rodents, mole rats, baboons and hyenas, warthogs, wild pigs and antelopes

Data Sources:
Open water, Rivers: NFA (2008)
Protected areas: UWA and NFA (2009)
Admin boundaries, Infrastructure: UBOS (2014)
Vermin + Wild-life animal conflicts: Field data (2016)

Datum: WGS 1984
Projection: UTM Zone 36N

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

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 Buvuma district. Paper mulberry has become a colonizer excluding all other plants especially evident in forests. Some of the intervention by NFA on Paper mulberry is the current campaign of cutting the Paper mulberry for fire wood. Participants mentioned that Lantana camara invasive species normally dominate grazing lands and thus destroy pastures that would have been palatable for animals. Water hyacinth wide spread along the Lake Victoria covering the open waters and affecting fish in the waters in the entire district. Figure 16 indicates Invasive Species Ranking in Buvuma district.

BUVUMA DISTRICT: INVASIVE SPECIES PRONE AREAS

Legend
- Landing site/ Trading centre
- Central forest reserve boundary
- District boundary
- Lantana spp. hotspot
- Sub-county boundary
- Main river
- Secondary river
- Small/ seasonal stream
- Footpath
- Secondary road
- Motorable track

Invasive species prone areas
- Very low
- Low
- Moderate
- High

MAYUGE

BUIKWE

MUKONO

KALANGALA

BUSAMUZI
Kibuli Bay
Bukaibale
Sozi
Bira
BUVUMA TOWN COUNCIL
Wahwenda
Buwanzi
BUWOOYA
Zinga
Nambeeyo
Bugusa
Bugomba
Kasanvu
Buluku
Lukale
Yubwe
Kakonwa
Buloba
Nakunyi
NAIRAMBI
Namadowe
Koja
Kande
Olamusa
Izinga Island

BWEEMA
Bweema Island

LWAJJE

B U V U M A
BUGAYA
LUBYA

LYABAANA
Mbalamwe

Lake Victoria

Notes
Most common invasive species: Lantana spp., oxalis spp., Paper Mulberry, water hyacinth
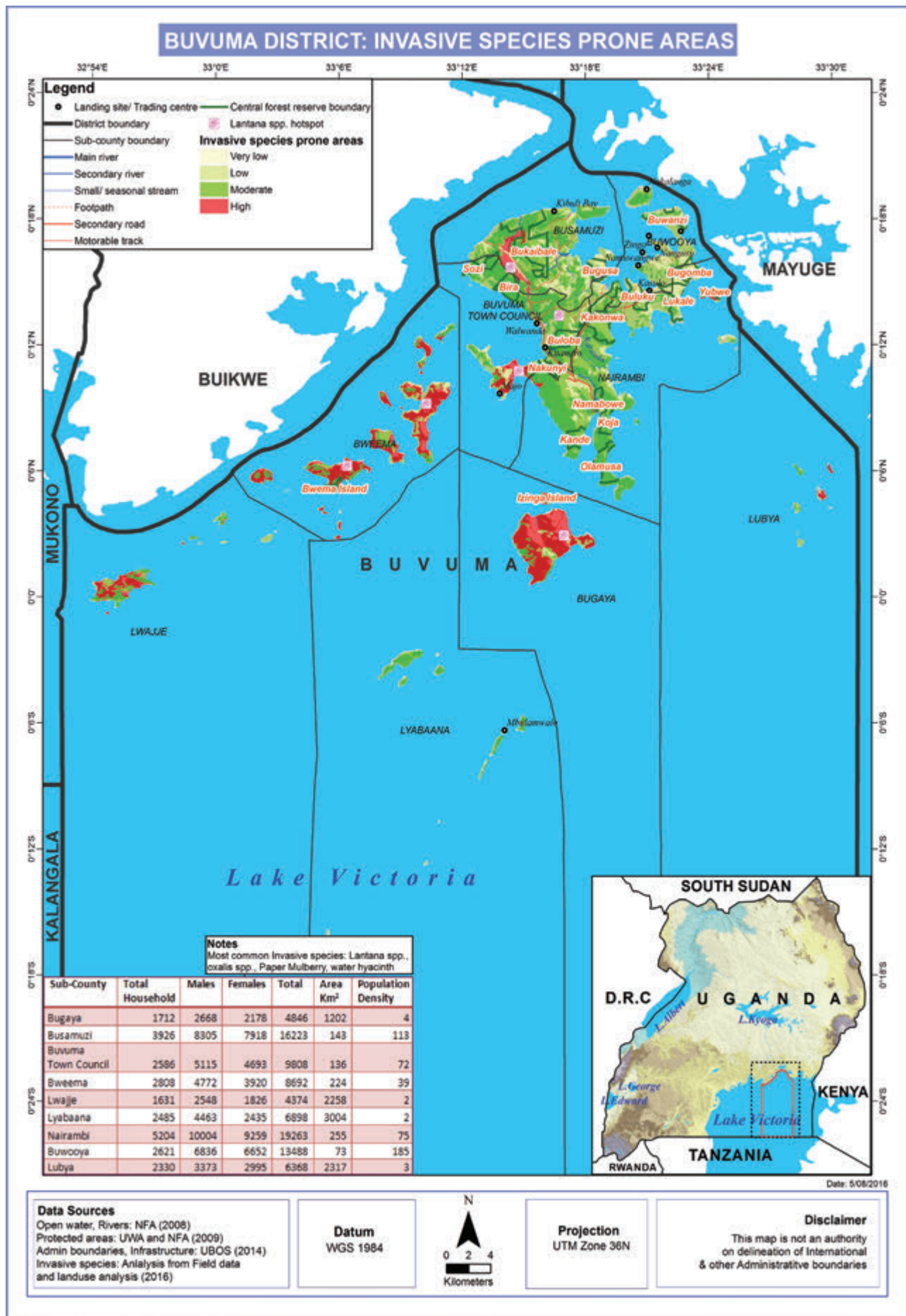
Sub-County	Total Household	Males	Females	Total	Area Km²	Population Density
Bugaya	1712	2668	2178	4846	1202	4
Busamuzi	3926	8305	7918	16223	143	113
Buvuma Town Council	2586	5115	4693	9808	136	72
Bweema	2808	4772	3920	8692	224	39
Lwajje	1631	2548	1826	4374	2258	2
Lyabaana	2485	4463	2435	6898	3004	2
Nairambi	5204	10004	9259	19263	255	75
Buwooya	2621	6836	6652	13488	73	185
Lubya	2330	3373	2995	6368	2317	3

SOUTH SUDAN
D.R.C
UGANDA
L. Albert
L. Kyoga
L. George
L. Edward
KENYA
Lake Victoria
TANZANIA
RWANDA

Date: 5/08/2016

Data Sources
Open water, Rivers: NFA (2008)
Protected areas: UWA and NFA (2009)
Admin boundaries, Infrastructure: UBOS (2014)
Invasive species: Anlaysis from Field data and landuse analysis (2016)

Datum
WGS 1984

N

0 2 4
Kilometers

Projection
UTM Zone 36N

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

Figure 16: Invasive Species Ranking, Buvuma District

4.4 Human Induced and Technological Hazards

4.4.1 Fires

Results from participatory assessments indicated fires as a problem in Buvuma district in form of bush fires, house fires and manageable fires. Some of the reported cases 40 houses burnt in 2013 in Tojwe Nairambi sub-county fires resulting from non pump fuel dealers and storage of petroleum products in houses. and agricultural practice of preparing land for crop farming. Figure 17 indicates fire risk areas and ranking in Buvuma district.

Some of the government interventions on fires include: sensitization and awareness on dangers of fires, purchase of fire extinguishers for public institutions especially health centres and fire bye-laws enforcement through Police.

BUVUMA DISTRICT: BUSH/FOREST/HOUSE FIRES PRONE AREAS

Legend

- Landing site/ Trading centre
- District boundary
- Sub-county boundary
- Main river
- Secondary river
- Small/ seasonal stream
- Footpath
- Secondary road
- Motorable track
- Central forest reserve boundary
- Bush fire evident spot

Fires prone areas
- High
- Moderate
- Low
- Very low

MAYUGE

BUIKWE

MUKONO

KALANGALA

BUSAMUZI
BUWOOYA
BUVUMA TOWN COUNCIL
NAIRAMBI
BWEEMA
Bwema Island
Izinga Island
LUBYA
B U V U M A
BUGAYA
LWAJJE
LYABAANA
L a k e   V i c t o r i a

Sub-County	Total Household	Males	Females	Total	Area Km²	Population Density
Bugaya	1712	2668	2178	4846	1202	4
Busamuzi	3926	8305	7918	16223	143	113
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Bweema	2808	4772	3920	8692	224	39
Lwajje	1631	2548	1826	4374	2258	2
Lyabaana	2485	4463	2435	6898	3004	2
Nairambi	5204	10004	9259	19263	255	75
Buwooya	2621	6836	6652	13488	73	185
Lubya	2330	3373	2995	6368	2317	3

Data Sources
Open water, Rivers: NFA (2008)
Gazetted areas: UWA and NFA (2009)
Fires prone areas: generated from analysing:
Landuse NFA 2010 and ground truthing (2016)
Admin boundaries, Infrastructure: UBOS (2014)

Datum WGS 1984

N

0 2 4 Kilometers

Projection UTM Zone 36N

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

SOUTH SUDAN
D.R.C
UGANDA
KENYA
TANZANIA
RWANDA
L. Albert
L. Kyoga
L. George
L. Edward
Lake Victoria

Date: 5/08/2016

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

4.4.2 Land conflicts

Participants indicated that land disputes were a serious problem in the entire Buvuma district. Most of the land conflicts in Buvuma district are between land lords and squatters (Tenants). Community and forest gazetted areas, boundary shifting of forest reserves (Mawanga and Koja), yet Titles for forest reserves (Koja) gazetted 1932 yet some people have recent land titles of 2014. The Main island land cover is 20,000 ha and the vegetable project requires 10,000ha (6500 ha for the estate and 3500ha has for outgrowers), the government is currently doing massive land acquisition for palm oil in the main island of Buvuma Town council, Busamuzi Nairambi, and Buwooya. Figure 18 indicates land conflicts ranking in Buvuma district.

Some of the government interventions on land disputes include: community dialogues, sensitization on land rights, arrest and evict, survey forest areas community involved and boundary opening, strengthening of security organs, courts of law and Ministry of Lands and surveys for boundary opening using the original coordinates for the boundaries.

Figure18: Land Conflicts Ranking, Buvuma 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 reclamation and conversion for agriculture, deforestation, brick making and sand mining.

Due to the current low productivity of the lake, people have resorted to deforestation, charcoal burning, cultivation of upland rice and other crops as a source of Household income causing massive Environmental degradation. Private forests have also been cut down by owners where they are selling the land to government for vegetable oil project that is currently ongoing in the district. About 60% forest cover loss has been recorded in the past 10 years. The reduced tree cover has caused extended dry spells, evident by reduced rainy frequency and amounts compared to the previous past 10 years where it would rain daily in the district. Gravity flow scheme in Busoba no longer has flowing water in the taps due to drying up effect caused by change in water levels attributed to the ongoing degradation. Reduced forest cover has also caused silting of the streams and water bodies, such as in Bukalabati Nairambi due to forest clearance.

Most of the wetlands are threatened with degradation and others with conversion into agriculture and rice growing as well as settlements. The most affected wetlands include: Nkoka-Busamuzi in Kabugombe in Buvuma Town council, Bukiyindi wetland in Nairambi sub-county, Bukwaya swamp in Bweema sub-county have been converted to paddy rice growing.

Cases of brick making in wetlands, massive tree felling as source of wood fuel for brick burning, issues of sanding mining in wetlands and local brewing associated with use of wetland water for cooling but also discharge of effluents from the brewing. It is important to note that there is increased sugar cane growing in the district claiming wetland areas it is deemed fertile and suitable for the cane growing.

Some of the government interventions on environmental degradation include: sensitization campaigns against wetland encroachment, tree planting and re-afforestation, bye-laws and ordinances on charcoal burning, arrest people involved in degradation. However, there is need for prudent and responsible management of these resources as they lay foundation for other district development activities. This calls for effective implementation of the policies there in and regular monitoring to address emerging issues.
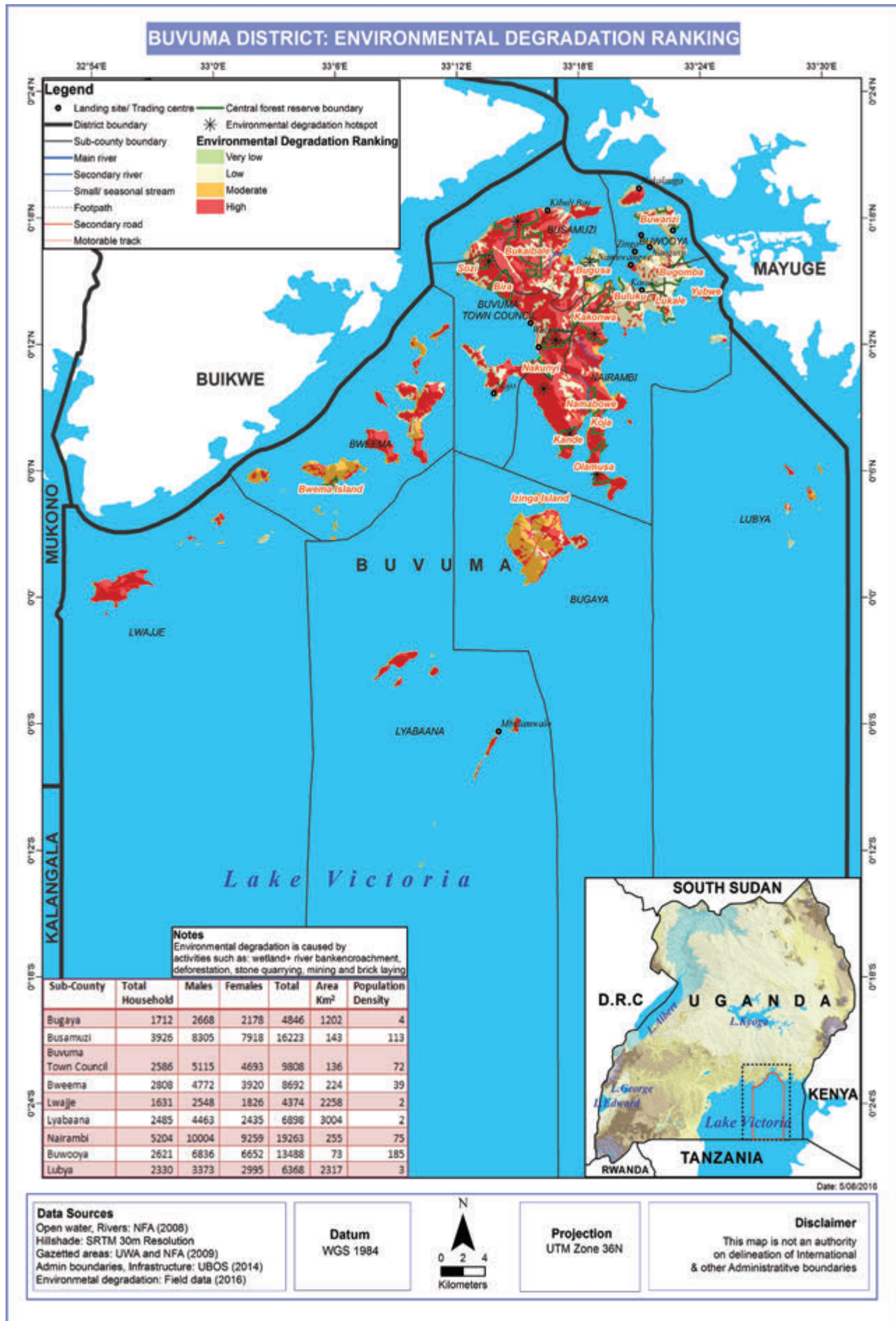
Figure 19: Environmental Degradation Ranking, Buvuma District

4.4.4 Accidents (Road, Water)

It was reported that there are isolated cases of road accidents such as head on collisions and vehicles overturning are along Kirongo – Kurwe road citing at least 2 accidents per year along the specific road. Boda-boda accidents reported as biggest form of road accidents in Buvuma district with no traffic officers and enforcement in the entire district.

Water accidents reported as the biggest challenge on the increase in the district especially during dry seasons where strong winds become common on Lake Victoria causing engine failures and boat capsizing, drowning and boat direction loss. The most prone areas are the open waters where waves gather momentum and getting stronger causing boat capsize. Windstorm typhoon reported in July 2015 60 killed in Bugaya, strong cyclic winds (ensoke) killed people in 2013.

Other forms of water accidents was reported as caused by sub-emergent rocks (e byeema) in the lake are a threat. Some incidences of boat engine crashing and non-motorized boat knocking of the submerged rocks in Bweema sub-county and Buvuma Town council (Namasimbi Island) and consequent boat capsize have been reported.

Some of the intervention is the central Police Marine and UNRA rescue boats at Kiyindi Landing site which are always on standby in case of any incidence. Also fishermen at landing sites are always on the look for fellow sailors especially during bad weather on the lake. The most affected sub-counties include Bugaya, Lyabaana, Lubya, Lwajje and Bweema sub-counties. Figure 20 indicates accident hotspots and risk areas in Buvuma district.

Figure 20: Road Accidents Hotspots and Vulnerability, Buvuma 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 Buvuma 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 8).

Table 9 (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 9). Table 10 shows Hazard assessment for Buvuma District.

Table 8: Components of Vulnerability in Buvuma 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

Hazard	Elements at risk	Level	Effects	Level	Coping mechanisms	Level
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

Environmental component	Hazard	Elements at risk	Effects	Level	Coping/Mitigation strategies	Level
	Land conflicts	- Human population	-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	-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	-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
	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	- 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

Hazard	Elements at risk	Level	Impacts	Level	Coping measures
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

Hazard	Elements at risk	Level	Effects	Level	Interventions
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 9: Vulnerability Profile for Buvuma District

Hazards	PROBABILITY	SEVERITY OF IMPACTS	RELATIVE RISK	VULNERABLE SUB COUNTIES
	Relative likelihood this will occur	*Overall Impact (Average)*	*Probability x Impact Severity*	
	1 = Not occur *2 = Doubtful* *3 = Possible* *4 = Probable* *5 = Inevitable*	*1 = No impact* *2= Low* *3=medium* *4 = High*	*0-1= Not Occur* *2-10= Low* *11-15=Medium* *16-20= High*	
Floods	4	3	12	Entire district
Dry spells	3	3		Buwoya, Busamuzi and Lubya
Soil erosion, rock falls and landslides	5	4		Nairambi, Busamuzi and Buvuma Town council
Hail storms, lightening and strong winds	4	3	12	Bweeema, Bugaya, Nairambi, Busamuzi and Buvuma Town council
Bush fires	3	3	9	Nairambi
Crop pests and diseases	3	3	9	Nairambi, Busamuzi, Buwooya and Buvuma Town council
Livestock pests and diseases	3	3	9	Nairambi and Buvuma Town council
Human Diseases outbreaks	3	3	9	Nairambi, Bugaya, Busamuzi, Buwooya and Buvuma Town council
Land conflicts	5	4	20	Nairambi and Buvuma Town council
Vermin and Wild-life animal attacks	4	3	12	Bweema and Buvuma Town council
Earthquakes and faults	1	1	1	Entire District
Road accidents	1	1	1	Not so significant
Environmental degradation	5	4	20	Nairambi, Bweema, Busamuzi, Buwooya and Buvuma Town council
Invasive species	3	3	9	Bugaya and Bweema

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 10: Hazard Risk Assessment

Hazard	Bugaya	Busamuzi	Buwooya	Buvuma TC	Bweema	Lubya	Lwajje	Lyabaana	Nairambi
Floods	M								M
Drought		M	M						
Landslides, Rock falls and Erosion	M	H	M	H	L	L	L	L	H
Strong winds, Hailstorms and Lightening	VH	H	M	H	VH	M	M	M	H
Crop pests and Diseases	L	M	M	M	L	L	L	L	M
Livestock pests and Diseases	L	L	L	M	L	L	L	L	M
Human disease outbreaks	M	M	M	VH	M	M	M	M	H
Vermin and Wildlife animal attacks	L	L	L	M	M	L	L	L	L
Land conflicts	M	M	M	VH	M	M	M	M	VH
Bush fires	L	L	L	L	L	L	L	L	M
Environmental degradation	M	VH	VH	VH	VH	M	M	M	VH
Earthquakes and faults	L	L	L	L	L	L	L	L	L
Road accidents									
Invasive species	M	L	L	L	M	L	L	L	L

Key

VH	Very high
H	High
M	Medium
L	Low
	Not reported/ Not prone

4.5.1 Gender and Age groups mostly affected by Hazards

Table 11: 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 12).

Table 12: Coping strategies to the Multi-hazards in Buvuma 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	*Ecological or Biological*	*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		*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 CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

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 Buvuma 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 Buvuma 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 Buvuma district increase their vulnerability to hazard exposure necessitating urgent external support.

Hazards experienced in Buvuma 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 programmes aimed at disaster risk reduction.

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

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

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

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

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

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

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

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

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

xiii. The Government through MAAIF should fund and recruit extension (facilitate them) works at sub-county level.

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Buvuma District development Plan 2015/2015 – 2019/2020

APPENDIX I: DATA COLLECTION TOOLS

FOCUS GROUP DISCUSSION GUIDE FOR DISTRICT DISASTER RISK MANAGEMENT FOCAL PERSONS

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

No.	Name of Participants	Designation	Contact	Signature

Introduction

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

17. What impacts have been caused by earth quakes?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

34. In which way are crops affected by drought?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

71. What impacts have been caused by wildlife attacks?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

87. What impacts have been caused by environmental degradation?

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

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

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

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

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

93. What impacts have been caused by land conflicts?

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

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

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

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

98. Which roads have experienced Road accidents?

99. What impacts have been caused by Road accidents?

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

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

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

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

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

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

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

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

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

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

FOCUS GROUP DISCUSSION GUIDE FOR LOCAL COMMUNITIES

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

No.	Name of Participants	Village/ Parish	Contact	Signature

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viii.I would not like to keep you here long; at most we should be here for 30 mi*nutes- 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?

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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?

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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?

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

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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?

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

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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?

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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?

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

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

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

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

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87. What impacts have been caused by environmental degradation?

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

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98. Which roads have experienced Road accidents?

99. What impacts have been caused by Road accidents?

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

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

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

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

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

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

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

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

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

SPATIAL DATA COLLECTION SHEET FOR HAZARD VULNERABILITY AND RISK MAPPING

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

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

Department of Relief, Disaster
Preparedness and Management
Office of the Prime Minister
P.O.Box 371, Kampala, Uganda

THE REPUBLIC OF UGANDA

With support from:

United Nations Development Programme

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