THE REPUBLIC OF UGANDA

Kween District

Hazard, Risk And Vulnerability Profile

2016

ACKNOWLEDGEMENT

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

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

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

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

My appreciation also goes to Bukwo District Team:

1. Mr. Chemusto Samuel, Ag. DNRO
2. Makwata Moses, DFO/Secretary DDMC

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 Ngenge, Kiriki, Benet, Kitawoi, Kwosir, Kaptoyoy, Binyinyi and Kaptum 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-day regional data verification and validation workshop was organized by UNDP in Mbale Municipality as a central place within the region. This involved key District DDMC focal persons for the purpose of creating Local/District ownership of the profiles.

Multi-hazards experienced in Kween 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, 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 Kween 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. Drought and floods were identified as most serious problems in Kween District with almost all Sub-counties being vulnerable to the hazards is generally hilly with Valleys and a number of Streams flowing Northwards from the Mt Elgon. The limited adaptive capacity (and or/ resilience) and high sensitivity of households and communities in the District increase their vulnerability to hazard exposure necessitating urgent external support. To reduce vulnerability at community, Local Government and national levels should be a threefold effort hinged on:

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

discrimination, inequality and inadequate access to resources and livelihood opportunities. The following were recommended policy actions targeting vulnerability reduction:

- The Government should improve enforcement of policies aimed at enhancing sustainable environmental health.
- The Government through MAAIF should review the animal diseases control act because of low penalties given to defaulters.
- The Government should establish systems to motivate support of political leaders toward Government initiatives and Programmemes aimed at disaster risk reduction.
- The Government should increase awareness campaigns aimed at sensitizing farmers/ communities on disaster risk reduction initiatives and practices.
- The Government should revive disaster committees at District level and ensure funding of disaster and environmental related activities.
- The Government through UNRA and the District Authority should fund periodic maintenance of feeder roads to reduce on traffic accidents.
- The Government through MAAIF and the District Production Office should promote drought and disease resistant crop seeds.
- The Government through OPM and Meteorology Authority should increase importation of lightning conductors and also reduce taxes on their importation.
- The Government through OPM and Meteorology Authority should support establishment of disaster early warning systems.
- The Government through MWE increase funding and staff to monitor wetland degradation and non-genuine agro-inputs.
- The Government through OPM should improve communication between the disaster department and Local communities.
- The Government through MWE should promote Tree planting along road reserves.
- The Government through MAAIF should fund and recruit extension workers at Sub-county level and also facilitate them.

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LIST OF ACRONYMS

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

DEFINITION OF KEY TERMS

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

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

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

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

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

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

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

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

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

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

processes, which increase the susceptibility of community to the impact of hazards "(UN-ISDR 2009.)

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

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

INTRODUCTION

1.1 Background

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

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

Since 2013, UNDP has been supporting the Office of the Prime Minister to develop District Hazard Risk and Vulnerability profiles in the Sub-regions of Rwenzori, Karamoja, Teso, Lango, Acholi and West Nile covering 42 Districts. During the above exercise, Local Government Officials and community members have actively participated in data collection and analysis. The data collected was used to generate hazard risk 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 Kween District in Eastern 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 Kween District, Eastern 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 Kween District and quantify them through a participatory approach on a scale of "not reported/ not prone", "low", "medium" and "high".
ii. Analysis of field data and review the quality of each hazard map which should be accompanied by a narrative that lists relevant events of their occurrence. Implications of hazards in terms of their effects on stakeholders with the vulnerability analysis summarizing the distribution of hazards in the District and exposure to multi-hazards in Sub-counties.
iii. Compilation of the entire District multi-hazard, risk and vulnerability HRV Profiles in the time frame provided.
iv. Generating complete HRV profiles and maps and developing a database for all the GIS data showing disaggregated hazard risk and vulnerability profiles to OPM and UNDP.

1.4 Justification

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

1.5 Structure of the Report

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

OVERVIEW OF KWEEN District

2.1 Location

Kween District was carved out of Kapchorwa District in July 2010. It is located between coordinates: 1° 25’ 0’’ N and 34° 31’ 0’’ E in Eastern Uganda. The District is bordered by Nakapiripirit District to the North, Amudat District to the Northeast, Bukwo District to the East, the Republic of Kenya to the South, Kapchorwa District to the west and Bulambuli District to the northwest. Figure 1 shows the Administrative boundaries and gazetted areas of Kween District.

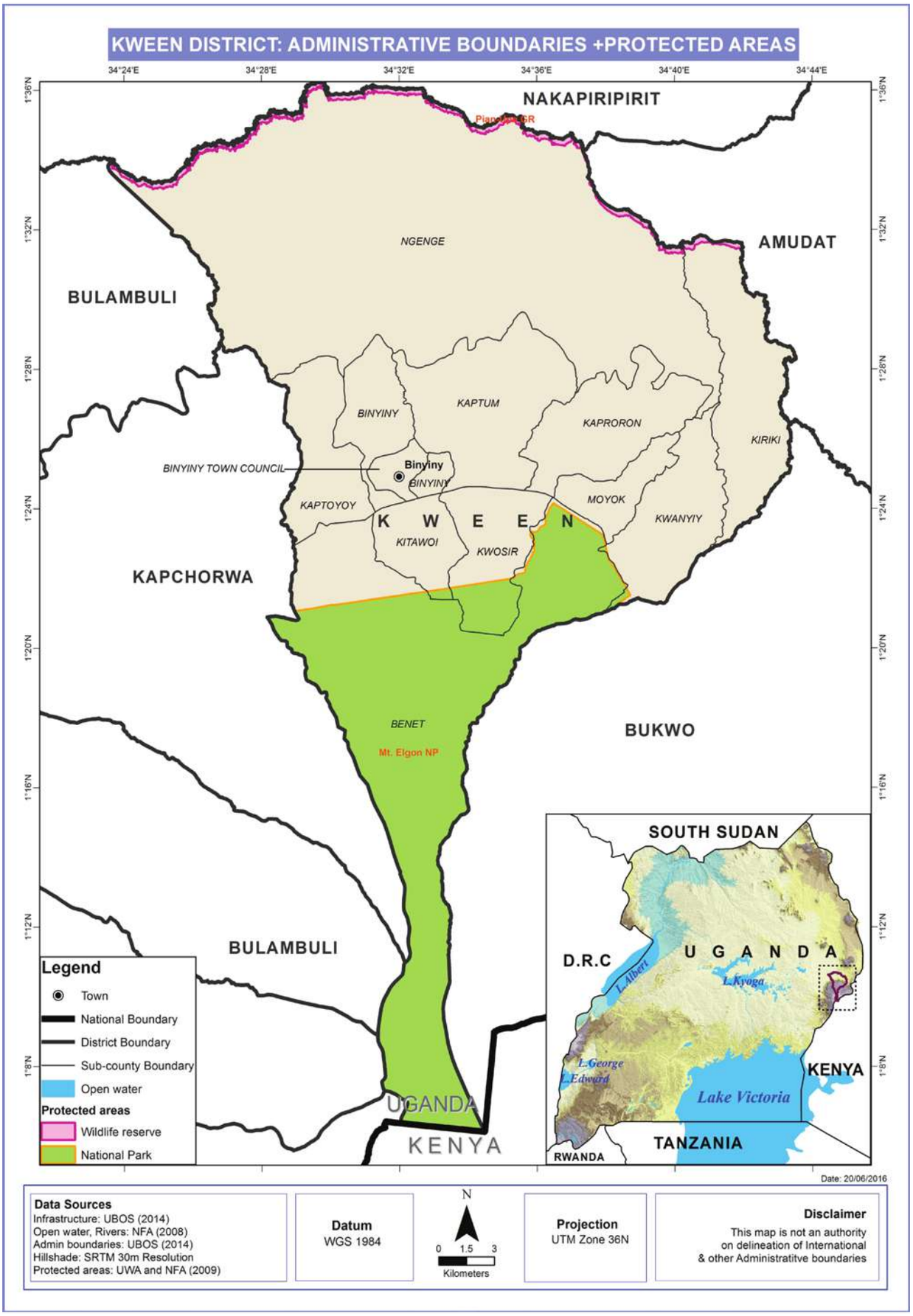


Figure 1: Administrative Boundaries, Kween District

2.1.1 Geomorphology

The District has three altitudes namely, the lowlands (Ngenge and kiriki Sub-counties) with an area of 1/3 of the entire District and altitude of 1000 -1300m above sea level with average land holding of 5 acres per household. The second is the middle zone that has highly steep slopes and adequate/reliable rainfall with altitude of 1400m above sea level (Kaptoyoy, Binyiny, Kaptum, Kaproron, Moyok, Kwanyiny and Binyiny Town Council). The third zone is the high altitude (Benet, Kwosir and Kitawoi Sub counties) which is between 1400 -2000 m. Mixed mountainous forests are found at altitude less than 2500m. Bamboo and low canopy mountainous forest are found between 2400m to 3500m. Moorland is found above altitude 3500m.The District is generally hilly with Valleys and a number of Streams flowing Northwards from the Mt Elgon. (Figure 2)

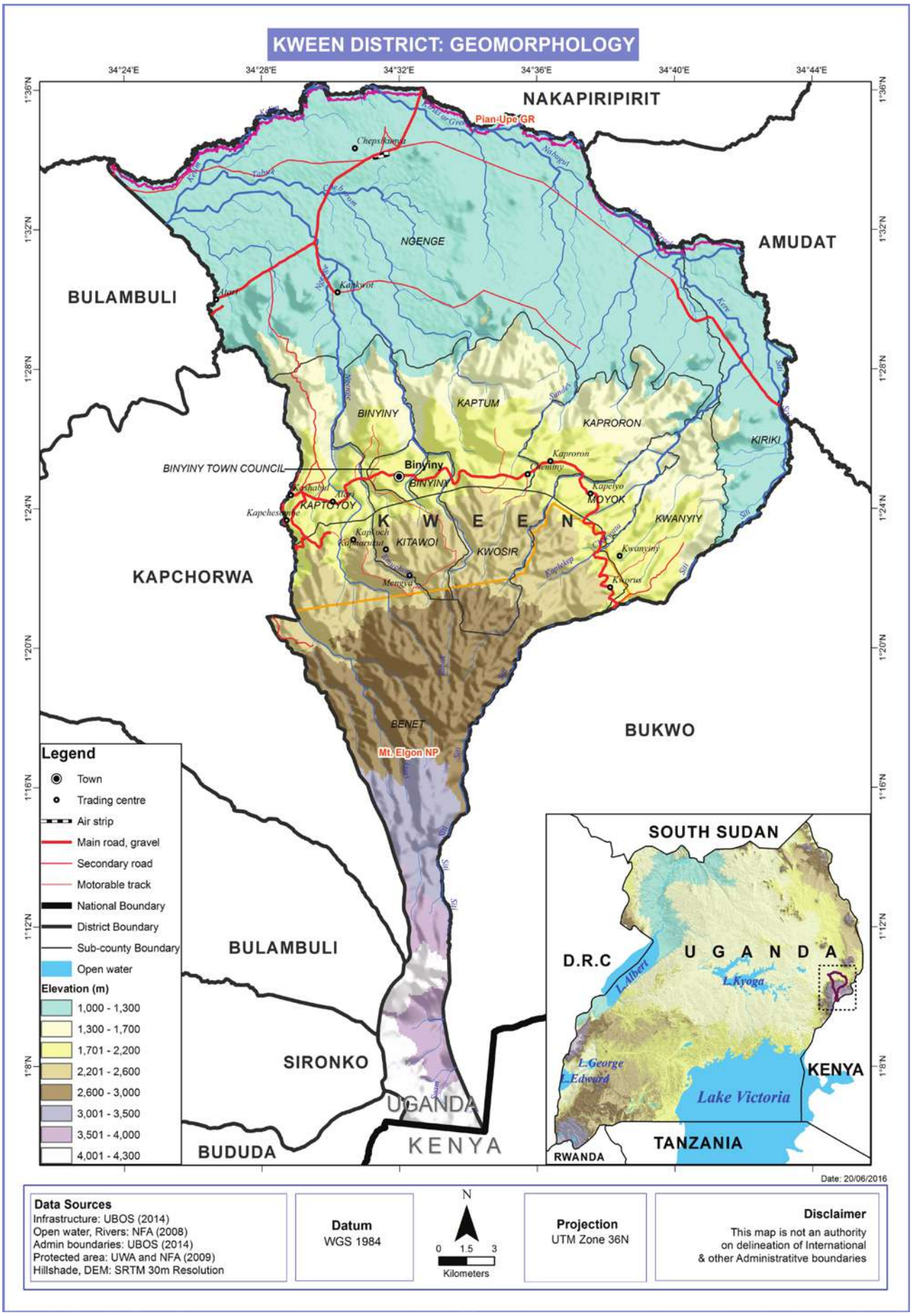


Figure 2 Geomorphology of Kween District

2.1.2 Geology and soils

Mt. Elgon is underlain by Mesozoic and Cainozoic rocks comprising of mainly volcanics and sediments. They are generally soda-rich agglomerates, lavas and tuffs that have been extruded. Much as the rocks belong to ancient rock systems, volcanic intrusions have occurred leading to material flows forming sediments in valleys rich in volcanic ash. Due to prolonged exposure weathering of volcanic ash has occurred releasing rock fragments ranging from cobbles to massive boulders that either lie on the slopes or are embedded in soils. Soils on the slopes of Mt. Elgon are mainly classified as Acrisols, Ferralsols, Nitisols and Luvisols. On higher altitudes in the forest belt soils are brown to red-brown clay-loams, up to a meter or so deeper. Above 3,000m however, shallow black humus soils predominate. These soils are relatively young and fertile with high concentration of calcium, sodium, and potassium. (Figure 3)

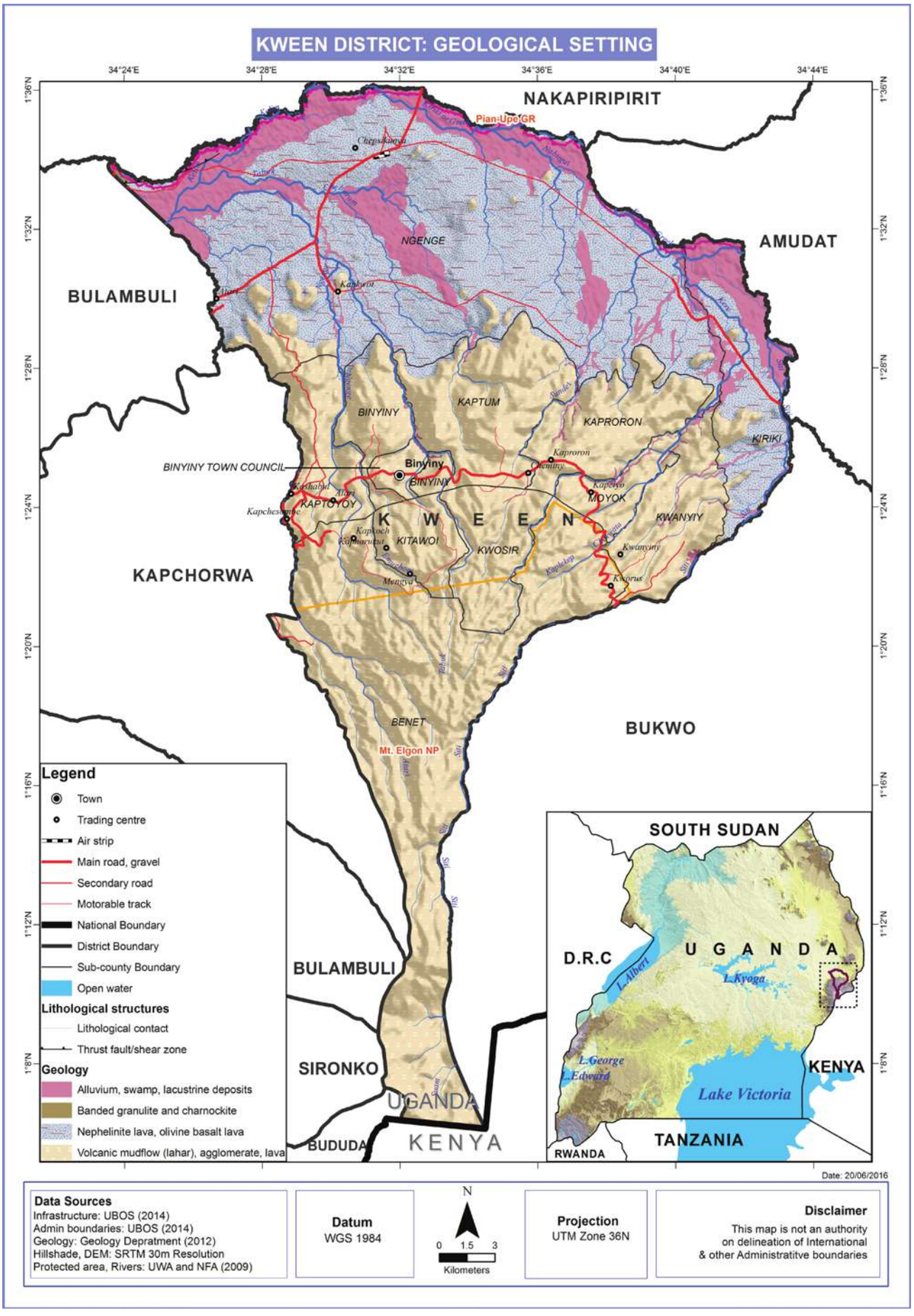


Figure 3: Geology and Lithological structutres of Kween District

2.1.3 Vegetation and Land use Stratification

Altitude of 1000m-1300m vegetation type is savanna woodlands comprising of combaratium spp 1400m-2500m- vegetation type. ***(More information from lit).***

Mixed mountainous forest found at altitude less than 2500m. Bamboo and low canopy mountainous forest found between 2400m to 3500m. Moor land found above altitude 3500m.

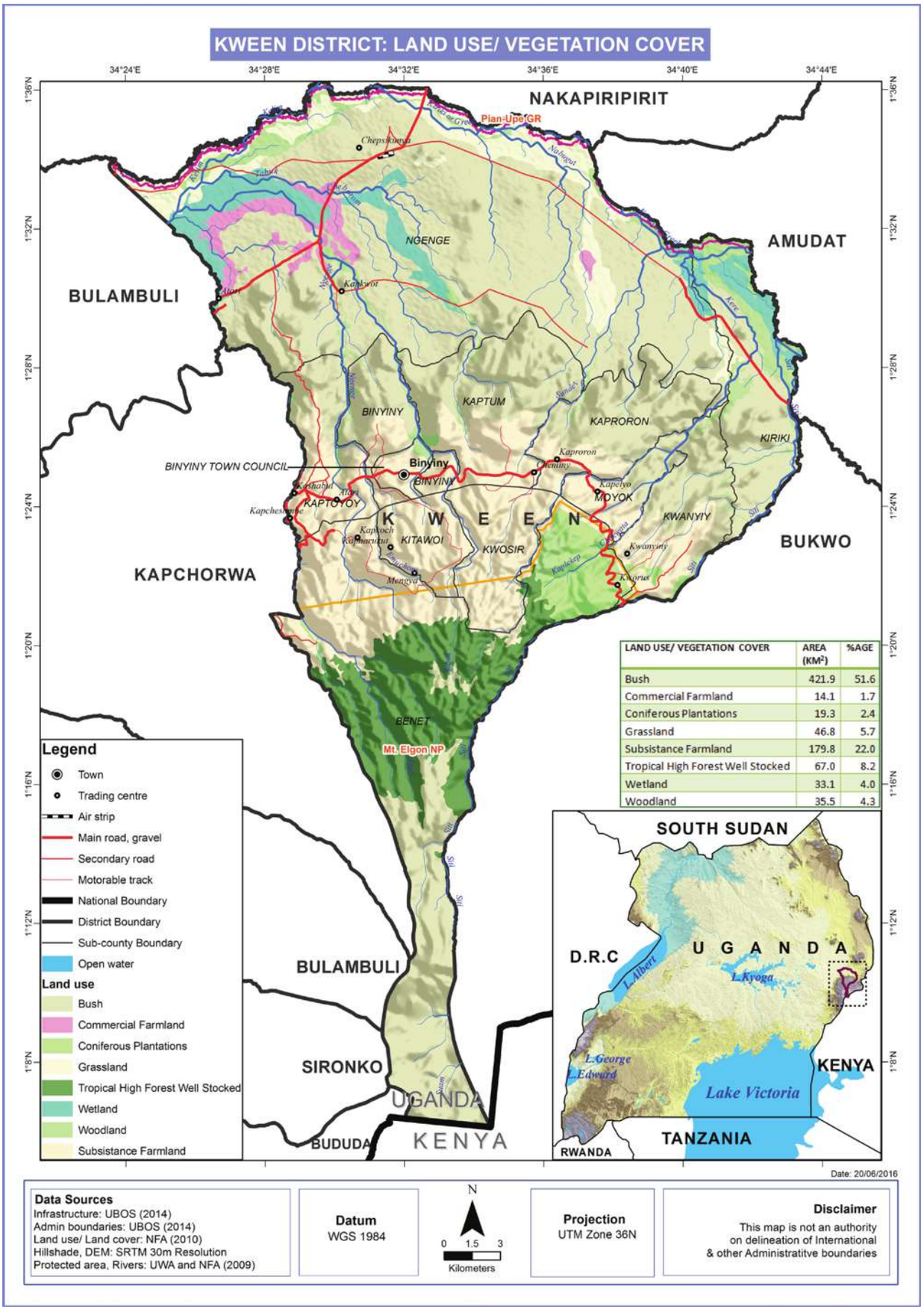


Figure 4: Land Use Stratification, Kween District

2.1.4 Temperature and Humidity

The mean minimum temperatures in Kween District vary from 10°C to 14oC, while the mean maximum temperatures vary from 20°C to 25oC.

2.1.5 Rainfall

Average Rainfall per annum lies between 920 – 1650mm and is usually received during the months of June-August. First Rains starts in mid march to May with a dry spell in the month of june . second rainy season starts in july to October. The District experiences dry windy conditions in December –February while occasional storms are also experienced.

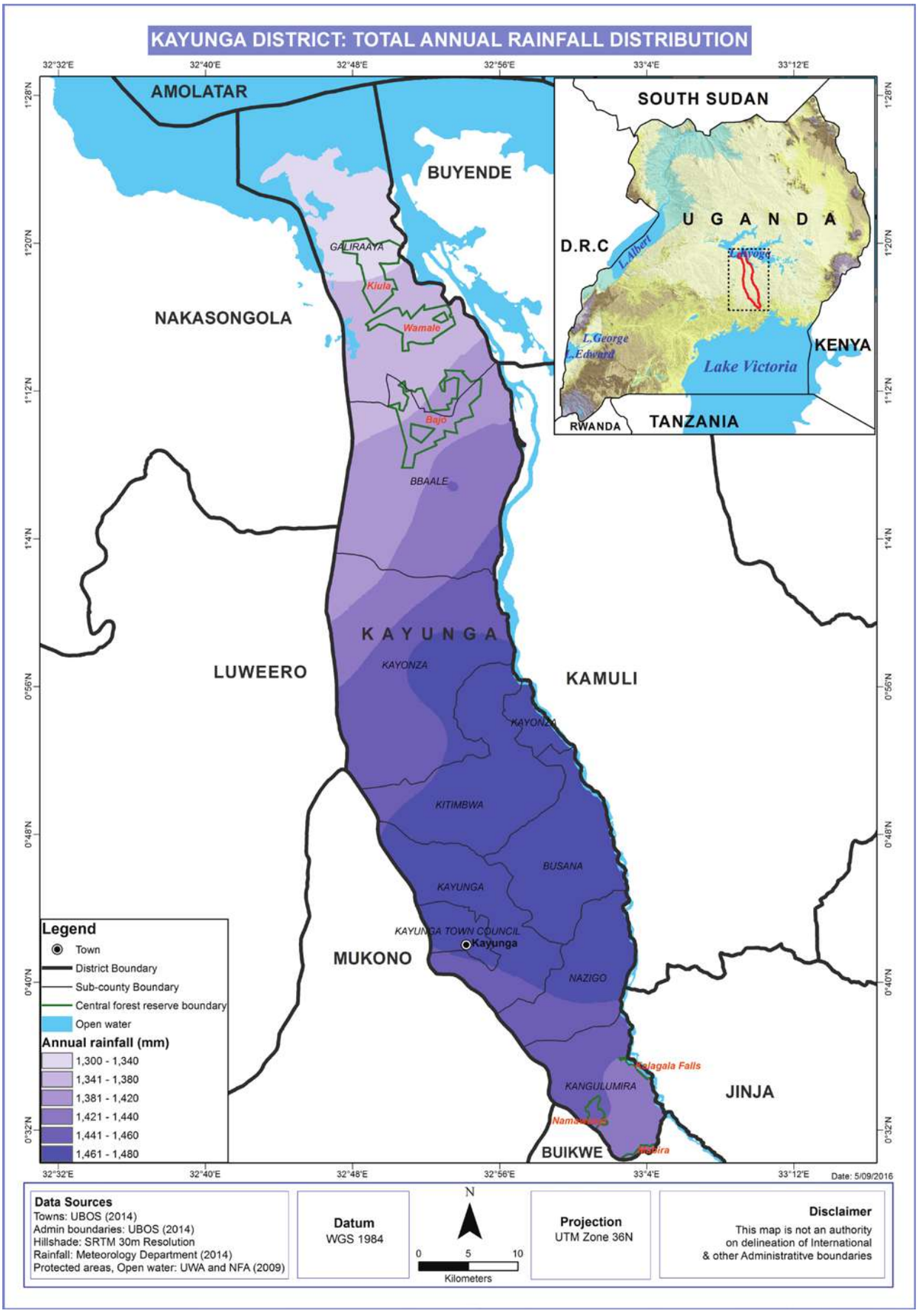


Figure 5: Total Annual Rainfall Distribution, Kween District

2.1.6 Hydrology

Kween District is endowed with a number of rivers and streams flowing northwards from Mt Elgon National Park traversing through the Sub counties in the District to kyoga water basin. Most of these rivers and streams form administrative boundaries between Sub counties and Districts. River siit traverses through Kwanyiy and kiriki Sub counties forming the administrative boundary to the east between Kween and Bukwo District and Atari river that transverse the Sub counties of Benet, Kaptoyoy and Ngenge and forms the administrative boundary between Kween ,Kapchorwa to the west and Bulambuli to the north west respectively . Other common rivers are Kere, Sundet, Chepyakaniet, Kaplegep and Yemptonyi Wetlands

Kween District has five wetlands , of which four are located in greater Ngenge area (ngenge and kiriki Sub counties); Atari, , sundet , kere and siit wetlands and one wetland in Kaptoyoy Sub county Kubal with historical and cultural background information that led to its formation

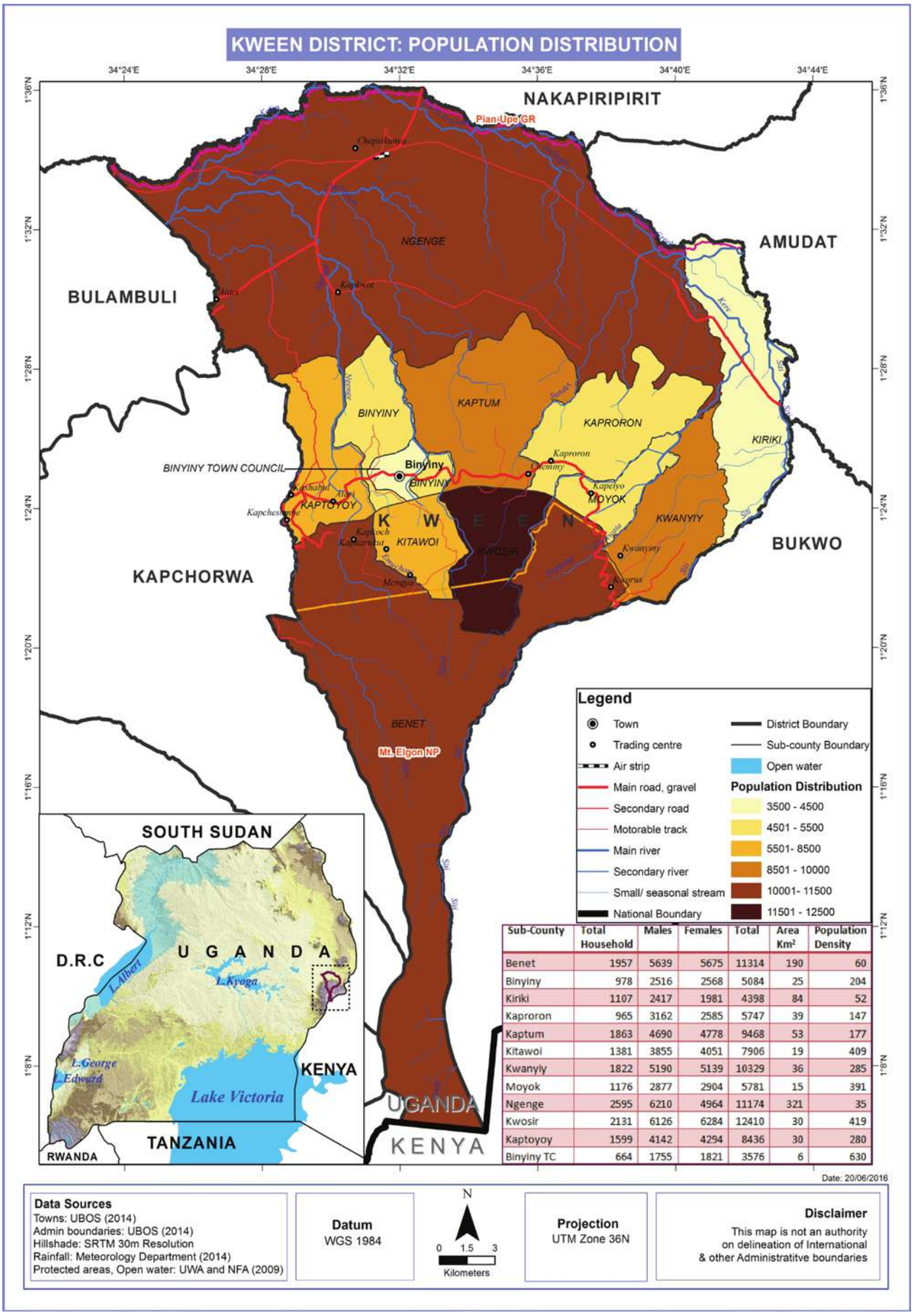
2.1.7 Population

According to the National Population and Housing Census (2014) results, Kween District had a total population 95,623 people. Results also showed that most of the people in Kween District reside in rural areas (92,047 (96.3%) compared to (3,576 (3.7%) who reside in urban centers. The gender distribution was reported to be males: 48,579 (50.8%) and females: 47,044 (49.2%). About 99.5% (95,104) of the population form the household population and only 0.5% (519) is Non-household. Kwosir Sub-county has the highest population of 12,410 people while Binyiny Town Council had the least population of 3,576 people (Figure 6).
Table 1 shows the population distribution per Sub-county for the different gender.

Table 1: Population Distribution in Kween District

	HOUSEHOLDS		POPULATION		
Sub-County	*Number*	*Average Size*	*Males*	*Females*	*Total*
Benet	1957	5.8	5639	5675	11314
Binyiny	978	5.2	2516	2568	5084
Binyiny Town Council	664	5.3	1755	1821	3576
Kaproron	965	5.9	3162	2585	5747
Kaptoyoy	1599	5.3	4142	4294	8436
Kaptum	1863	5.1	4690	4778	9468
Kiriki	1107	4	2417	1981	4398
Kitawoi	1381	5.7	3855	4051	7906
Kwanyiy	1822	5.7	5190	5139	10329
Kwosir	2131	5.8	6126	6284	12410
Moyok	1176	4.8	2877	2904	5781
Ngenge	2595	4.2	6210	4964	11174

Source: UBOS Census 2014



Sub-County	Total Household	Males	Females	Total	Area Km²	Population Density
Benet	1957	5639	5675	11314	190	60
Binyiny	978	2516	2568	5084	25	204
Kiriki	1107	2417	1981	4398	84	52
Kaproron	965	3162	2585	5747	39	147
Kaptum	1863	4690	4778	9468	53	177
Kitawoi	1381	3855	4051	7906	19	409
Kwanyiy	1822	5190	5139	10329	36	285
Moyok	1176	2877	2904	5781	15	391
Ngenge	2595	6210	4964	11174	321	35
Kwosir	2131	6126	6284	12410	30	419
Kaptoyoy	1599	4142	4294	8436	30	280
Binyiny TC	664	1755	1821	3576	6	630

Figure 6: Population Distribution, Kween District

2.1.8 Economic activities

The majority of households in Kween District are involved in Subsistence agriculture where cultivation of food crops such as maize, beans, coffee, millet, sorghum, Irish potatoes, bananas, rice wheat and barley was dominant. Livestock farming is also practiced and the animals reared include cattle, goats, pigs, sheep and chicken.

METHODOLOGY

3.1 Collection and analysis of field data using GIS

3.1.1 Preliminary spatial analysis

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

3.1.2 Stakeholder engagements

Stakeholder engagements were carried out in close collaboration with OPM's DRM team and the District Disaster Management focal persons with the aim of identifying the various hazards ranging from drought, 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 four respondents (Chief Administrative Officer, District Environment Officer and District Natural Resources Officer was held at Kween 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 Ngenge Sub-county, Kiriki Sub-county and Benet 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 respectively. In order to produce age and sex disaggregated data, results from FGDs and KIIs were integrated with the District population census data. This was also input in the multi-hazard, risk and vulnerability profile maps.

3.1.3 Participatory GIS

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

3.1.4 Geo-referencing and ground-truthing

The identified hazard hotspots in the community profile maps were ground-truthed and geo-referenced using a handheld Spectra precision Global Positioning System (GPS) unit, model: Mobile Mapper 20 set in WGS 1984 Datum. The entities captured included: hazard location, (Sub-county and Parish), extent of the hazard, height above sea level, slope position, topography, neighboring land use among others (Appendix I). Hazard hot spots, potential and susceptible areas will be classified using a participatory approach on a scale of “not reported/ not prone”, “low”, “medium” and “high”. This information generated through a participatory and transect approach was used to validate modelled hazard, risk and vulnerability status of the District. The spatial extent of a hazard event was established through modelling and a participatory validation undertaken.

3.2 Develop District Specific Multi-hazard Risk and Vulnerability Profiles

3.2.1 Data analysis and integration

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

3.2.2 Data verification and validation

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

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

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

RESULTS FROM 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).

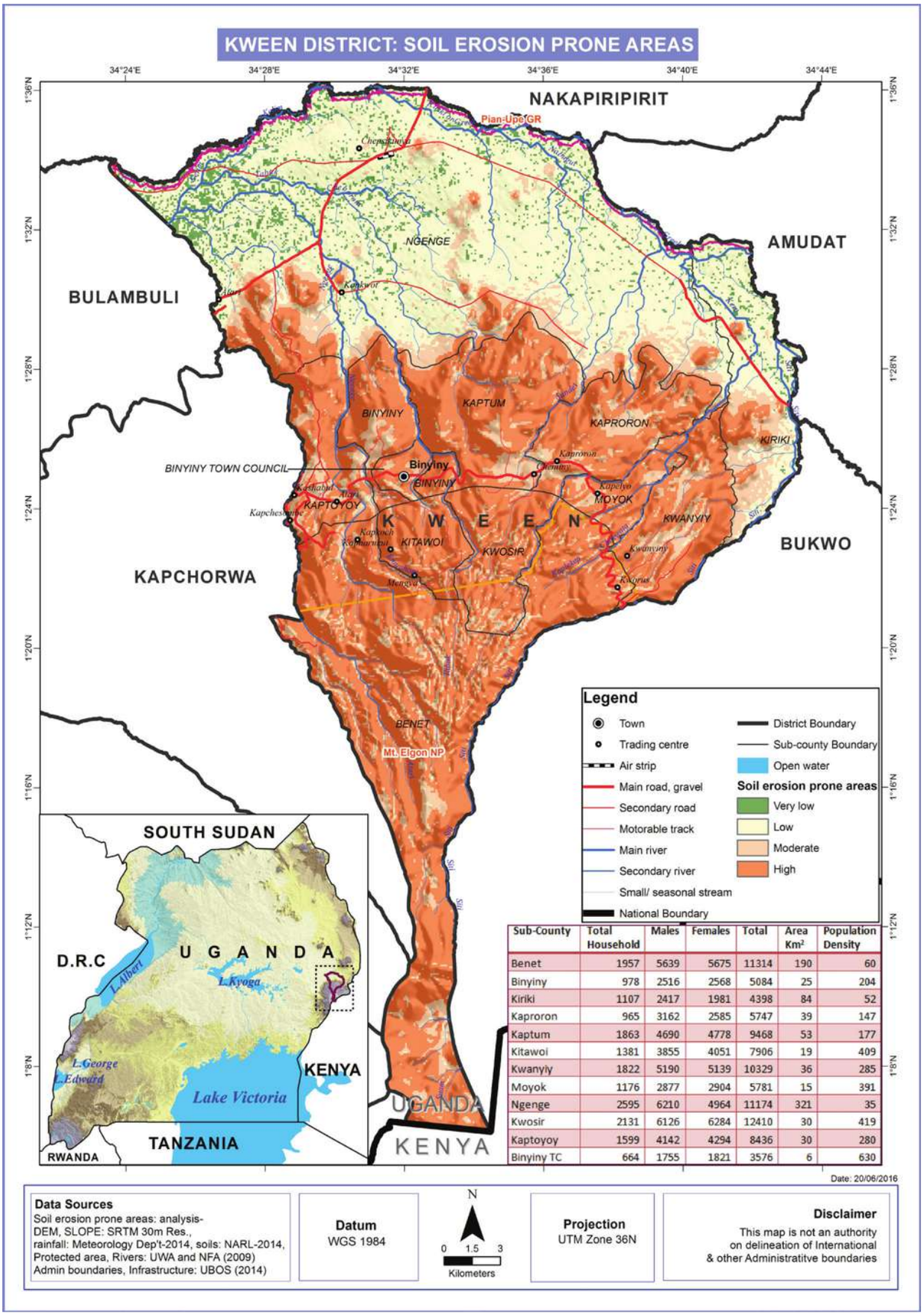
In the case of Kween District, hazards were classified following main controlling factors:

i. Geomorphological or Geological hazards including landslides, rock falls and soil erosion
ii. Climatological or Meteorological hazards including floods, drought, hailstorms, strong winds and lightning
iii. Ecological or Biological hazards including crop pests and diseases, livestock pests and diseases, human epidemic diseases, vermin attacks and wildlife animal attacks,
iv. Human induced or Technological hazards including bush fires, road accidents land conflicts.

4.1 Geomorphological and Geological Hazards

4.1.1 Landslides, rock falls and soil erosion

Results from the participatory assessments indicated that there were many incidences of landslides, mudslides, soil erosion and rock falls in Kween District especially during the rainy seasons. Participants reported that landslides block roads rendering them impassable, destroy crops and houses and kill livestock and people. It was also reported that parts of Kitawoi Sub-county hadn't been inhabited since 1983 but they have been degazetted for resettlement of recent. The most affected Sub-counties include; Benet, Kwosir, Kitawoi, Kaptum, Kaptoyoy and Kaproron. This information was integrated with the spatial modelling using socio-ecological spatial data i.e. Soil texture (data for National Agricultural Research Laboratories – Kawanda (NARL) 2014, Rainfall (Meteorology Department 2014), Digital Elevation Model (DEM), SLOPE, ASPECT (30m resolution data from SRTM Shuttle Radar Topography Mission (SRTM) to generate Land slide, rock falls and soil erosion vulnerability map (Figure 7).



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Kaptoyoy	1599	4142	4294	8436	30	280
Binyiny TC	664	1755	1821	3576	6	630

Figure 7. Soil Erosion risk map, Kween District

4.1.2 Earthquakes and faults

Participants of the focus group discussion indicated that Kween District only experiences minor tremors occasionally. However, earth cracks have developed in Benet Sub-county in Mulungwa Parish and this has put several communities in this area at risk.

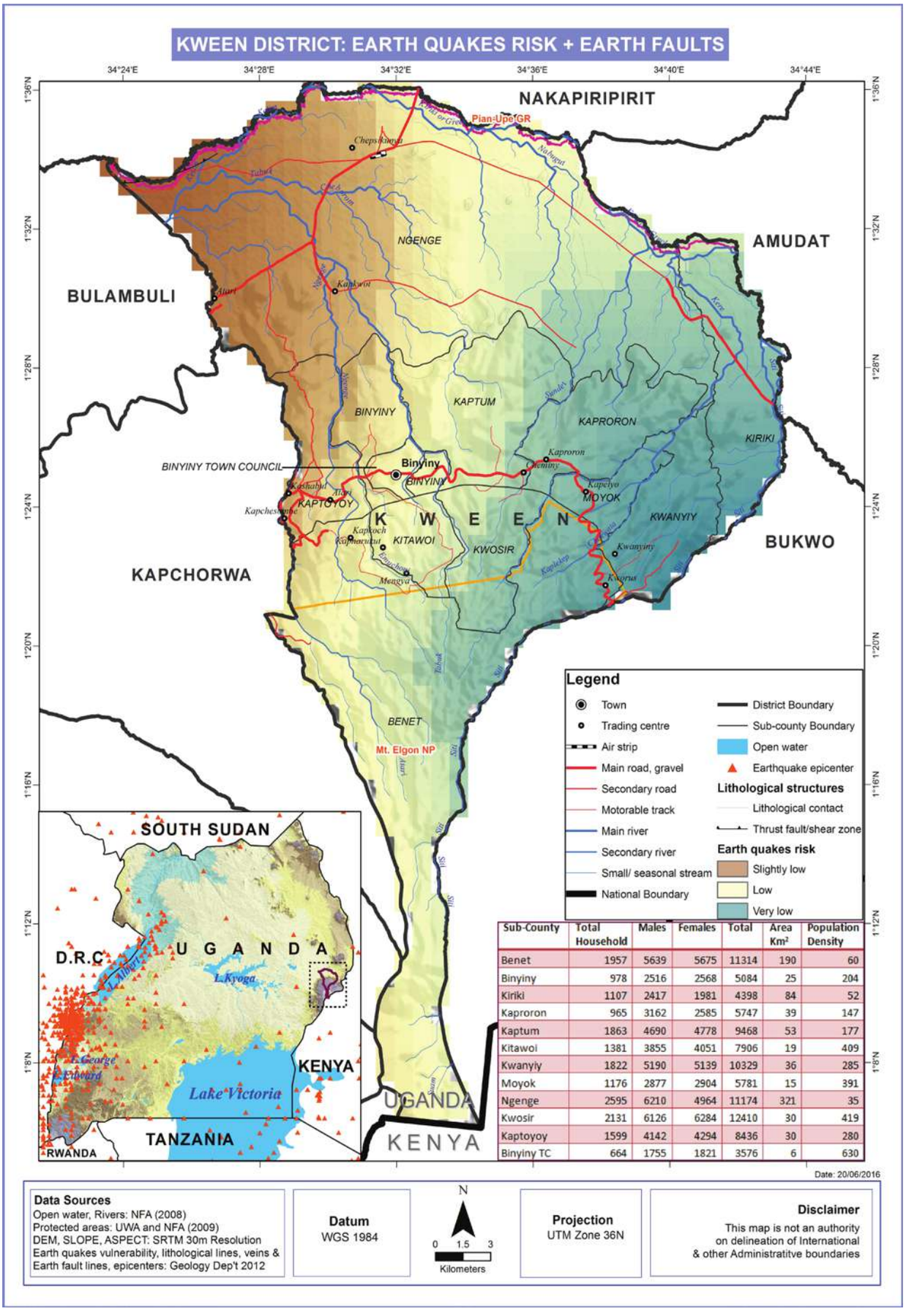

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Figure 8: Earthquakes Vulnerability and Fault lines, Kween District

4.2 Climatological and Meteorological Hazards

4.2.1 Floods

Results from the focus group discussions revealed that floods usually occur along rivers, low lying areas and valleys during the rainy seasons. Participants reported that floods cut off roads, Submerge crops thus causing food insecurity and considerable economic losses. Incidences of flooding were reported in areas along Rivers Ngenge, greek (kiriki Sub county) and Atari in Ngenge, Kaptoyoy and benet Sub counties . This information was integrated with the spatial modelling using socio-ecological spatial data i.e. generated from Soil texture (data for National Agricultural Research Laboratories – Kawanda (NARL) 2014, Rainfall (Meteorology Department 2014), Digital Elevation Model (DEM), SLOPE, ASPECT (30m resolution data from SRTM Shuttle Radar Topography Mission (SRTM). Figure 9 shows areas susceptible to floods.

See pictorials for disaster effects in the annex

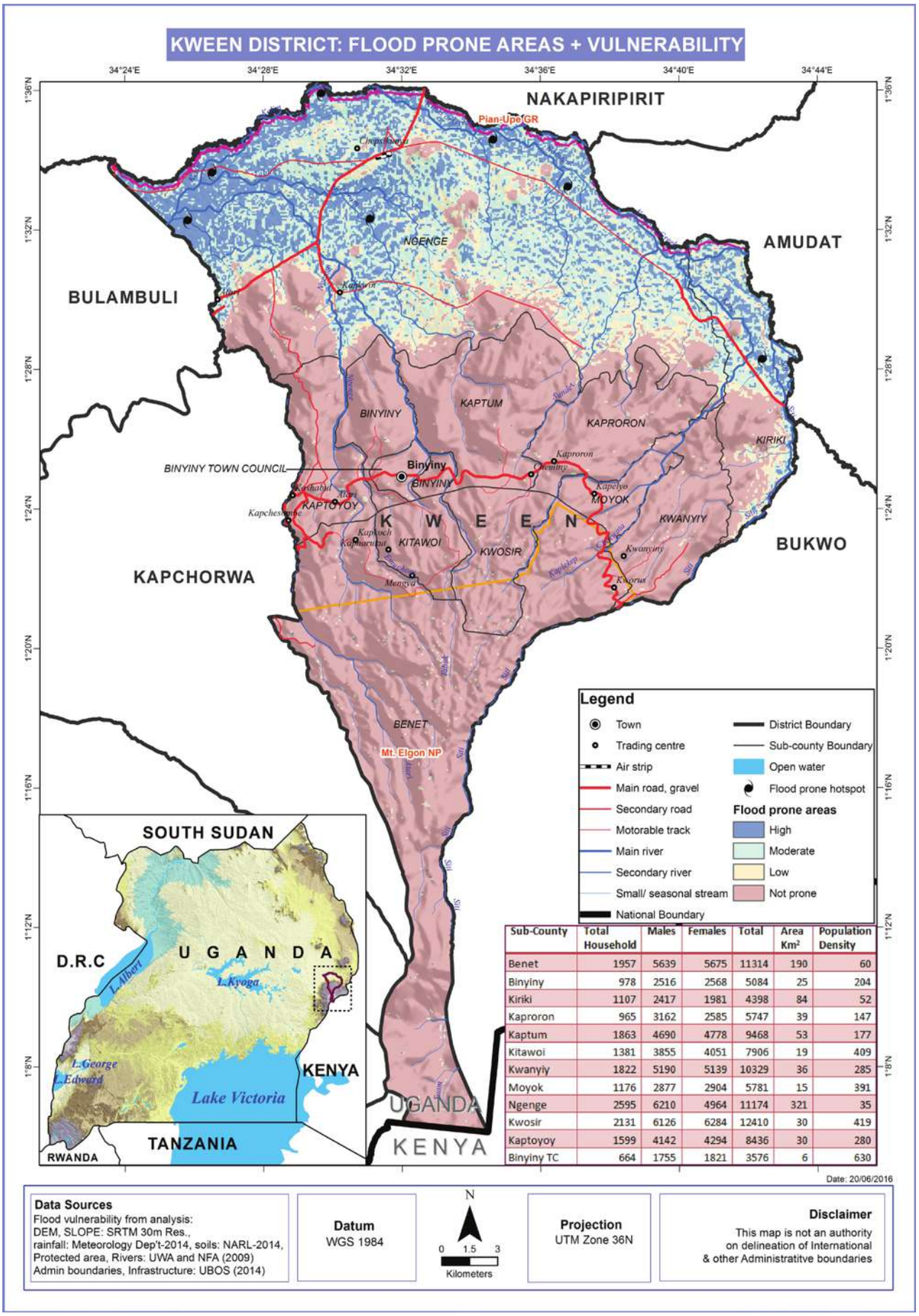

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Figure 9: Flood Prone Areas and Vulnerability Ranking, Kween District

4.2.2 Prolonged Dry spells

Participatory assessments through focus group discussions indicated that Kween District experiences severe drought in form of prolonged dry spells. Participants indicated that drought had detrimental impacts on their livelihoods and wellbeing. Some of these impacts include; drying up of water sources, lack of pastures for livestock, food insecurity and rampant outbreaks of crop and livestock diseases. The most affected Sub-counties are; Ngenge and Kiriki. This information was integrated with the spatial modeling using socio-ecological spatial data i.e. generated from Rainfall and Temperature (Uganda National Meteorological Authority, 2014) using the Standardized Precipitation Index. Figure 10 shows areas that are affected by drought and their ranking.

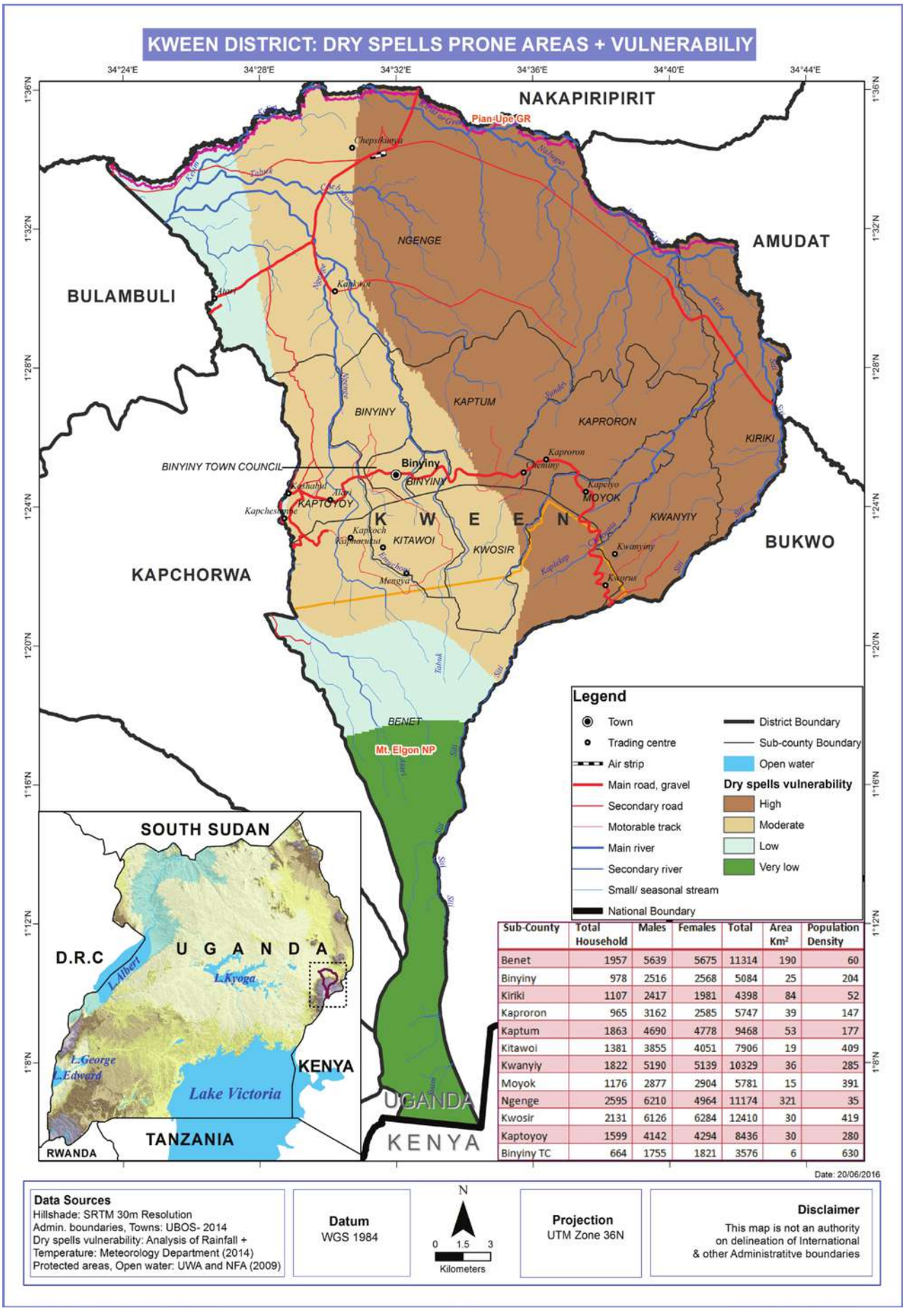

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Figure 10: Drought Prone Areas and Vulnerability Ranking, Kween District

4.2.3 Hailstorms

Results from the participatory assessments showed that Kween District experiences hailstorms at the beginning of the rainy seasons. Participants reported that hailstorms cause serious damage to crops such as beans, coffee, maize and banana plantations leading to food insecurity and considerable economic losses to farmers. The most affected Sub-counties are; Kaptum, Moyok, Benet, Kwosir, Binyiny Kitawoi and Kaptoyoy. In 2013 and 2015, hailstorms destroyed crops houses and animals in Sub counties of Binyiny , Kwosir and Kaptum . (Figure 11).

4.2.4 Strong winds

The participants of the focus group discussions reported that strong winds are experienced during the rainy seasons. It was observed that strong winds blow off roof tops of houses, churches and schools, destroy banana plantations and cause tree falls. The most affected Sub-counties are; Kiriki, Ngenge and Kwosir, Kitawoi and Benet (Figure 11).

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 participatory assessments indicated that lightning was a common phenomenon in Kween District. Participants reported that pupils of Kere Primary School including community members (5 Death cases) that were attending a campaign rally in Kwosir Sub-county were struck by lightning in November 2015. Reports also indicated that in 2015, a woman was struck by lightning in Benet Sub-county. The most affected Sub-counties are; Binyiny, Benet, Kaptum, Kitawoi and Kwosir (Figure 11).

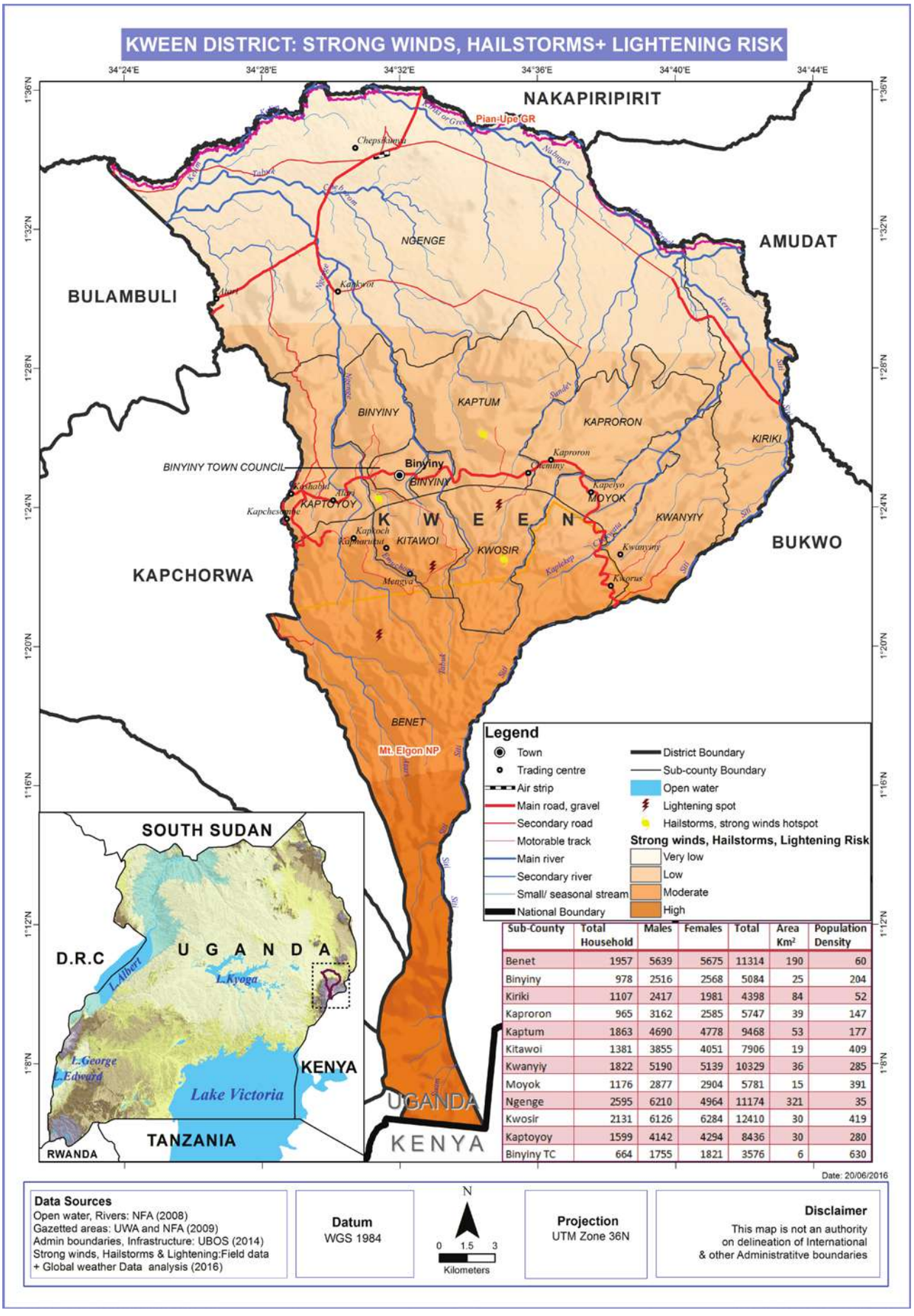

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Figure 11: Strong winds, Hailstorms and Lightning Hotspots and Vulnerability, Kween District

4.3 Ecological and Biological Hazards

4.3.1 Crop Pests and Diseases

Participatory assessments through focus group discussions indicated that Kween District was vulnerable to crop pests and diseases. The main crop diseases reported were; coffee berry disease, banana bacterial wilt, maize lethal necrosis(lower belt) and tomato blight while the most common crop pests in the District are; coffee stem borer, aphids and army worms. Participants noted that Benet, Kitawoi, Kwosir and the upper catchment Sub-counties were the most affected Sub-counties (Figure 12). Banana bacterial wilts was reportedly affecting the midbelt Sub counties of Kaptoyoy, Binyiny, Binyiny T/C, Kaptum, Kaproron and Moyok

4.3.2 Livestock Parasites and Diseases

Results from the focus group discussions indicated that livestock parasites and diseases were a serious problem in Kween District. The most common livestock diseases in the District are; East Coast Fever, Foot and Mouth Disease while ticks were the most common pests. Reports indicated that the Sub-counties of Kiriki and Ngenge were the most affected by foot and mouth disease. The Sub-counties of Benet, Kwosir and Kitawoi were prone to East Coast Fever.

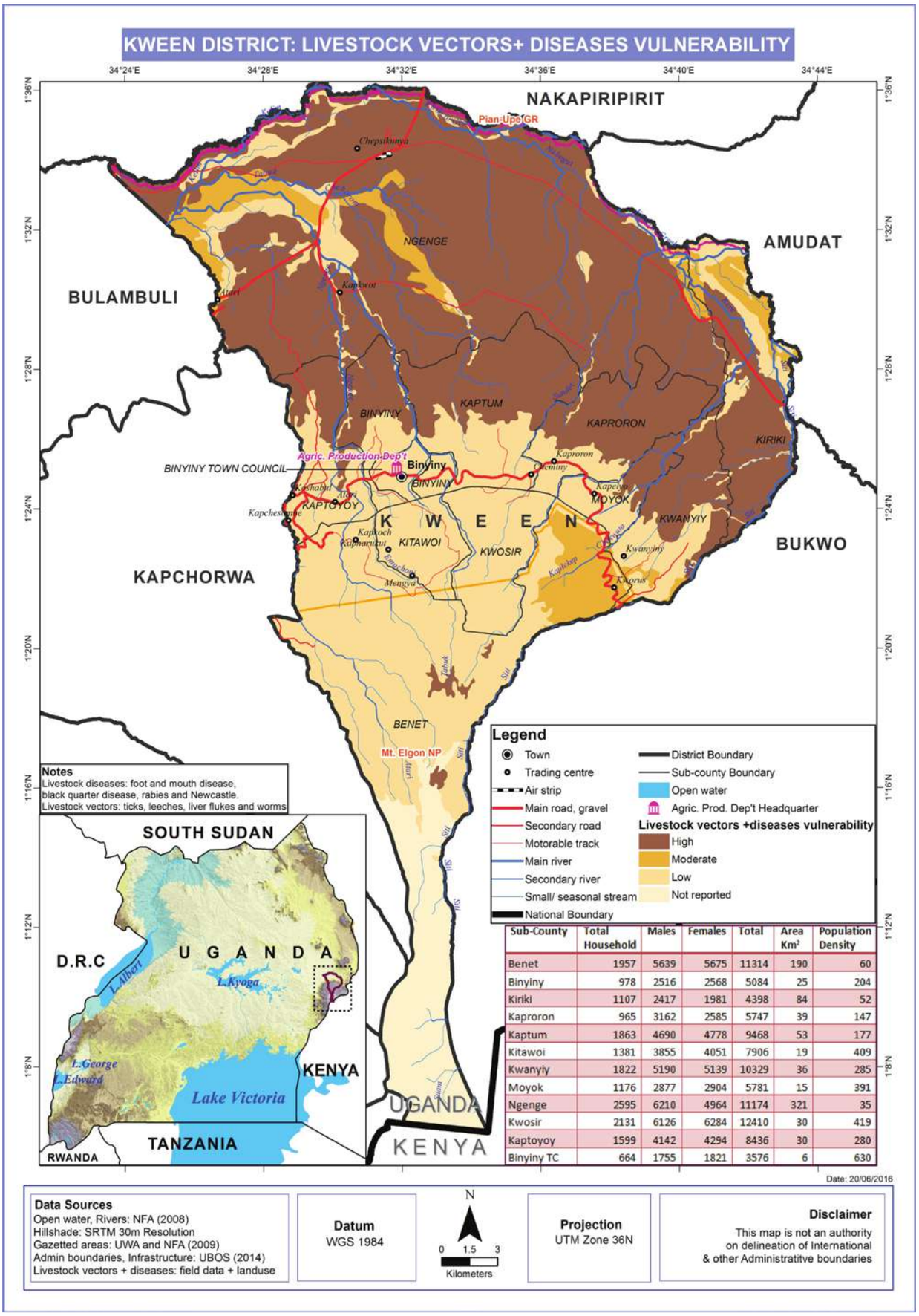

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Figure 12: Livestock Parasites and Diseases Vulnerability, Kween District

4.3.3 Human Diseases

Participants in the series of focus group discussions held indicated that the most common human diseases in Kween District were malaria, typhoid, brucellosis and HIV/AIDS. Reports showed that HIV/AIDS prevalence rates were high in Rwanda resettlement camp, Kwanyiy Sub-county as a result of a big number of internally displaced persons from Kapwata soft wood plantation. In March 2016, incidences of malaria were high in Ngenge, Kiriki and Kwanyiy Sub-counties. This was because of too much stagnant water collection points left in the area as a result of floods that became breeding grounds for mosquitos, in addition to the bushy surrounding environment. Communities in in the same areas during the dry season use mosquito nets for fish harvesting rending them helpless in the rainy season

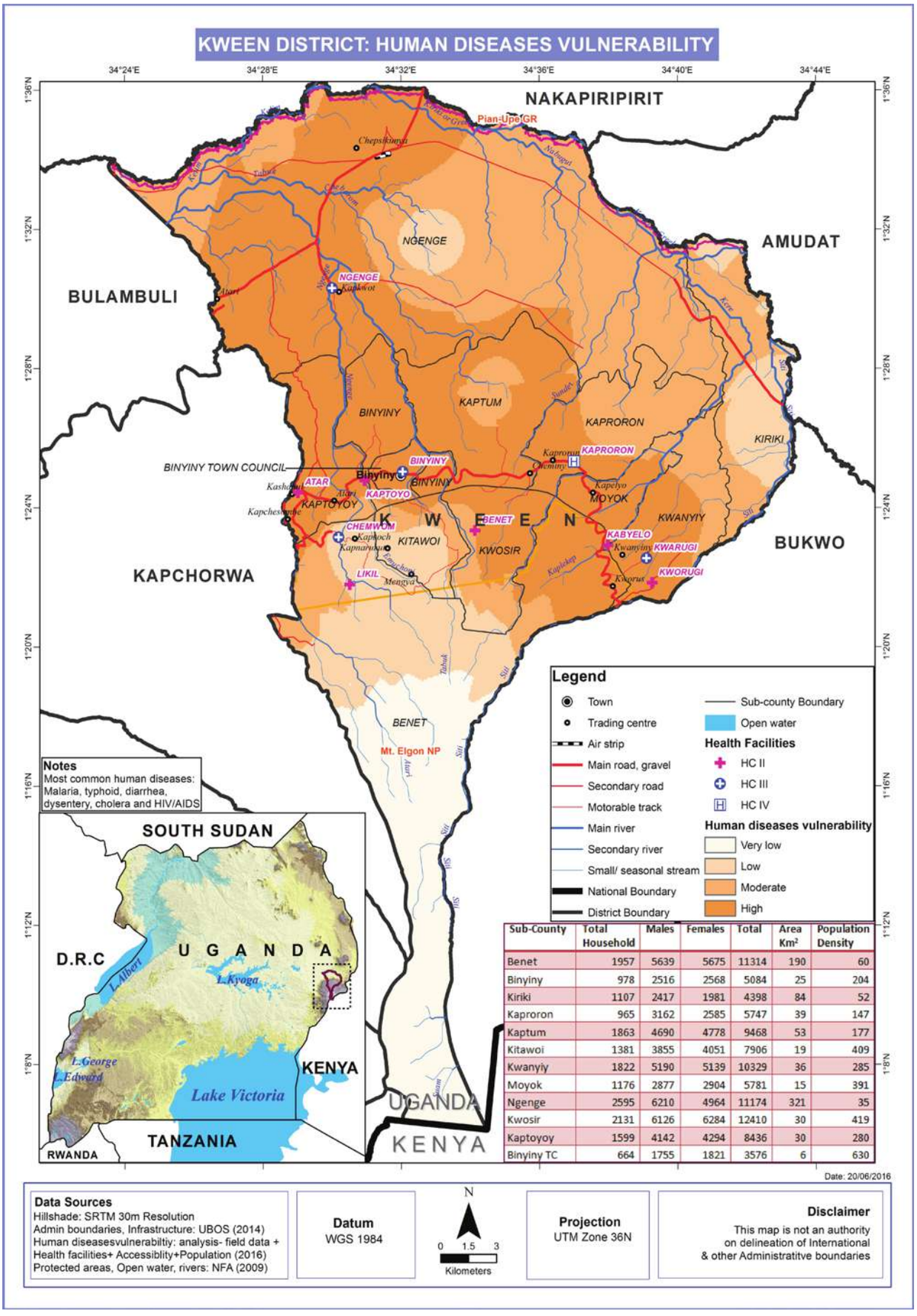

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Figure 13: Human Disease Prevalence and Health Facilities, Kween District

4.3.4 Vermin and Wild-life Animal Attacks

Participatory assessments through focus group discussions revealed that there were incidences of vermin attacks in Kween District especially in areas neighbouring Mt. Elgon National Park and Pian Upe game reserve. Reports indicated that monkeys, baboons, and warthogs destroy crop gardens in the Sub-counties of Benet, Kitawoi, Kwanyiy, Kiriki and Ngenge (Figure 14).

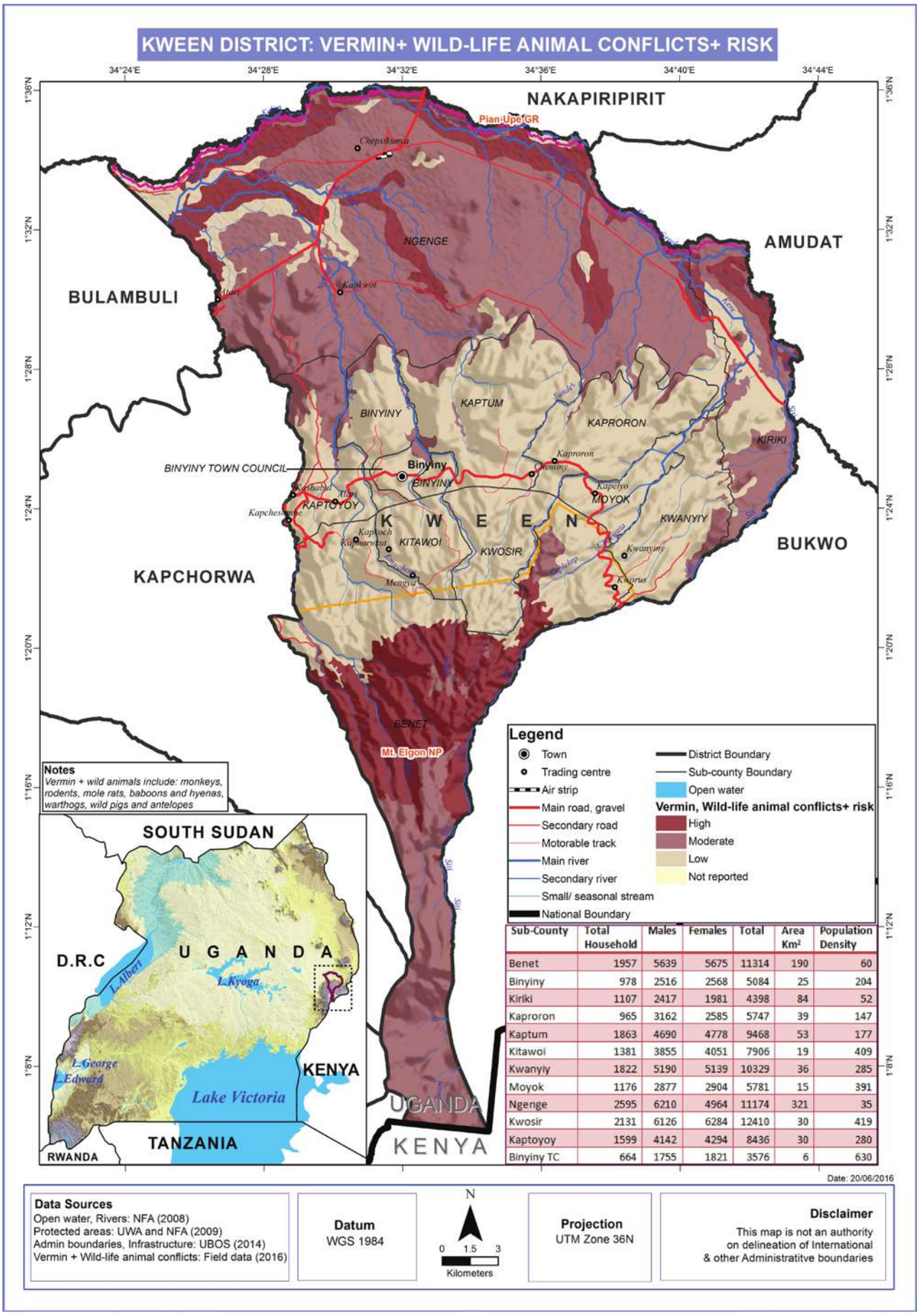

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Figure 14: Vermin and Wildlife Animal Conflicts and Vulnerability, Kween District

4.3.5 Invasive species

The most common invasive species in Kween District were; *latana camara* and *Tithonia diversifolia*. The *Tithonia diversifolia* are usually washed by run-off to the rivers from mid and upstream areas of Kween were the plant is used as a live fence within home steads . Participants reported that *Tithonia diversifolia* was dominant in Ngenge Sub-county. Figure 15 indicates areas where invasive species exist and their ranking. In the high altitude area(benet, Kwosir, and Kitawoi), fox tail weed mostly affect wheat and barley production (believed to have entered the region during seed importation from Kenya), *oxalis latifolia* in mid-stream Sub counties of the District

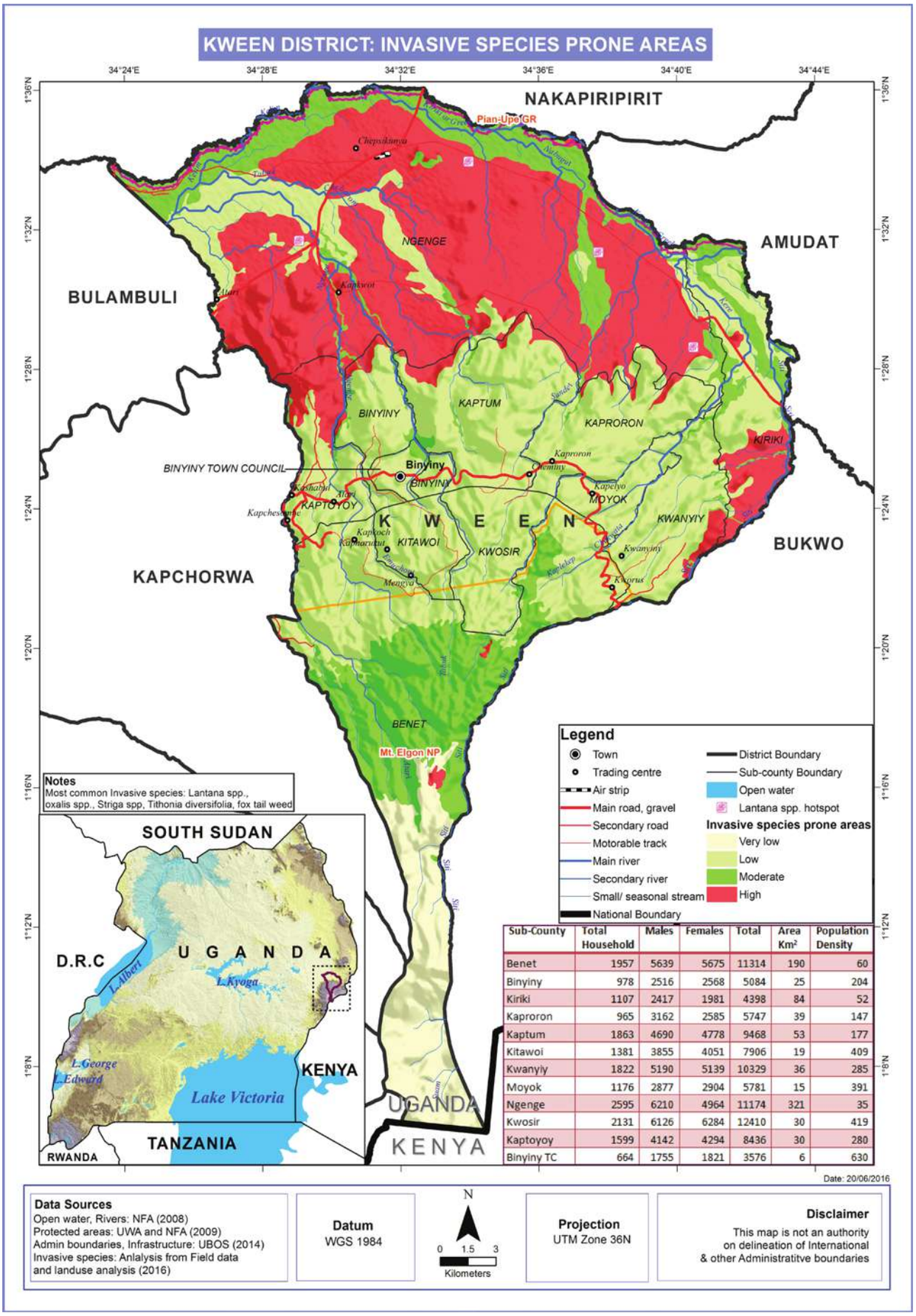

Figure 15: Invasive Species Vulnerability, Kween District

4.4 Human Induced and Technological Hazards

4.4.1 fires

Results from participatory assessments indicated that uncontrolled bush burning was a serious problem in Kween District. Reports indicated that cattle keepers have a practice of burning old grass for regeneration of fresh pastures at the onset of the rainy season. Participants also reported that bush fires are at times started by hunters. The most affected Sub-counties are; Ngenge, Kiriki and Northern Parishes of Kaptoyoy, binyiny , Kaptum and Kaproron Sub counties that borders greater Ngenge to the South (Figure 16).

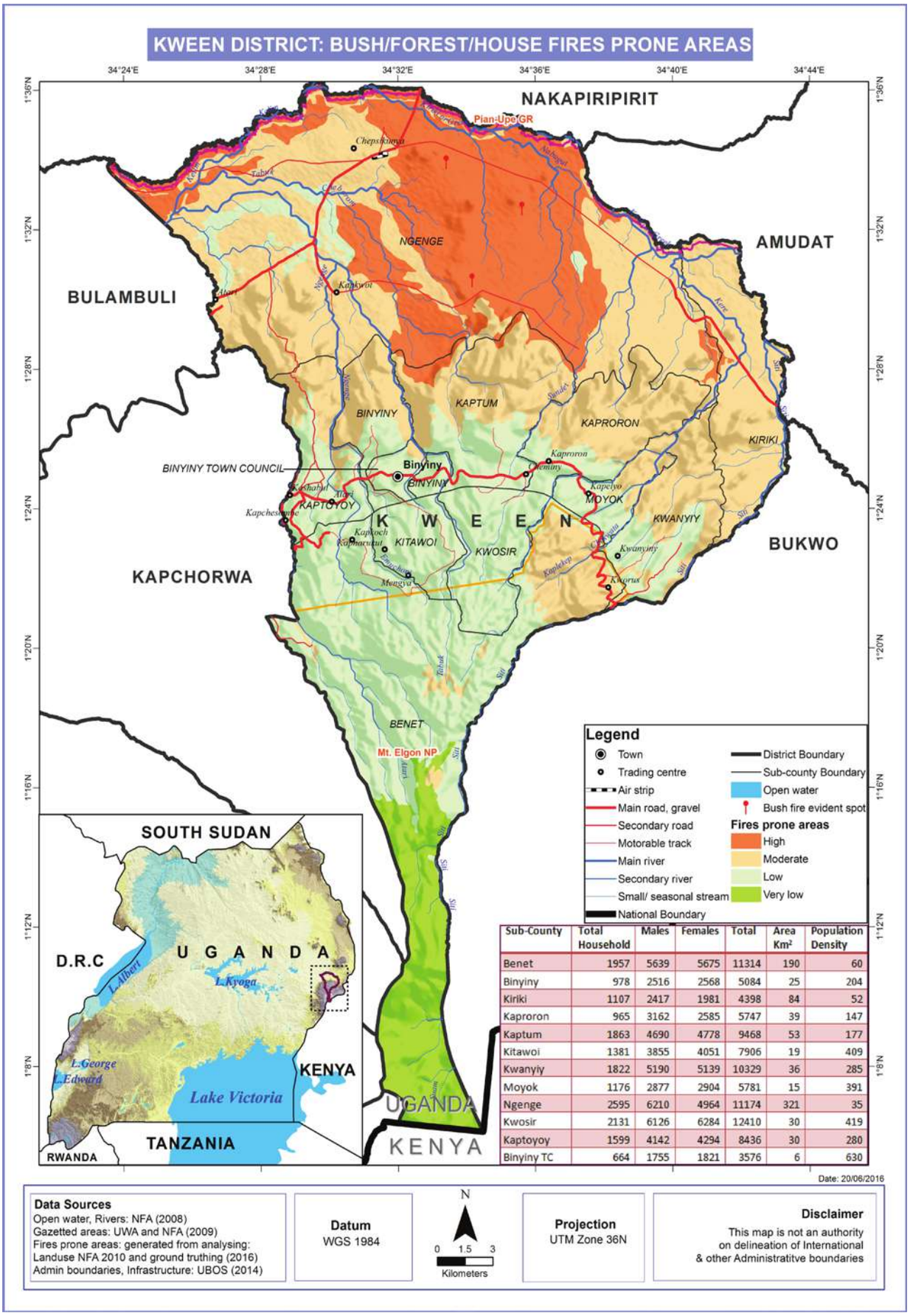

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Figure 16: Bush/Forest fires Hot spot Areas and Vulnerability, Kween District

4.4.2 Land conflicts

Participants indicated that land conflicts were very common in Kween District. Reports indicated that there is a District boundary conflict between Kween and Bukwo Districts at River Alalam. It was also reported that some communities were displaced from Mt. Elgon National Park in Benet Sub-county and were not resettled to date. In Ngenge Sub-county, there were incidences of Karamojong cattle rustlers grabbing grazing land. Matters of land disputes in the District are mostly settled by the Area land committee, clans, RDCs office, community dialogue and Magistrate's court. Boundary dispute between Kween and Bukwo Districts be resolved with the use of topographic maps to be provided by Ministry of Lands Housing and Urban Development with support from OPM .

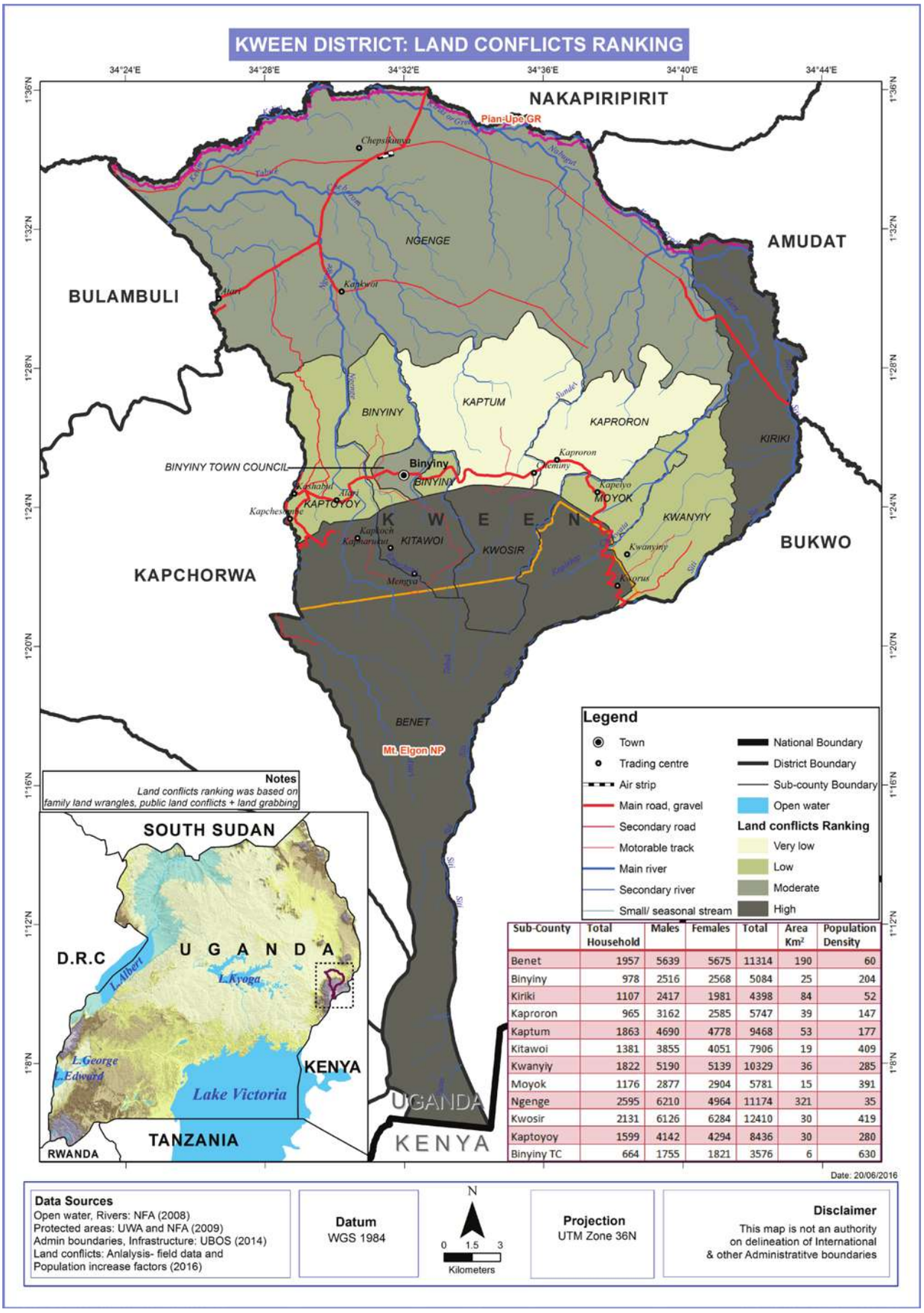

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Figure 17: Land Conflicts Ranking, Kween District

4.4.3 Environmental Degradation

The most reported forms of environmental degradation in Kween District include; sand mining, deforestation (charcoal burning, clearance for crop production), overgrazing, soil erosion, and river bank degradation, farmers in the region cultivate beyond the higest water point along most of river banks due to fertile nature of the soil. The most affected Sub-counties are Ngenge, Benet, Kitawoi, Kwosir, Kaptum, Kaptoyoy Kaproron and Binyiny Town Council. Figure 18 indicates areas where environmental degradation has occurred and ranking.

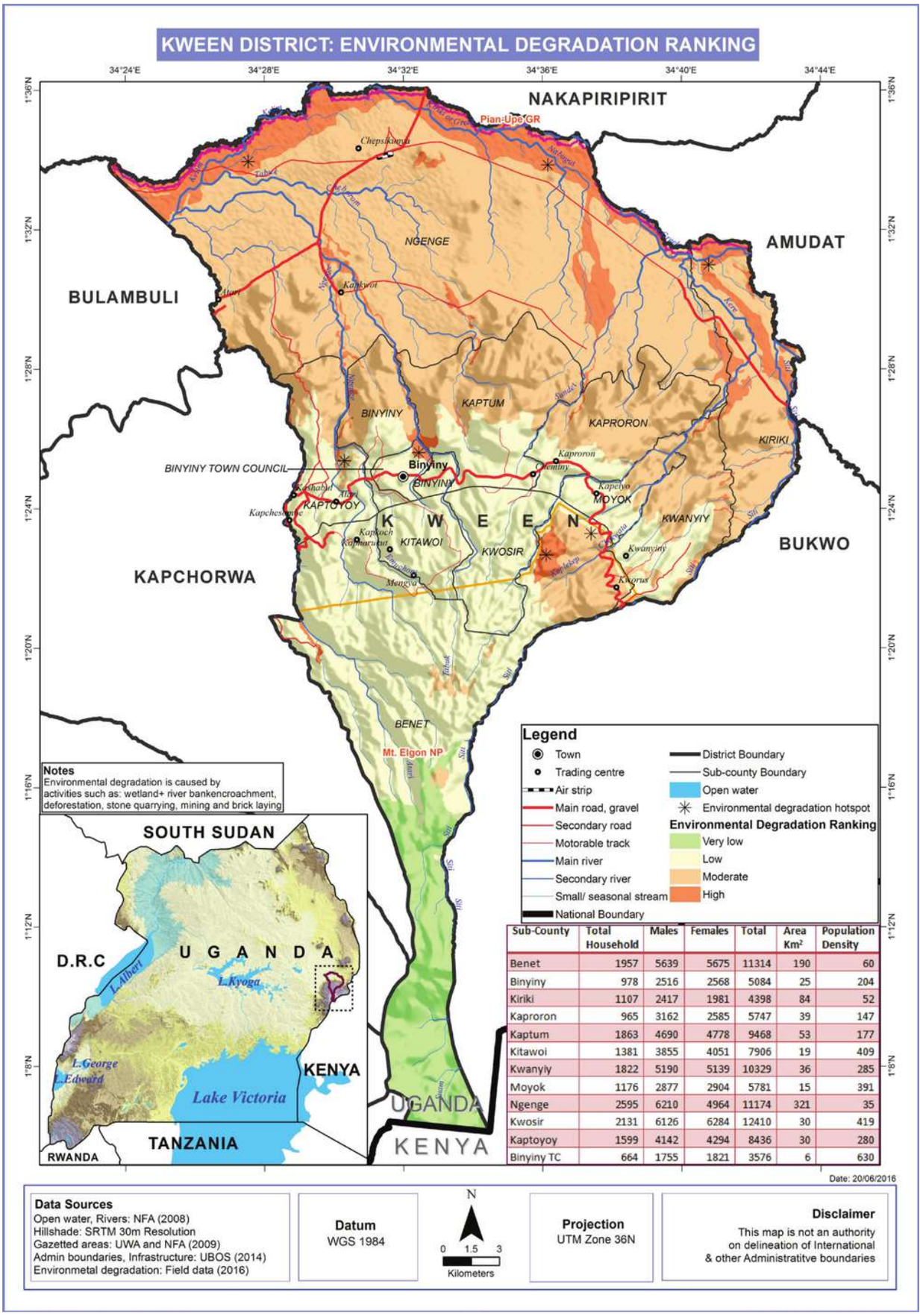

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Figure 18: Environmental Degradation Ranking, Kween District

4.4.4 Road Accidents

Participants reported that road accidents occur occasionally on the Kween – Kapchorwa road especially during the rainy seasons. Most of the roads are slippery and develop gullies in the rainy season. In early 2016, a lorry lost control and overturned. It was observed that boda boda accidents are the most registered in the District.

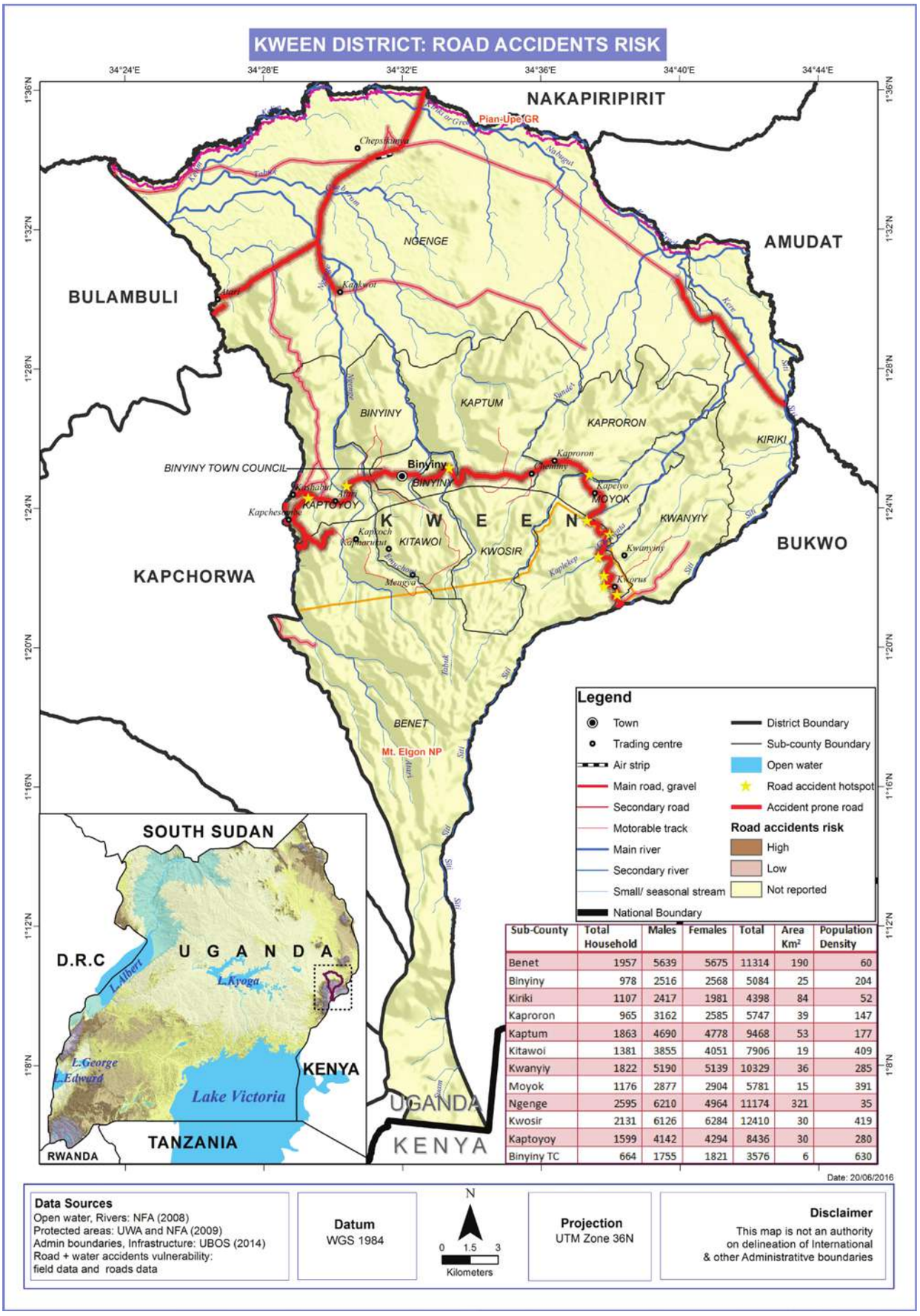

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Figure 19: Road Accidents Hotspots and Vulnerability, Kween District

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 Kween District were assessed based on exposure, susceptibility and adaptive capacity at community (village), Parish, Sub-county and District levels highlighting their sensitivity to a certain risk or phenomena. Indeed, vulnerability was divided into biophysical (or natural including environmental and physical components) and social (including social and economic components) vulnerability. Whereas the biophysical vulnerability is dependent upon the characteristics of the natural system itself, the socio-economic vulnerability is affected by economic resources, power relationships, institutions or cultural aspects of a social system. Differences in socio-economic vulnerability can often be linked to differences in socio-economic status, where a low status generally means that you are more vulnerable.

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

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

Table 2: Components of Vulnerability in Kween District

Vulnerability	Exposure			Susceptibility			Resilience
	Hazards	**Elements at Risk**	**Geographical Scale**	**Susceptibility**	**Geographical Scale**	**Coping strategies**	**Geographical Scale**
Socio-economic component	Landslides, Rock falls and Soil erosion	- Human and livestock adjacent to hill slopes - Crops on hill slopes - Infrastructure e.g. houses, schools, roads adjacent to hill slopes	Parish	- Loss of lives - Complete crop failure - Destruction of infrastructure e.g. homes, and schools	Parish	-Migration -Sensitization by both Government and non-Governmental agencies	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 and along river banks - 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 - put early warning systems in place	Parish
	Drought	- Livestock - Crops - Human population	Village	- Hunger & poverty - Livestock loss - Crop failure - Shortage of pasture - Shortage of water	Village	-Migration -Sensitization on tree planting -Buy food from elsewhere	Village
	Hailstorms, strong winds and Lightning	- Human and livestock populations - Crops - Infrastructure e.g. houses, schools, health centres -soil/land	Parish	- Loss of lives - Destruction of crops - Destruction of infrastructure e.g. houses, schools, roads adjacent to flood plain	Parish	-Soil and water conservation measures -shade trees & wind breakers -lightning arresters on public structures	Parish
	Crop Pests and Diseases	-Crops	District	- Complete crop failure	District	- Spraying - Cut and burry affected crops -Sensitization on crop disease management -seed and crop certification	District
	Livestock Pests and Diseases	-Livestock (cattle, goats etc.)	District	- Loss of livestock - Reduced livestock productivity	District	- Vaccination - Burry and burn animals that have died from infection - Quarantine	District
	Human Disease outbreaks	- Human Population	District	- Loss of lives - Reduced labour productivity	District	- Mass Immunization - Use of mosquito nets Mass sensitization	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	District	- Cut and burn -Sensitization on Invasive species management Screening and plant certification before importation	District
	Bush fires	- Livestock - Crops - Infrastructure e.g. houses, schools -human population(people)	Sub-county	- Loss of livestock - Shortage of pasture - Destruction of crops - Destruction of infrastructure e.g. houses, schools House hold property	Sub-county	-Sensitization -bye laws and ordinances enforcements -	Sub county
	Accidents(cliff fall, water, road and electricity)	- 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 black spots &speed limits -Sensitization on traffic rules	Sub-county
	Land conflicts	- Human population	Village	-Loss of lives -Family violence and break outs	Village	- Community dialogue - District court in charge of land issues	Village
	Vermin and Wildlife animal attacks	- Human population - Livestock - Crops	Parish	-Loss of lives -Livestock loss -Crop destruction	Parish	- Report to UWA - Guard gardens -Poison -Hunt and kill -Fence water collection points with Wildlife animals	Village
	Environmental degradation	- Human and livestockpopulations - Crops - Natural vegetation	Sub-county	-Crop failure -Shortage of pasture -Shortage of water -Decline of water and air quality -Decline in soil productivity	Sub-county	-Sensitization on wetland conservation -Sensitization on tree plating -Setting bi-laws and ordinances -wetland demarcation	Sub-county

Environmental component	Landslides, Rock falls and Soil erosion	- Human and livestock adjacent to hill slopes - Crops on hill slopes - Infrastructure e.g. houses, schools, roads adjacent to hill slopes	Parish	- Loss of lives - Complete crop failure - Destruction ofinfrastructuree.g. homes, and schools	Parish	-Migration -Sensitization by both Government and non-Governmental agencies on soil &water conservation - landuse planning and settlement - by laws and ordinance	
	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 & along river banks - 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 -standard river bank/buffer zone demarcation - early warning systems	District
	Drought	- Livestock - Crops - Human population	Village	- Hunger & poverty - Livestock loss - Crop failure - Shortage of pasture - Shortage of water	Village	-Migration -Sensitization on tree planting -planting short term and drought resistant crop varieties -Buy food from elsewhere -Irrigation adoption	
	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	-Planting shade trees & wind breakers -lightning arresters for insititutions/houses.	Parish
	Crop Pests and Diseases	-Crops	District	- Complete crop failure	District	- Spraying - Cut and burry affected crops -Sensitization on crop disease management - seed and plant certification	District
	Livestock Pests and Diseases	-Livestock (cattle, goats etc.)	District	- Loss of livestock - Reduced livestock productivity repetition	District	- Vaccination - Burry and burn animals that have died from infection - Quarantine	
	Human Disease outbreaks	- Human Population	District	- Loss of lives	District	- Mass Immunization - Use of mosquito nets	
	Invasive species	-indigenous species -Animals	District	- Outcompete the indigenous spp., suppress growth of indigenous spp - Loss of indigenous spp. - Complete crop Failure - suppress growth of pasture	District	- Cut and burn -Sensitization on Invasive species management	
	Bush fires	- Livestock - Crops - Infrastructure e.g. houses, schools	Sub-county	- Loss of livestock - Shortage of pasture - Destruction of crops - Destruction of infrastructure e.g. houses, schools	Sub-county	-Sensitization	
	Road accidents	- Human population - Infrastructure adjacent to accident black spots e.g. houses, schools etc.	Sub-county	- Loss of lives - Destruction of vehicles - Destruction of Infrastructure adjacent to accident black spots e.g. houses, schools etc.	Sub-county	-Humps on roads -Signage on speed limits -Sensitization on traffic rules	
	Land conflicts	- Human population	Village	-Loss of lives -Family violence and break outs	Village	- Community dialogue - District court in charge of land issues	
	Vermin and Wildlife animal attacks	- Human population - Livestock - Crops	Parish	-Loss of lives -Livestock loss -Crop destruction	Parish	- Report to UWA - Guard gardens -Poison -Hunt and kill -Fence water collection points with Wildlife animals	
	Environmental degradation	- Human and livestock populations - Crops - Natural vegetation	Sub-county	-Crop failure -Shortage of pasture -Shortage of water -Decline of water quality	Sub-county	-Sensitization on wetland conservation -Sensitization on tree plating -Setting bi-laws	

Table 3: Vulnerability Profile for Kween District

	PROBABILITY	SEVERITY OF IMPACTS	RELATIVE RISK	VULNERABLE Sub COUNTIES
	Relative likelihood this will occur	*Overall Impact (Average)*	*Probability x Impact Severity*	
Hazards	*1 = Not occur 2 = Doubtful 3 = Possible 4 = Probable 5 = Inevitable*	*1 = No impact 2= Low 3=medium 4 = High*	*0-1= Not Occur 2-10= Low 11-15=Medium 16-20= High*	
Floods	4	4	16	Ngenge, Kiriki
Droughts	4	4	16	Ngenge, Kiriki,
Soil erosion, rock falls and landslides	5	3	15	Benet, Kitawoi, Kwosir, Kaptoyoy, Binyiny, Kaptum, Kwanyiy Kaproron and Moyok, Town Council
Hail storms, lightning and strong winds	4	3	12	Benet, Kitawoi, Kwosir, Kaptoyoy, binyiny, Kaptum, Kwanyiy Kaproron and Moyok, Town Council
Bush fires	4	3	12	Ngenge and kiriki
Crop pests and diseases	4	3	12	All Sub counties
Livestock pests and diseases	4	3	12	All Sub counties
Human Diseases outbreaks	4	3	12	All Sub counties
Land conflicts	5	4	20	Ngenge & Kiriki
Vermin and Wild-life animal attacks	4	3	12	Benet, Kwosir, Kitawoi, Moyok, Kwanyiy, Ngenge & Kiriki
Earthquakes and faults	3	2	6	Kitawoi, Kwosir & Benet
Road accidents	4	3	12	Ngenge, Kiriki, Binyiny, Kaptoyoy, Kaproron, Moyok, Kaptum, Kwanyiy
Environmental degradation	4	3	12	All Sub counties
Invasive species	3	2	6	lower belt(Ngenge & Kiriki) and upper Belt(Benet, Kwosir and Kitawoi)

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

Key for Relative Risk

	High
	Medium
	Low
	Not reported/ Not prone

Table 4: Hazard Risk Assessment

Hazard	Ngenge	Kiriki	Benet	Kitawoi	kwosir	Kaproron	moyok	kwanyiy	binyiny	kaptoyoy	Binyiny T/C	Kaptum
Floods												
Drought												
Landslides, Rock falls and Erosion												
Strong winds, Hailstorms and Lightning												
Crop pests and Diseases												
Livestock pests and Diseases												
Human disease outbreaks												
Vermin and Wildlife animal attacks												
Land conflicts												
Bush fires												
Environmental degradation												
Earthquakes and faults												
Road accidents												
Invasive species												

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 5: Gender and age groups mostly affected by hazards

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

4.5.2 Coping Strategies

In response to the various hazards, participants identified a range of coping strategies that the community employs to adjust to, and build resilience towards the challenges. The range of coping strategies are broad and interactive often tackling more than one hazard at a time and the focus of the communities leans towards adaptation actions and processes including social and economic frameworks within which livelihood and mitigation strategies take place; ensuring extremes are buffered irrespective of the direction of climate change and better positioning themselves to better face the adverse impacts and associated effects of climate induced and technological hazards (Table 6).

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

No	Multi-Hazards		Coping strategies
1	Geomorphological or Geological	Landslides, Rock falls and Erosion	• Migration to safe areas • Terracing/ contour farming • Plant trees to control water movement on hill slopes • Mulching in banana plantations • Plant grass in banana plantations on hill slopes • Removal of stones from banana farmlands
2		Earthquakes and faults	• No action, communities think the tremors are minor • Designs of houses (pillars) • Early warning system • Vigilance • Sensitization • Emergency response mechanisms
3	Climatological or Meteorological	Floods	• Digging up of trenches in the flood plains • Planting trees to control water movement to flood plains • Migration to other areas • Seek for Government food aid
4		Drought	• Leave wetlands as water catchments • Plant trees as climate modifiers • Buy food elsewhere in case of shortage • Buy water from the nearby areas • Food Storage especially dry grains
5		Strong winds, Hailstorms and Lightning	• Plant trees as wind breakers • Use of stakes against wind in banana plantations • Use of ropes to tire banana against wind • Installation of lightning conductors • Stay indoors during rains • Changing building designs and roof types • Removal of destroyed crops • Request for aid from the Office of the Prime Minister • Installation of lightning conductors on newly constructed schools
6	Ecological or Biological	Crop pests and Diseases	• Spraying pests • Cutting and burying BBW affected crops • Burning of affected crops • Vigilance
7		Livestock pests and Diseases	• Spraying pests • Vaccinations • Burying animals that have died from infection • Quarantine
8		Human epidemic Diseases	• Mass immunisation • Visiting health centres • Use of mosquito nets
9		Vermin and Wild-life animal attacks	• Guarding the gardens • Poisoning • Hunt and kill • Report to UWA • Mauritius thorns • Dig trenches • Chain link • Plant red pepper as buffer • Recommend vermin guards
10		Invasive species	• Uproot • Spray with herbicides (e.g 2-4-D) • Biological control (e.g beetles) • Cut and burn • Sensitization on Invasive species management • Blacklisting exotic species

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

GENERAL CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

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

Results from the participatory assessment indicated that Kween 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 drought and flooding were identified as most serious problem in Kween 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 Kween District increase their vulnerability to hazard exposure necessitating urgent external support.

Hazards experienced in Kween 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 wildlife animal attacks and invasive species.
iv. Human induced or Technological hazards including; bush fires, road accidents land conflicts.

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

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

5.2 Policy-related Recommendations

The following recommended policy actions targeting vulnerability reduction include:

i. The Government should improve enforcement of policies aimed at enhancing sustainable environmental health.
ii. The Government through MAAIF should review the animal diseases control act because of low penalties given to defaulters.
iii. The Government should establish systems to motivate support of political leaders toward Government initiatives and Programmemes aimed at disaster risk reduction.
iv. The Government should increase awareness campaigns aimed at sensitizing farmers/ communities on disaster risk reduction initiatives and practices.
v. The Government should revive disaster committees at District level and ensure funding of disaster and environmental related activities.
vi. The Government through UNRA and the District Authority should fund periodic maintenance of feeder roads to reduce on traffic accidents.
vii. The Government through MAAIF and the District Production Office should promote drought and disease resistant crop seeds.
viii. The Government through OPM and Meteorology Authority should increase importation of lightning conductors and also reduce taxes on their importation.
ix. The Government through OPM and Meteorology Authority should support establishment of disaster early warning systems.
x. The Government through MWE increase funding and staff to monitor wetland degradation and non-genuine agro-inputs.
xi. The Government through OPM should improve communication between the disaster Department and Local communities.
xii. The Government through MWE should promote Tree planting along road reserves.
xiii. The Government through MAAIF should fund and recruit extension works at Sub-county level.

PICTORIAL PRESENTATION OF SOME OF THE DISASTERS IN THE DISTRICT

One of the vehicles that could not proceed because of slippery road

Atar-Mogotio road sections which are badly affected Ngenge sub county

Cheborom bridge which cut off Ngenge Sundet road

The rice hauling machine that was submerged in Ngenge

Trucks struggling to go through Muyembe Moroto road in Sikwo Parish Ngenge Sub County

Trucks on Kapchorwa-kween-bukwo waiting for the road to dry before they can proceed with their journey to Kapchorwa

The water logged farms in Ngenge

Bridge at Ngenge on the verge of collapse

Households that were submerged in Ngenge Sub county

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APPENDIX I: DATA COLLECTION TOOLS

FOCUS GROUP DISCUSSION GUIDE FOR District DISASTER RISK MANAGEMENT FOCAL PERSONS

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

No.	Name of Participants	Designation	Contact	Signature

Introduction

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

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

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

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

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

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

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

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

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

5. Which Villages, Parishes or Sub-counties have been most affected by landslide and rock falls?

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

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

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

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

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

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

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

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

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

15. Which particular Villages, Parishes or Sub-counties have been majorly affected by earth quakes in your area of jurisdiction?

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

17. What impacts have been caused by earth quakes?

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

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

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

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

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

22. Which Villages, Parishes or Sub-counties have been most affected by floods?

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

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

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

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

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

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

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

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

31. Which Villages, Parishes or Sub-counties have been most affected by drought?

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

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

34. In which way are crops affected by drought?

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

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

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

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

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

40. Which Villages, Parishes or Sub-counties have been most affected by hailstorms or lightning?

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

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

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

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

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

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

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

47. Which Villages, Parishes or Sub-counties have been most affected by epidemic animal disease outbreaks?

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

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

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

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

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

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

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

55. Which Villages, Parishes or Sub-counties have been most affected by epidemic animal disease outbreaks?

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

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

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

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

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

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

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

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

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

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

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

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

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

69. Which particular Villages, Parishes or Sub-counties have been majorly affected by wildlife attacks in your area of jurisdiction?

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

71. What impacts have been caused by wildlife attacks?

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

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

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

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

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

77. Which Villages, Parishes or Sub-counties have been most affected by invasive species in your area of jurisdiction?

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

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

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

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

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

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

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

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

85. Which Villages, Parishes or Sub-counties have been most affected by environmental degradation?

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

87. What impacts have been caused by environmental degradation?

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

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

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

91. Which particular Villages, Parishes or Sub-counties have been majorly affected by land conflicts in your area of jurisdiction?

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

93. What impacts have been caused by land conflicts?

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

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

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

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

98. Which roads have experienced Road accidents?

99. What impacts have been caused by Road accidents?

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

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

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

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

104. Which particular Villages, Parishes or Sub-counties have been majorly affected by bush and or forest fires in your area of jurisdiction?

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

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

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

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

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

FOCUS GROUP DISCUSSION GUIDE FOR Local COMMUNITIES

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

No.	Name of Participants	Village/ Parish	Contact	Signature

Introduction

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

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

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

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

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

1. Which crops are majorly grown in your community?

2. Which domestic animals are dominant in your community?

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

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

5. Which Villages and Parishes have been most affected by landslide and rock falls?

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

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

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

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

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

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

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

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

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

15. Which particular Villages, Parishes or Sub-counties have been majorly affected by earth quakes in your community?

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

17. What impacts have been caused by earth quakes?

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

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

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

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

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

22. Which Villages and Parishes have been most affected by floods?

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

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

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

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

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

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

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

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

31. Which Villages and Parishes have been most affected by drought?

32. As a way of ranking from Low, Medium, High and Very high, rank the Villages and

Parishes that have been most affected?

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

34. In which way are crops affected by drought?

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

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

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

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

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

40. Which Villages and Parishes have been most affected by hailstorms or lightning?

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

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

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

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

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

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

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

47. Which Villages and Parishes have been most affected by epidemic animal disease outbreaks?

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

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

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

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

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

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

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

55. Which Villages and Parishes have been most affected by epidemic animal disease outbreaks?

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

71. What impacts have been caused by wildlife attacks?

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

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

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

75. Are there invasive species in your community?

76. Specify the invasive species in your community?

77. Which Villages and Parishes have been most affected by invasive species in your community?

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

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

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

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

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

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

83. Have you experienced environmental degradation in your community?

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

85. Which Villages and Parishes have been most affected by environmental degradation?

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

87. What impacts have been caused by environmental degradation?

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

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

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

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

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

93. What impacts have been caused by land conflicts?

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

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

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

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

98. Which roads have experienced Road accidents?

99. What impacts have been caused by Road accidents?

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

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

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

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

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

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

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

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

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

FOCUS GROUP ATTENDANCE LIST FOR District DISASTER RISK MANAGEMENT FOCAL PERSONS

Name of Participant **Designation** **Contact**

FOCUS GROUP DISCUSSION ATTENDANCE LIST FOR Local COMMUNITIES

Name of Participant **Village/Parish** **Contact**

SPATIAL DATA COLLECTION SHEET FOR HAZARD VULNERABILITY AND RISK MAPPING

<table>
<tr><td colspan="2">Observer Name:

Date:</td><td colspan="2">District:

Sub- county:

Parish:

Village:</td><td colspan="3">Coordinates</td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>X:</td><td></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>Y:</td><td></td><td></td></tr>
<tr><td colspan="2"></td><td colspan="2"></td><td>Altitude</td><td></td><td></td></tr>
<tr><td colspan="2">Slope characterization</td><td colspan="2">Bio-physical characterization</td><td colspan="2">Vegetation characterization</td><td rowspan="7">Land use type (tick)
Bush
Grassland
Wetland
Tree plantation
Natural forest
Cropland
Built-up area
Grazing land
Others</td></tr>
<tr><td>Slope degree (e.g 10, 20, …)</td><td></td><td>Soil Texture</td><td></td><td>Veg. cover (%)</td><td></td></tr>
<tr><td>Slope length (m) (e.g 5, 10, …)</td><td></td><td>Soil Moisture</td><td></td><td>Tree cover (%)</td><td></td></tr>
<tr><td>Aspect (e.g N, NE…)</td><td></td><td>Rainfall</td><td></td><td>Shrubs cover (%)</td><td></td></tr>
<tr><td>Elevation (e.g high, low…)</td><td></td><td>Drainage</td><td></td><td>Grass / Herbs cover (%)</td><td></td></tr>
<tr><td>Slope curvature (e.g concave, covex…)</td><td></td><td>Temperature</td><td></td><td>Bare land cover</td><td></td></tr>
<tr><td colspan="7">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)</td></tr>
</table>

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

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