

Manafwa District Hazard, Risk and Vulnerability Profile



Acknowledgment

On behalf of Office of the Prime Minister, I wish to express 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 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 Programmer.

My appreciation also goes to Manafwa District Team;

- 1. Mr. Martin Jacan Gwokto The Chief Administrative Officer
- 2. Dr. Wamasebu Gideon District Health Officer
- 3. Bisikwa Sarah District Environment Officer
- 4. Mwangale Micheal Forestry Officer

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, floods, landslides, human and animal diseases, 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 Buwabwala, Buwabwana, Mukoto and Kato 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 and 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 prone hotspots in the community profile maps were ground-truthed and georeferenced 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 attributes 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 location 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 Manafwa district were classified as:

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

General findings from the participatory assessment indicated that Manafwa 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 severe affecting hazards in Manafwa District with almost all sub-counties being vulnerable to the hazards. This is because the area is generally flat hence very prone to flooding in case of heavy rains.

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

- Reducing the impact of the hazard where possible through mitigation, prediction, 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:

- \cdot The government should improve enforcement of policies aimed at enhancing sustainable environmental health.
- The government through MAAIF should review the animal diseases control act because of low penalties given to defaulters.
- The government should establish systems to motivate support of political leaders toward government initiatives and programmes aimed at Disaster Risk Reduction.

- The government should increase awareness campaigns aimed at sensitizing farmers/ communities on Disaster Risk Reduction initiatives and practices.
- The government should revive Disaster Committees at district level and ensure funding of disaster and environmental related activities.
- The government through UNRA and the District Authority should fund periodic maintenance of feeder roads to reduce on traffic accidents.
- The government through MAAIF and the District Production Office should promote drought and disease resistant crop seeds.
- The government through OPM and 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.

TABLE OF CONTENTS

ACKNOWLEDGMENT	i
EXECUTIVE SUMMARY	ii
LIST OF FIGURES	vi
LIST OF TABLES	vii
LIST OF PLATES	vii
LIST OF ACRONYMS	viii
DEFINITION OF KEY TERMS	ix
INTRODUCTION	1
1.1 Background	1
1.2 Objectives of the study	1
1.2.1 Main objective	1
1.2.2 Specific Objectives	1
1.3 Scope of Work	2
1.4 Justification	2
1.5 Structure of the Report	2
2.1 Location	3
2.1.1 Geomorphology	4
2.1.2 Geology and soils	5
2.1.3 Vegetation and Land use Stratification	6
2.1.5 Wind	7
2.1.6 Rainfall	7
2.1.8 Population	8
2.1.9 Economic activities	9
METHODOLOGY	10
3.1 Collection and analysis of field data using GIS	10
3.1.1 Preliminary spatial analysis	10
3.1.2 Stakeholder engagements	10
3.1.3 Participatory GIS	10
3.1.4 Geo-referencing and ground-truthing	11
3.2 Develop District Specific Multi-hazard Risk and Vulnerability Profiles	11
3.2.1 Data analysis and integration	11
3.2.2 Data verification and validation	11
3.3 Preserve the Spatial data to enable future use of the maps	11
RESULTS FROM MULTI-HAZARD RISK, VULNERABILITY MAPPING	12
4. Multi-hazards	12
4.1 Geomorphological and Geological Hazards	12
4.1.1 Landslides, rock falls and soil erosion	

4.1.2 Earthquakes and faults	15
4.2 Climatological and Meteorological Hazards	16
4.2.1 Floods	16
4.2.2 Dry spell	18
4.2.3 Hailstorms	20
4.2.4 Strong winds	20
4.2.5 Lightning	20
4.3 Ecological and Biological Hazards	22
4.3.1 Crop Pests and Diseases	22
4.3.2 Livestock Vectors and Diseases	23
4.3.3 Human Diseases	24
4.3.4 Vermin and Wild-life Animal Attacks	25
4.3.5 Invasive species	26
4.4 Human Induced and Technological Hazards	27
4.4.1 Bush fires and Forest fires	27
4.4.2 Land Conflicts	28
4.4.3 Environmental Degradation	29
4.4.4 Road Accidents	31
4.5 Vulnerability Profile	32
4.5.1 Gender and Age groups mostly affected by Hazards	37
4.5.2 Coping Strategies	38
GENERAL CONCLUSIONS AND RECOMMENDATIONS	40
5.1 Conclusion	40
5.2 Policy-related Recommendations	40
Defense	40
Reterences	42
APPENDIX I: DATA COLLECTION TOOLS	43

LIST OF FIGURES

Figure 1: Administrative Boundaries and Gazetted areas, Manafwa District	3
Figure 2: Geormophology, Manafwa District	4
Figure 3: Geology and Lithological Structures, Manafwa District	5
Figure 4: Landuse stratification, Manafwa District	6
Figure 5: Total Annual Rainfall Distribution, Manafwa District	7
Figure 6: Population Distribution, Manafwa District	9
Figure 7: Landslides, rock falls and soil erosion, Manafwa District	14
Figure 8: Earthquakes Vulnerability and Fault lines, Manafwa District	15
Figure 9: Flood Prone Areas and Vulnerability Ranking, Manafwa District	17
Figure 10: Drought Vulnerability Ranking, Manafwa District	
Figure 11: Strong winds, Hailstorms and Lightning Hotspots Manafwa District	21
Figure 12: Crop Pests and Diseases Vulnerability, Manafwa District	22
Figure 13: Livestock Pests and Diseases Vulnerability, Manafwa District	23
Figure 14: Human Diseases Prevalence and Health Facilities, Manafwa District	
Figure 15: Vermin and Wildlife Animal Conflicts Manafwa District	25
Figure 16: Invasive Species Vulnerability, Manafwa District	
Figure 17: Bush/Forest fires Hotspot Areas Manafwa District	27
Figure 18: Land Conflicts Ranking, Manafwa District	
Figure 19: Environmental Degradation Ranking, Manafwa District	30
Figure 20: Road Accident Hotspots and Vulnerability, Manafwa District	

LIST OF TABLES

Table 1: Population Distribution in Manafwa District	8
Table 2: Components of Vulnerability in Manafwa District	33
Table 3: Vulnerability Profile for Manafwa District	35
Table 4: Hazard Risk Assessment	36
Table 5: Gender and age groups mostly affected by hazards	37
Table 6: Coping strategies to the Multi-hazards in Manafwa District	38

LIST OF PLATES

Plate 1:	Landslide spot in Bunamuwenge Parish in Wesswa Sub County	13
Plate 2:	Impact of flooding in Bugobero along Khamitsalu River	16
Plate 3:	The impact of dry spells on boreholes (dry up)	
	in lower sub-counties of the district including Namboko, Bunabwana and Butiru	18
Plate 4:	River bank encroachment through sand mining and farming along river Manafwa	29

LIST OF ACRONYMS

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

DEFINITION OF KEY TERMS

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

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

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

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

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

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

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

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

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

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

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

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

INTRODUCTION

1.1 Background

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

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

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

This final draft report details methodological approach for HRV profiling and mapping for Manafwa 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 Manafwa District.

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

1.5 Structure of the Report

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

OVERVIEW OF MANAFWA DISTRICT

2.1 Location

Manafwa District was carved out of Mbale District in 2005, the District lies between the longitudes of 34° E, 35°E and latitudes 00°45°N. It is bordered by the Republic of Kenya to the East and South; Bududa District to the North; Mbale District to the West and Tororo District to the SouthWest. It has 28 sub-counties and 2 Town Councils namely; Bubutu, Bugobero, Bukhabusi, Bukhaweka, Bukhofu, Bukiabi, Bukokho, Bukusu, Bumbo, Bumwoni, Bunabwana, Bupoto, Busukuya, Butiru, Butta, Buwabwala, Buwagogo, Kaato, Khabutoola, Magale, Mukoto, Nalondo, Namabya, Namboko, Sibanga, Sisuni, Tsekululu and Wesswa sub-counties and Lwakhakha and Manafwa Town council.



Figure 1: Administrative Boundaries and Gazetted areas, Manafwa District

2.1.1 Geomorphology

Manafwa District consists of three topographical regions, namely; lowland Manafwa; Upland Manafwa and the mountain landscapes. On average the plain runs in the West-South direction, from the borders of Mbale District to the South through to Tororo District. The dominant altitude of this landscape is slightly over 1800m, but with many features higher.



Figure 2: Geormophology, Manafwa District

2.1.2 Geology and soils

The District is well endowed with phosphates in in Bukusu Hills, Vermiculite in Butiru Bugobero; there are also phosphate deposits and iron. Quarry sites exist in around river Manafwa. These quarries provide livelihood for local people who produce aggregates, hardcore and sand mining along the river beds for the construction industry.



Figure 3: Geology and Lithological Structures, Manafwa District

2.1.3 Vegetation and Land use Stratification

There are a variety of vegetation types, which are a result of a number of physical factors, in particular, climatic and altitudinal. Therefore as one climbs up, there is progressive change both in climate and vegetation zones. This leads to a situation where tropical savannah and grassland savannah on the plain change to tropical forest then to alpine vegetation towards the mountain summit. The different vegetation zones include grasses, forests and swampy vegetation bamboo a local delicacy is uniquely the dominant vegetation in the temperate zones of Mt Elgon.



Figure 4: Landuse stratification, Manafwa District

2.1.5 Wind

The District is swept by the South East and North East monsoon winds since it lies near the equator and experiences mean annual vapour pressure between 18-20 m b and the highest potential evaporation is in March.

2.1.6 Rainfall

The District experiences bimodal type of rainfall with the highest coming in the first season of March to June and the second, which is normally light, in September to November. A short dry spell is between June/July while the December to March spell is longer. The average rainfall is 1500mm per annum. This very high rainfall is very supportive to intensive agriculture, which forms the back bone of the District economy, thus Manafwa District belongs to the area regarded as having highly reliable condition for agricultural production and hence, the important national agricultural base and food basket.



Figure 5: Total Annual Rainfall Distribution, Manafwa District

2.1.8 Population

According to the National Population and Housing Census (2014) results, Manafwa District had a total population of 352,864 people. Results also showed that most of the people in Manafwa District reside in rural areas (330,103 (93.5%) compared to (22,761 (6.5%) who reside in urban centers. The gender distribution was reported to be males: 171,745 (48.7%) and females: 181,119 (51.3%). About 99.7% (351,931) of the population form the household population and only 0.3% (933) is Nonhousehold. Bubutu sub-county had the highest population of 23,201 people while Sisuni sub-county had the least population of 4,044 people (Figure 6). Table 1 shows the population distribution per sub-county for the different gender.

	HOUSEHOLDS		POPULATION		
Sub-County	Number	Average Size	Males	Females	Total
Bubutu	4,481	5.2	11370	11831	23201
Bugobero	2,711	5	6467	7020	13487
Bukhabusi	2,094	4.6	4837	4899	9736
Bukhaweka	1,907	4.7	4411	4528	8939
Bukhofu	1,510	4.9	3541	3815	7356
Bukiabi	2,425	4.7	5475	5985	11460
Bukokho	3,726	5.2	9445	9930	19375
Bukusu	2,018	4.8	4756	4980	9736
Bumbo	3,226	5.2	8218	8503	16721
Bumwoni	3,970	4.9	9282	10104	19386
Bunabwana	2,481	4.9	5833	6221	12054
Bupoto	2,875	4.8	6752	6950	13702
Busukuya	2,768	4.7	6301	6728	13029
Butiru	3,491	5.1	8635	9050	17685
Butta	1,002	4.7	2256	2501	4757
Buwabwala	1,805	3.9	3328	3737	7065
Buwagogo	1,528	4.5	3324	3549	6873
Kaato	1,928	4.6	4405	4532	8937
Khabutoola	3,107	4.8	7131	7755	14886
Lwakhakha Town Council	2,035	4.4	4408	4653	9061
Magale	4,284	4.8	10103	10779	20882
Manafwa Town Council	3,033	4.4	6645	7055	13700
Mukoto	1,719	4.7	3985	4043	8028
Nalondo	1,236	4.8	2905	2999	5904
Namabya	2,155	5	5228	5463	10691
Namboko	1,838	5.6	5062	5211	10273
Sibanga	1,580	4.9	3695	4004	7699
Sisuni	815	5	1919	2125	4044
Tsekululu	3,493	4.8	8289	8337	16626
Weswa	1,499	5.1	3739	3832	7571

Table 1:	Population	Distribution in	n Manafwa	District
----------	-------------------	------------------------	-----------	----------

Source: UBOS Census 2014



Figure 6: Population Distribution, Manafwa District

2.1.9 Economic activities

Most households are engaged mainly in Agriculture with emphasis on food crops, Manafwa is a national agricultural base and food basket. Cash crops consist of coffee.

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 and animal diseases, pests, animal attacks, earthquakes, fires, conflicts etc. Stakeholder engagements were done through Focus Group Discussions (FGDs) and key informant interviews guided by checklist tools (Appendix I). At district level, One Key Informant Interview comprising of five respondents (District Agricultural Officer, District Fisheries Officer and 3 Sub-county Extension Officers) was held at Manafwa District Headquarters. At sub-county level Key informants included: Sub-county and parish chiefs, community Development mobilizers and health workers.

FGDs were carried out in four purposively selected sub-counties that were ranked with highest vulnerability. FGDs comprising of an average of 12 respondents (crop farmers, local leaders, nursing officers, police officers and cattle keepers) were conducted at Sub-county (1)Bunabwana , Sub-county (2), Buwabwala ,Sub-county (3) Kato and Sub-county(4)Mukoto . 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 and men) with respect to age groups since hazards affect both men and women though in different perspectives irrespective of age. This allowed for comprehensive representation as well as provision of detailed and verifiable information.

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

3.1.3 Participatory GIS

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

3.1.4 Geo-referencing and ground-truthing

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

3.2 Develop District Specific Multi-hazard Risk and Vulnerability Profiles

3.2.1 Data analysis and integration

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

3.2.2 Data verification and validation

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

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

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

RESULTS FROM MULTI-HAZARD RISK, VULNERABILITY MAPPING

4. Multi-hazards

A hazard, and the resultant disaster can have different origins: natural (geological, Hydrometeorological 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 Manafwa 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 and land conflicts.

4.1 Geomorphological and Geological Hazards

4.1.1 Landslides, rock falls and soil erosion

Results from the participatory assessments showed that landslides, mudslides, rock falls and soil erosion were a serious problem in Manafwa District as a result of degradation in the very steep hill slopes. In Bukokho, Bumbo, Wesswa, Kaato, Buwabwala sub-counties and several high altitude areas still face the threat of land movements or landslides. In April to June 2015, Bunamuwenge Parish in Wesswa Sub-county experienced mass movement where an area that was leveled developed crack and became rugged over this period and slope failure was experienced in November 2014, Soobi Village in Kaato Sub-county where a big block of land moved down hill leading to destruction of a newly constructed road and an electricity line. It also displaced 5 households and several more are at threat. This information was integrated with the spatial modelling using socio-ecological spatial data i.e. Soil texture (data for National Agricultural Research Laboratories – Kawanda (NARL) 2014, Rainfall (Meteorology Department 2014), Digital Elevation Model (DEM), SLOPE, ASPECT (30m resolution data from SRTM Shuttle Radar Topography Mission (SRTM) to generate Land slide, rock falls and soil erosion vulnerability map (Figure 7).



Plate 1: Landslide spot in Bunamuwenge Parish in Wesswa Sub County



Figure 7: Landslides, rock falls and soil erosion, Manafwa District

4.1.2 Earthquakes and faults

Participants in the focus group discussions indicated that Manafwa district occasionally experiences minor earth tremors. However, participants reported from 2010 to 2012, several sub-counties in the District developed cracks some of which were life threatening. This was in Bupoto, Mukoto, Bumbo, Bukokho, Tsekululu, Buwabwala, Bukhabusi and Wesswa Sub-Counties. Several families in Bupoto, Bumbo, Bukokho and Wesswa were displaced by the cracks.

In Bupoto, there was surging creating a step like feature some of which were in peoples' homes. This alone displaced many households as house walls developed life threatening cracks



Figure 8: Earthquakes Vulnerability and Fault lines, Manafwa District

4.2 Climatological and Meteorological Hazards

4.2.1 Floods

Participants in the focus group discussions indicated that floods were a common occurrence in Manafwa District especially along rivers and low lying areas. It was reported that floods have continuously devastated sub-counties along Manafwa and Khamitsalu Rivers. These include Kaato, Wesswa, Buwagogo, Manafwa Town Council, Butta, Sibanga along Manafwa River and Sisuni, Bukhofu, Bukusu, Bugobero along Khamitsalu River and Bunabwana Sub-county along Nandelema Stream. This year in April/May, rivers Khamitsalu and Kufu created a lot of devastation with Khamitsalu washing away a bridge along Bupoto Magale road and Kufu destroying 100s of hectares of crops. This has continued to occur year in year out leading to enormous destruction of property and crops of residents along the rivers and streams hence affecting the food security situation of the District. This information was integrated with the spatial modelling using socio-ecological spatial data i.e. Soil texture (data for National Agricultural Research Laboratories – Kawanda (NARL) 2014, Rainfall (Meteorology Department 2014), Digital Elevation Model (DEM), SLOPE, ASPECT (30m resolution data from SRTM Shuttle Radar Topography Mission (SRTM) to generate flood susceptibility map (Figure 9).



Plate 2: Impact of flooding in Bugobero along Khamitsalu River



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

4.2.2 Dry spell

Results from participatory assessments indicated that long dry spells without rain are experienced in the lower sub-counties including Namboko, Bunabwana, Butiru, Busukuya and parts of Bubutu. Most of the crops grown in these areas have significantly been affected thus resulting into economic losses. This information was integrated with spatial modelling using socio-ecological spatial data i.e. Rainfall and Temperature (Uganda National Meteorological Authority, 2014) using the Standardized Precipitation Index (SPI) to generate drought vulnerability map (Figure 10).



Plate 3: The impact of dry spells on boreholes (dry up) in lower sub-counties of the district including Namboko, Bunabwana and Butiru



Figure 10: Drought Vulnerability Ranking, Manafwa District

4.2.3 Hailstorms

Participatory assessments through the focus group discussions indicated that hailstorms are experienced at the onset of heavy rains. Participants reported that in Septembe 2015, the Sub-counties of Bumwoni, Bukiabi, Lwakhakha Town Council, and many others were completely devastated when a hailstorm occurred in the area destroying all crops and homes. This affected over 600 households and hence potential food security situation in these areas.

4.2.4 Strong winds

Results from participatory assessments showed that strong winds occur at the start of rainy seasons. Participants reported that strong winds cause enormous destruction of property and crops across the District such as blowing off roof tops of houses and schools and cause logging of banana plantations and tree falls. In April 2014, a heavy down pour with a strong wind blew off 24 roof tops in Bukhaweka. The most affected sub-counties are; Wesswa, Kaato, Buwabwala, Mukoto, Tsekululu, Bukhabusi, Bumbo, Bukokho, Bukusu, Sisuni, Bukhofu, Bukhaweka, Namabya, Bupoto. (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. Participants indicated that lightning was a common occurrence in Manafwa District. It was observed that lightning continues to be a potential risk in the District likely to affect the entire district. In 2013, lightning struck and caused death of a school boy in Bupoto subcounty.



Figure 11: Strong winds, Hailstorms and Lightning Hotspots Manafwa District

4.3 Ecological and Biological Hazards

4.3.1 Crop Pests and Diseases

Results from participatory assessments indicated that Manafwa District is vulnerable to crop pests and diseases. The most reported crop diseases include; banana bacterial wilt, coffee leaf rust, tomato blight and maize lethal necrosis while the most reported crop pests were banana weevils, coffee twig borer and aphids on late planted beans. The lowere sub-counties of Bugobero, Namboko, Bubutu, Butiru, Bumwoni and Bukiabi were mostly affected by banana bacterila wilt. Coffee leaf rust affected all the Sub-counties. Tomato blight mostly affected the sub-counties of Bupoto, Bumbo, Bukokho and Mukoto in the highlands. It was reported that in 2014, there was an outbreak of maize lethal necrosis near the border with Kenya in Lwakhakha Town Council. The other sub-counties that were affected by maize lethal necrosis included Namboko, Bubutu, Magale and Bukiabi, Bumwoni. Figure 12 shows crop pests and diseases vulnerability in Manafwa District.



Figure 12: Crop Pests and Diseases Vulnerability, Manafwa District

4.3.2 Livestock Vectors and Diseases

Participants in the focus group discussions reported that the most common livestock diseases in Manafwa District include foot and mouth disease, Nagana, swine fever and Newcastle whereas ticks and worms were the most reported parasites among livestock. It was observed that foot and mouth disease being common in the sub-counties of Bubutu, Namboko and Magale neighbouring Kenya. In 2014, there was a quarantine to control foot and mouth disease in the entire district. Nagana mostly affected the sub-counties of Sibanga, Bugobero, Nalondo and Bumbo. Figure 13 shows livestock pests and diseases vulnerability in Manafwa District.



Figure 13: Livestock Pests and Diseases Vulnerability, Manafwa District
4.3.3 Human Diseases

Participatory assessments indicated that the most common disease experienced in Manafwa District are; malaria, dysentery, cholera, respiratory tract infections, diarrhea, HIV/AIDS and Tuberculosis. Reports indicated that malaria prevalence had reduced from 35% to 29% probably due to the government's intervention through the Ministry of Health to provide mosquito nets. In March 2016, there was an outbreak of Cholera in Wesswa sub-county, 31 cases were reported and 2 people died. It was also reported that HIV/AIDS prevalence rates were high in the urban centres such as Lwakhakha and Manafwa Town council. Cases of bovine tuberculosis were reported in Bugobero and Butiru Sub-counties.



Figure 14: Human Diseases Prevalence and Health Facilities, Manafwa District

4.3.4 Vermin and Wild-life Animal Attacks

Participatory assessments through focus group discussions indicated that there are incidences of vermin and wildlife animal attacks in the areas adjacent to Mt. Elgon National Park. Vermin and wildlife animal attacks were also reported in parts of Mukoto sub-county neighboring Mt. Elgon National park. Figure 15 shows vermin and wildlife animal conflicts and vulnerability in Manafwa District.



Figure 15: Vermin and Wildlife Animal Conflicts Manafwa District

4.3.5 Invasive species

The most common invasive species in Manafwa District were Lantana camara, Oxalis spp. and paper malbury. It was reported that Lantana camara suppresses the growth of crops and pastures. Participants also reported that paper malburg is spatially distributed in Butiru sub-county. Figure 16 shows invasive species prone areas in Manafwa District.



Figure 16: Invasive Species Vulnerability, Manafwa District

4.4 Human Induced and Technological Hazards

4.4.1 Bush fires and Forest fires

Participants in the focus group discussions indicated that bush fires weren't common in Manafwa District. However, reported that in 2010 a forest was burnt on Walanga hill in Manafwa Town Council. Figure 17 shows bush/forest fires hotspot areas in Manafwa District.



Figure 17: Bush/Forest fires Hotspot Areas Manafwa District

4.4.2 Land conflicts

Results from the participatory assessments indicated that land conflicts were common in the entire district. They reported that there was a district boundary conflict between Manafwa District and Bududa District in Kaato Sub-county. The other reported land disputes are usually between family members. Figure 18 shows land conflict prone areas in Manafwa district.



Figure 18: Land Conflicts Ranking, Manafwa District

4.4.3 Environmental Degradation

The most common forms of environmental degradation in Manafwa District are; brick making, deforestation in areas neighboring Mt. Elgon National Park, wetland and river bank encroachment at Namweke in Sisuni and Bukhofu sub-counties and Nabaloosi in Kaato Sub-county.



Plate 4: River bank encroachment through sand mining and farming along river Manafwa



Figure 19: Environmental Degradation Ranking, Manafwa District

4.4.4 Road Accidents

Participants in the focus group discussions reported that cases of road accident are few which are majorly caused by boda – boda cyclists and vehicles especially during the rainy season along the Manafwa – Kuffu – Bumbo – Magale road.



Figure 20: Road Accident Hotspots Manafwa 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 Manafwa 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 Manafwa District.

Vulnerability		Exposure		Susceptibility			Resilience
	Hazards	Elements at Risk	Geographical Scale	Susceptibility	Geographical Scale	Coping strategies	Geographical Scale
	Landslides, Rock falls and Soil erosion	 Human and livestock adjacent to hill slopes Crops on hill slopes Infrastructure e.g. houses, schools, roads adjacent to hill slopes 	Parish	 Loss of lives Complete crop failure Destruction of infrastructure e.g. homes, and schools 	Parish	-Migration -Senstitization by both government and non- governmental agencies	Parish
	Earth quakes	- Infrastructure e.g. houses, schools	District	- Loss of lives - Destruction of Infrastructure e.g. houses, schools	District	-No much measure so far	District
	Floods	 Livestock adjacent to flood plain Crops on flood plain Infrastructure e.g. houses, schools, roads adjacent to flood plain 	Parish	 Livestock loss Destruction of crops Destruction of infrastructure e.g. houses, schools, roads adjacent to flood plain 	Parish	-Migration -Sensitization on wetland conservation -Dig trenches	Parish
	Drought/prolonged dry spells	- Livestock - Crops - Human population	Village	- Hunger & poverty - Livestock loss - Chortage ure - Shortage of water - Shortage of water	Village	-Migration -Sensitization on tree planting -Buy food from elsewhere	Village
	Hailstorms, strong winds and Lightning	- Human and livestock populations - Crops - Infrastructure e.g. houses, schools, health centres	Parish	 Loss of lives Destruction of crops Destruction of infrastructure e.g. houses, schools, roads adjacent to flood plain 	Parish		Parish
	Crop Pests and Diseases	-Crops	District	- Complete crop failure	District	- Spraying - Cut and burry affected crops -Sensitization on crop disease anagement	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	District	- Mass Immunization - Use of mosquito nets	District
Socio- economic component	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 -Senstitzation on Invasive species management	District
	Bush fires	- Livestock - Crops - Infrastructure e.g. houses, schools	Sub-county	- Loss of livestock - Shortage of pasture - Destruction of crops - Destruction of infrastructure e.g. houses, schools	Sub-county	-Sensitization	Sub-county
	Road accidents	- Human population - Infrastructure adjacent to accident black spots e.g. houses, schools etc.	Sub-county	- Loss of lives - Destruction of vehicles - Destruction of vehicles Infrastructure adjacent to accident black spots e.g. houses, schools etc.	Sub-county	-Humps on roads -Signage on speed limits -Sensitization on traffic rules	Sub-county
	Land conflicts	- Human population	Village	-Loss of lives -Family violence and break outs	Village	 Community dialogue District court in charge of land issues 	Village
	Vermin and Wildlife animal attacks	- Human population - Livestock - Crops	Parish	-Loss of lives -Livestock loss -Crop destruction	Parish	 - Report to UWA - Guard gardens - Poison - Hunt and kill - Fence water collection points with Wildlife animals 	Village
	Environmental degradation	- Human and livestock populations - Crops - Natural vegetation	Sub-county	-Crop failure -Shortage of pasture -Shortage of water -Decline of water quality	Sub-county	-Sensitization on wetland conservation -Sensitization on tree plating -Setting bi-laws	Sub-county

Table 2: Components of Vulnerability in Manafwa District

MANAFWA DISTRICT HAZARD, RISK AND VULNERABILITY PROFILE 📕 📕 🔳

33

-Migration -Sensitization by both government and non- governmental agencies	-No much measure so far	-Migration -Sensitization on wetland conservation -Dig trenches	-Migration -Sensitization on tree planting -Buy food from elsewhere		- Spraying - Cut and burry affected crops -Sensitization on crop disease management	 Vaccination Burry and burn animals that have died from infection Quarantine 	- Mass Immunization - Use of mosquito nets	- Cut and burn -Sensifization on Invasive species management	-Sensitization	-Humps on roads -Signage on speed limits -Sensitization on traffic rules	- Community dialogue - District court in charge of land issues	- Report to UWA - Guard gardens - Poison -Hunt and kill -Fence water collection points with Wildlife animals	-Sensitization on wetland conservation -Sensitization on tree plating -Setting bi-laws
Parish	District	Parish	Village	Parish	District	District	District	District	Sub-county	Sub-county	Village	Parish	Sub-county
- Loss of lives - Complete crop failure - Destruction of infrastructure e.g. homes, and schools	- Loss of lives - Destruction of Infrastructure e.g. houses, schools	 Livestock loss Destruction of crops Destruction of infrastructure phouses, schools, roads adjacent to flood plain 	- Hunger & poverty - Livestock loss - Crop failure - Shortage of pasture - Shortage of water	- Loss of lives - Destruction of crops - Destruction of infrastructure e.g. houses, schools, roads adjacent to flood plain	- Complete crop failure	 Loss of livestock Reduced livestock productivity 	- Loss of lives	 Outcompete the indigenous spp., suppress growth of indigenous spp Loss of indigenous spp. Complete crop Failure suppress growth of pasture 	 Loss of livestock Shortage of pasture Destruction of crops Destruction of infrastructure e.g. houses, schools 	 Loss of lives Destruction of vehicles Destruction of Infrastructure adjacent to accident black spots e.g. houses, schools etc. 	-Loss of lives -Family violence and break outs	-Loss of lives -Livestock loss -Crop destruction	-Crop failure -Shortage of pasture -Shortage of water -Decline of water quality
Parish	District	Parish	Village	Parish	District	District	District	District	Sub-county	Sub-county	Village	Parish	Sub-county
 Human and livestock adjacent to hill slopes Crops on hill slopes Infrastructure Infrastructure e.g. houses, schools, roads adjacent to hill slopes 	- Infrastructure e.g. houses, schools	 Livestock adjacent to flood plain Crops on flood plain Infrastructure in houses, schools, roads adjacent to flood plain 	- Livestock - Crops - Human population	- Human and livestock populations - Crops - Infrastructure e.g. houses, schools, health centres	-Crops	-Livestock (cattle, goats etc.)	- Human Population	-indigenous species -Animals	- Livestock - Crops - Infrastructure e.g. houses, schools	- Human population - Infrastructure adjacent to accident black spots e.g. houses, schools etc.	- Human population	- Human population - Livestock - Crops	- Human and livestock populations - Crops - Natural vegetation
Landslides, Rock falls and Soil erosion	Earth quakes	Floods	Drought	Hailstorms, strong winds and Lightning	Crop Pests and Diseases	Livestock Pests and Diseases	Human Disease outbreaks	Invasive species	Bush fires	Road accidents	Land conflicts	Vermin and Wildlife animal attacks	Environmental degradation
						Environmental	component						

Table 3: Vulnerability Profile for Manafwa 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	3	12	Kaato, Manafwa Town Council, Bukhaweka, Sisuni, Butiru and Bunabwana
Droughts	4	3	12	Butiru, Bunabwana, Busukuya, Namboko, Sibanga, Nalondo, Bugobero
Soil erosion, rock falls and landslides	5	4	20	Kaato, Wesswa, Buwabwala, Bupoto, Tsekululu, Bukhabusi, Bumbo, Bukokho, Buwagogo
Hail storms, lightning and strong winds	4	3	12	Across the District
Bush fires and Forest fires	3	3	9	Nalondo, Sibanga, Khabutoola, Manafwa Town Council
Crop pests and diseases	3	3	9	Across the District
Livestock pests and diseases	3	3	9	Across the District
Human Diseases outbreaks	4	4	16	Across the District
Land conflicts	3	4	12	Kaato, Bupoto, Mukoto, Bumbo, Bukokho and Tsekululu
Vermin and Wild-life animal attacks	3	2	6	Across the District
Earthquakes and faults	3	4	12	Bupoto, Bumbo, Bukokho, Wesswa, Mukoto,
Road accidents and Water accidents	2	2	4	Across the District especially boda boda accidents
Environmental degradation	5	5	25	Across the District
Invasive species	2	3	6	Across the District

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

Key for Relative Risk

Medium
Low
Not reported/ Not prone

Table 4: Hazard Risk Assessment

Hazard	Kaato	Wesswa	Buwagogo	Bukhabusi	Tsekululu	Buwabwala	Mukoto	Bupoto	Namabya	Bukhaweka	Butiru	Bumwoni	Bukokho	Bumbo	Butta
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 and Forest fires															
Environmental degradation															
Earthquakes and faults															
Road accidents															
Invasive species															
Hazard	Bunabwana	Bubutu	Namboko	Bukiabi	Lwakhakha T/Council	Sisuni	Bukusu	Bukhofu	Bugobero	Khabutoola	Manafwa Town Council	Nalondo	Busukuya	Sibanga	Magale
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 and Forest fires															
Environmental degradation															
Earthquakes and faults															
Invasive species															

Key

,	
VH	Very high
Н	High
Μ	Medium
L	Low
	Not reported/ Not prone

4.5.1 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

Table 5: Gender and age groups mostly affected by hazards

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 5).

No	Multi-Hazards		Coping strategies
1	Geomorphological or	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	Geological	Earthquakes and faults	 No action, communities think the tremors are minor Designs of houses (pillars) Early warning system Vigilance Sensitization Emergency response mechanisms
3		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	Meteorological	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 To put on rubber shoes or sandles

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

6		Crop pests and Diseases	 Spraying pests Cutting and burying BBW affected crops Burning of affected crops Vigilance
7		Livestock pests and Diseases	 Spraying pests Vaccinations Burying animals that have died from infection Quarantine
8		Human epidemic Diseases	 Mass immunisation Visiting health centres Use of mosquito nets
9	Ecological or Biological	Vermin and Wild-life animal attacks	 Guarding the gardens Poisoning Hunt and kill Report to UWA Hugo group Mauritius thorns Plant tea as buffer Dig trenches Chain link Plant red pepper as buffer Recommend vermin guards
10		Invasive species	 Uproot Spray with herbicides (e.g 2-4-D) Cut and burn Sensitization on Invasive species management Blacklisting exotic species
11		Land conflicts	 Community dialogues Report to court Migration Resettlement Surveying and titling Strengthen Land management structures Sensitization on land ownership Proper demarcation (live fencing)
12		Bush fires/ Forest fires	 Stop the fires in case of fire outbreak Fire lines (may be constructed, cleared grass) Fire breaks planted along gardens e.g. euphorbia spp. Vigilance especially in dry seasons where most burning is done Bye-laws Sensitization on dangers of fires
13	Human induced or technological	Road accidents	 Construction of humps Road Signage including speed limits Separate lanes on sharp corners Sensitisation Widen narrow roads Plant trees on road reserve, as road guards Deployment of Traffic officers
14		Environmental degradation	 Leave wetlands as water catchments Plant appropriate tree species as climate modifiers Sensitization Bye-laws Enforcement Gazatte and demarcate wetlands Restore wetlands and other fragile ecosystems EIA for new developments No land titles for wetland areas Cancellation of existing wetland land titles Developing land use plans and enforce them No approval of applications for developments in wetlands by Physical Planning Committees

GENERAL CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

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

Results from the participatory assessment indicated that Manafwa district has over the past two decades increasingly experienced hazards including rock falls, soil erosion, floods, drought, hailstorms, strong winds, lightning, crop pests and diseases, livestock pests and diseases, human disease outbreaks, vermin, wildlife animal attacks, invasive species, bush fires and land conflicts putting livelihoods at increased risk. Generally landslides and flooding were identified as most serious problem in Manafwa 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 Manafwa district increase their vulnerability to hazard exposure necessitating urgent external support.

Hazards experienced in Manafwa district can be classified as:

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

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

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

5.2 Policy-related Recommendations

The following recommended policy actions targeting vulnerability reduction include:

- i. The government should improve enforcement of policies aimed at enhancing sustainable environmental health.
- ii. The government through MAAIF should review the animal diseases control act because of low penalties given to defaulters.

- iii. The government should establish systems to motivate support of political leaders toward government initiatives and programmes aimed at disaster risk reduction.
- iv. The government should increase awareness campaigns aimed at sensitizing farmers/ communities on disaster risk reduction initiatives and practices.
- v. The government should revive disaster committees at district level and ensure funding of disaster and environmental related activities.
- vi. The government through UNRA and the District authority should fund periodic maintenance of feeder roads to reduce on traffic accidents.
- vii. The government through OPM and Meteorology Authority should increase importation of lightning conductors and also reduce taxes on their importation.
- viii. The government through OPM and Meteorology Authority should support establishment of disaster early warning systems.
- ix. The government through MWE increase funding and staff to monitor wetland degradation and non-genuine agro-inputs.
- x. The government through OPM should improve communication between the disaster department and local communities.
- xi. The government through MWE should promote Tree planting along road reserves.
- xii. The government through MAAIF should fund and recruit extension workers at sub-county level and also facilitate them.

References

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

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

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

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

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

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

APPENDIX I: DATA COLLECTION TOOLS



Key informant interview at Manafwa district headquarters

FOCUS GROUP DISCUSSION GUIDE FOR DISTRICT DISASTER RISK MANAGEMENT FOCAL PERSONS

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

No.	Name of Participants	Designation	Contact	Signature

Introduction

- i. You have all been requested to this session because we are interested in learning from you. We appreciate your rich experiences and hope to use them to strengthen service delivery across the district and the country as whole in a bid to improve access to information on Hazards and early warning.
- ii. There is no "right" or "wrong" answers to any of the questions. As a Focus Group Discussion leader, I will try to ask all people here today to take turns speaking. If you have already spoken several times, I may call upon someone who has not said as much. I will also ask people to share their remarks with the group and not just with the person beside them, as we anxious to hear what you have to say.
- iii. This session will be tape recorded so we can keep track of what is said, write it up later for our report. We are not attaching names to what you have to what is said, so whatever you say here will be anonymous and we will not quote you by name.
- iv. I would not like to keep you here long; at most we should be here for 30 minutes- 1 hour.
- Section A: Geomorphological or Geological Hazards (Landslides, rock falls, soil erosion and earth quakes)
- 1. Which crops are majorly grown in your area of jurisdiction?
- 2. Which domestic animals are dominant in your area of jurisdiction?
- 3. What challenges are faced by farmers in your area of jurisdiction?
- 4. Have you experienced landslides and rock falls in the past 10 years in your area of jurisdiction?
- 5. Which villages, parishes or sub-counties have been most affected by landslide and rock falls?
- 6. As a way of ranking from Low, Medium, High and Very high, rank the villages, parishes or subcounties 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 subcounties 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 subcounties that have been most affected?
- 24. Which crops are majorly affected by floods in your area of jurisdiction?

45 MANAFWA DISTRICT HAZARD, RISK AND VULNERABILITY PROFILE 🔳 🔳 🔳

- 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 subcounties 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 subcounties 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 subcounties 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 subcounties 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?

47 MANAFWA DISTRICT HAZARD, RISK AND VULNERABILITY PROFILE 🔳 🔳 🔳

- 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 subcounties 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 subcounties 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 subcounties 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 subcounties 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

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

No.	Name of Participants	Designation	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?

53 MANAFWA DISTRICT HAZARD, RISK AND VULNERABILITY PROFILE 🔳 🔳 🔳

- 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?

	Name of Participant	Designation	Contact
1	Martin Jacan Gwekto	CAO	0772460408
2	Dr. Wamesebu Gideion	DHO	0772642451
3	Bisikwa Sarah	DNRO	0772479537
4	Mwangale Micheal	DFO	0772946812
5	Nambuya Modesta	DPO	0772881582
6	Nambuya Stella	A CAO	0772698432
7	Bamwete James	D. Planner	0703649188

ATTENDANCE LIST FOR DISTRICT DISASTER RISK MANAGEMENT FOCAL PERSONS

SPATIAL DATA COLLECTION SHEET FOR HAZARD VULNERABILITY AND RISK MAPPING

Observer Name:	District:	Coordinates	Coordinates	
	Sub- county:	X:		
Date:	Parish:	Y:		
	Village:	Altitude		
Slope characterization	Bio-physical characterization	Vegetation characterization	Lenduce for	
Slope degree (e.g 10, 20,)	Soil Texture	Veg. cover (%)	(tick) Bush	
Slope length (m) (e.g 5, 10,)	Soil Moisture	Tree cover (%)	Grassland Wetland Tree plantation Natural forest Cropland Built-up area Grazing land Others	
Aspect (e.g N, NE)	Rainfall	Shrubs cover (%)		
Elevation (e.g high, low)	Drainage	Grass / Herbs cover (%)		
Slope curvature (e.g concave, covex)	Temperature	Bare land cover		

Area Description (Susceptibility ranking: landslide, mudslide, erosion, flooding, drought, hailstorms, lightning, cattle disease outbreaks, human disease outbreaks, land conflicts, wildlife conflicts, bush fires, earthquakes, faults/ cracks, pictures, any other sensitive features)
Available online: <u>http://www.necoc-opm.go.ug/</u>

All Rights Reserved $\ensuremath{\mathbb{C}}$ 2016 The Republic of Uganda



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

With support from:

United Nations Development Programme



Plot 11 Yusuf Lule, Road, Nakasero P. O. Box 7184, Kampala, Uganda Tel: (+256) 417 112 100 Fax: (+256) 414 344 801 www.undp.org