THE REPUBLIC OF UGANDA

Otuke District
Hazard, Risk, and Vulnerability Profile

2016

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Acronyms

AU	African Union
CAO	Chief Administrative Officer
CDPC	City Disaster Policy Committee
CDMTC	City Disaster Management Technical Committee
CSOs	Civil Society Organizations
DDPMC	District Disaster Preparedness and Management Committee
DDPC	District Disaster Policy Committee
DECOC	District Emergency Coordination and Operations Centre
DRM	Disaster Risk Management
DRR	Disaster Risk Reduction
FGD	Focus Group Discussions
GIS	Geographical Information Systems
GoU	Government of Uganda
GPS	Global Positioning System
HFA	Hyogo Framework for Action
IDP	Internally Displaced Persons
IATC	Inter Agency Technical Committee
IGAD	Inter Governmental Authority on Development
IMPC	Inter Ministerial Policy Committee
IATC	Inter- Agency Technical Committee
IPCC	Inter- governmental Panel on Climate Change
LC	Local Council
MLHUD	Ministry of Lands Housing and Urban Development
MGLSD	Ministry of Gender Labour and Social Development
MoLG	Ministry of Local Government
MS	Micro Soft
NAADS	National Agricultural Advisory Services
NARO	National Agricultural Research Organisation
NDPMC	National Disaster Preparedness Management Committee
NECOC	National Emergency Coordination and Operations Centre
NEMA	National Environment Management Organisation
NFA	National Forestry Authority
NGO	Non-Governmental Organizations

NIC	National Incident Commander
OPM	Office of the Prime Minister
OVC	Orphans and vulnerable Children
PEAP	Poverty Eradication Action Plan
SCDMC	Sub County Disaster Preparedness and Management Committee
UCC	Uganda Communication Commission
UN	United Nations
UPDF	Uganda People's Defense Forces
URA	Uganda Revenue Authority
UWA	Uganda Wildlife Authority
UNDAF	United Nations Development Assistance Framework
UNDP	United Nations Developments Programme
UNOCHA	United Nations Office for Co-ordination of Humanitarian Affairs
UXO's	Unexploded Ordinances
VDPMC	Village Disaster Preparedness and Management Committees

ACKNOWLEDGEMENT

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

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

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

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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

This Otuke District Hazard, Risk and Vulnerability Profile integrates scientific information provided by GoU agencies and hazard and vulnerability knowledge provided by communities on the district base map to contribute to a Uganda risk atlas of disaster risk. It will support planning and decision-making processes to manage disaster risk in the District.

The methodology provided for four phases of work:

Phase I: requirements analysis, work planning, team building, logistical arrangements

Phase II: stakeholder mapping, consultation, spatial data acquisition, secondary data assessment

Phase III: data cleaning, analysis and verification

Phase IV: dissemination workshop

The report characterizes the district in terms of location, geography, gender demographics by sub-county and livelihoods.

Otuke is geographically located at latitude 20' 17' North of the equator and longitude 32' 56' East of the principal meridian. Otuke District exhibits a unimodal rainfall pattern with a single rainfall maximum. The rainy season stretches from March to November with a short dry spell in June. The dry season stretches from December to March. It receives an average rainfall in the range of 1000mm to 1600mm per annum. The average temperature of Otuke District ranges from

In 1991, the district population was estimated at about 43,500. The 2002 National Census estimated the population of the district at approximately 62,000. In 2012, the population of Otuke District was estimated at 86, 000. According to the just concluded National Census, the preliminary results indicate the district population is about 105,318.   The population density is 55.5 persons per square kilometer with a population growth rate of 3.39% per year.

It identifies endemic hazards in eleven classes, in order of high to low risk: prolonged dry spell, heavy storms, environmental degradation, bush fires, floods/water logging, internal conflicts, crop pests and diseases, animal vectors and diseases, invasive species, human epidemics and vermin

The discussion of the nature of each hazard and its geographic extent in terms of sub-counties provides a qualitative assessment of the situations that the communities face. Maps corresponding to each hazard show the areas where the hazard is significant, and also hotspots as points of incidence of the hazard.

The Eastern and Nothern sub-counties of Olilim, Ogwette and Ogor reported the highest vulnerability in Otuke district with cumulative vulnerability values of 28, 27 and 26 respectively and a weighted vulnerability value of 9 which lies in the top (red) category of the vulnerability scale. Most of the sub-counties displayed medium (yellow) vulnerability with weighted vulnerabilities between 5 and 7. Otuke T/C was the least vulnerable sub-county in the district with a weighted vulnerability value of 4. This sub-county though less vulnerable, should also be fortified against occurrences of new hazards and exacerbation of resident hazards now occurring at lower magnitudes but which may be worsened by climate extremes expected in the near future.

Timely early warning systems and other DRR interventions would enhance the resilience of the people of Otuke in their hazard and climate change situation.

INTRODUCTION

Otuke district is vulnerable to a number of hazards that lead frequently to disasters. They include prolonged dry spell, heavy storms, environmental degradation, bush fires, land conflicts, water logging crop pests and animal diseases among others.

The Otuke District Local Government and the Department of ReliefDisaster Preparedness and Management in the Office of the Prime Minister (OPM), with the support of the United Nations Development Programme (UNDP), embarked on a process of mapping the hazards and analyzing disaster risks and vulnerabilities in Otuke district.

The information contained in this District Hazard, Risk, and Vulnerability Profile will guide the adoption of disaster risk management (DRM) measures in the district and inform the development of the district's contingency and development plans.

Objectives

The objective of the hazard, risk, and vulnerability mapping is to produce a District Profile that will aid planning and decision making processes in addressing disaster threats/risks in Otuke District.

Methodology

The multi hazard, risk and vulnerability mapping employed a people-centered, multi-sectoral, and multi-stakeholder approach. To capture the required information for production of the district profile, a team of four led by the Office of the Prime Minister (OPM) visited stakeholders in a field mission to Lango region from 11th to 30th May, 2014. The team had One Disaster Preparedness Officer, One GIS Expert and two GIS Specialists. They worked in each district for an average of two days.

The field team interviewed District, Sub-County and Parish officials, as well as community members. They acquired secondary data through government sources (relevant Ministries, Departments and Agencies, and District Authorities in the Lango Sub-Region) and data bases from other organizations/NGOS operating in these districts. The mapping team integrated the field data, secondary data spatial data and analyzed them to produce hazard and vulnerability maps, interpretation and conclusions in district hazard, risk and vulnerability profiles.

The district profile production process had four phases:

Phase I: Preliminary Activities

Phase II: Field Data Collection and Mapping

Phase III: Data Analysis, Map Production, Report Writing and Verification

Phase IV: Dissemination

Phase I: Preliminary Activities

Before the start of field activity the team undertook a series of planning and preparation activities. These included meetings with relevant stakeholders, mobilization of required

resources, acquisition of required equipment and materials, review of relevant literature, establishment of study contacts and preparation of a checklist of activities to be undertaken in Phase II.

The main objectives of Phase One were to allow the mapping team to prepare and undertake a preliminary assessment of the quality and nature of the resources/materials, develop a quick understanding within the team and by stakeholders of the tasks of the multi-hazard, risk, and vulnerability mapping before any detailed field work was undertaken. This phase enabled early choice and scoping of specific mapping content and legends for the thematic maps.

This phase was also useful for preparing the resource deployment plan, and outlining procedural and field work plans. It articulated how various stakeholders would be consulted to ensure maximum participation in locating hazard-prone communities and other information relevant to the mapping exercise.

Phase II: Field Data Collection and Mapping

Stakeholder mapping and local meetings: The team held an entry meeting in each district to facilitate capture of key local issues related to hazard occurrence and trends. The meeting gave an opportunity for the team and stakeholders to identify other key resource persons and support staff for consultation in the local community.

Stakeholder Participation Practices: Stakeholder participation was a key component of the mapping exercise. The team consulted District technical sector heads, usually members of the District Disaster Management Committee (DDMC), and involved them in the ground-truthing exercises to ensure ownership of the data and results by the district leadership. They gave stakeholders, particularly those at district level, the opportunity to validate/update the data and make useful observations and additions of any other information relevant to the mapping process.

Capture of spatial data: The mapping team acquired spatial data and digital base maps at appropriate scales. When necessary they digitized feature layers of paper maps. The base maps contained relevant feature data including terrain, district and sub-county boundaries, forest reserves, national parks, roads, rivers, streams, water bodies and wetlands, and the locations of infrastructure, services and settlements.

Secondary data and desk research: The team reviewed relevant documents at the district offices and other organizations, assimilating policy and legal documents, and existing maps, development plans, reports and studies to characterize the socioeconomic and geographic nature of the district. They used a checklist which summarized the information required for each of the various risk indicators being mapped.

Critical observation and ground truthing: To critically assess the conditions, nature and location of hazard prone zones, current human activities and settlement patterns in hazard prone areas, the team visited infrastructure elements, observed principal household economic activities and spot-checked the locations of map features. They took the locations of hazard instances, called "hotspots", using a GPS receiver and used satellite imagery to validate and extend map features.

Main instruments of data collection: The main tools for data collection were methodology guidebooks, key informant guides, notebooks, GPS receivers, digital camera, document scanner, Google Earth, Satellite images and topographic sheets of the mapping areas.

Phase III: Data Analysis, Map Production, Report Writing and Verification

Analysis of collected data: The team and district local government officials analyzed the collected data. The mapping team added thematic layers and hazard incident points (hotspots) to the base maps to develop the hazard, risk and vulnerability maps. The main activities in this phase include:

• Data entry, cleaning and coding

• Preparation of base maps and process maps

• Preparation of disaster risk and vulnerability maps

Methods used for data analysis: The following data analysis methods were used:

• Scanning, geo-referencing, digitizing, geo-processing, and data transformation

• Focus group discussions and team discussions

• Drafting, digitizing and GIS overlays

• Compiling data and information

Data editing, cleaning and coding: The mapping team used the various tools mentioned above for editing, cleaning and coding. They transcribed the qualitative and quantitative data obtained from the field into spreadsheet tables using a data entry interface analogous to the field data forms. They cleaned the data by reconciling differences among the perceptions of the various stakeholders and resolving data anomalies as they edited the spreadsheet tables that listed the hazards perceived in each sub-county. They chose coding schemes to distinguish and represent on the hazard maps the levels of risk perceived by the stakeholders.

Data analysis: After data were collected from the field, the mapping team analysed and represented them using MS Office software (MS Word and MS Excel for Windows). They analysed spatial data using ArcGIS software and mobile GIS applications, systematically overlaying hazard feature (layers) onto base maps to produce the risk and vulnerability maps.

Descriptive statistics: The mapping team investigated trends per given indicator using tables, graphs, charts and frequencies. As processing of data developed, it was integrated for production of thematic maps for the various types of hazards.

Generation and verification of draft maps: The mapping team elaborated a series of hazard risk maps which reflect the severity of each hazard risk in each sub-county, encoded as high (red), medium (yellow), low (green) , and "not reported" (clear), reflecting the perception of stakeholders. They summarized the vulnerability situation in the district on a single map by colour-coding the sub-counties according to the sum of the sub-county hazard risk scores divided by 3, using the following classification scheme:

Table 1: Vulnerability classification scheme

(Sum of hazard risk severities) / 3 in the sub-county	Vulnerability	Map colour code
0	none	clear
1 - 4	low	green
5 - 7	moderate	yellow
8 or more	high	red

The hazard summary table ranks the hazards according to the ascending order of the values of the sum of sub-county hazard risk scores for each hazard.

Several weeks later, the team returned to the region to present the draft District Hazard, Risk and Vulnerability Profiles in a verification workshop. They invited stakeholders to assess the maps' accuracy and completeness, identify errors and gaps, and provide correct information to be incorporated in the final map versions.

Phase IV: Dissemination Workshop

After publication of the set of the district hazard, risk, and vulnerability profiles of the region, OPM staff led a final workshop to dissemination them and promote awareness of their usefulness to local partners.

Overview of the District

Historical Background

Otuke District was curved out of Lira District effective in February 2010. The district is administered by the Otuke District Administration, with headquarters at Otuke. The district is part of the Lango sub-region , which consists of eight districts. Lango sub-region was home to an estimated 1.5 million Langi, in 2002, according to the national census conducted that year. The area is approximately 1,549.8 km².

Location

Otuke District is bordered by Agago District to the north, Abim District to the northeast, Napak District to the east, Amuria District to the southeast, Alebtong District to the south, Lira District to the southwest and Pader District to the northwest. It is geographically located at latitude 2^0 17' north of the equator and longitude 32^0 56' east of the principal meridian Otuke, where the district headquarter is located, lies approximately 66 kilometres (41 mi), by road, east of Lira the largest city in the sub-region and 62.32 Km (38.72mi) via Apala.

Vision and Mission

Vision

"To have a well-served society in a coordinated and sustainable environment for the prosperity for all". This is in conformity to the National Poverty Eradication

Mission:

To provide services in a well-coordinated manner while focusing on the local needs and national priorities in order to improve on the livelihood of the people of Otuke in a sustainable environment

Administrative Units

Otuke district consists of five Sub Counties and one Town Council with 34 parishes ; Orum Sub County, Ogor Sub County, Olilim Sub County, Adwari Sub County, Okwang Sub County And Otuke Town Council. However, according the just concluded National Housing and Population Census (UBOS), there is proposal for two new Sub Counties; Ogwete and Alango.

Institutional set up

The District Council is the policy making body of the district and monitors development programs in the district.

The District Chairperson who is also the Political Head heads the District Council. He is responsible to the electorate through an elected District Council.

He is assisted in his day-to- day work by secretaries selected from among the Councilors by him and approved by the District Council. The Chairperson is supported by a technical team led by the Chief administrative Officer who is the Accounting Officer, heads all Civil servants and coordinates all the activities in the district assisted by heads of departments.

Rainfall and Temperature

Otuke district exhibits a unimodal rainfall pattern with a single rainfall maximum. The rainy season stretches from late March to November with a short dry spell in June. The dry season stretches from December to March. It receives an average rainfall in the range of 1000mm to 1600mm per annum. The average temperature of Otuke District ranges from 22^0 and 26^0C but the diurnal temperature range is high in the dry season and may reach 40^0C.

Demographics Characteristics

In 1991, the district population was estimated at about 43,500. The 2002 national census estimated the population of the district at approximately 62,000. In 2012, the population projection of Otuke District was estimated at 86, 000 and the just concluded Census 2014 preliminary result indicates 105,318 people. The population density is 55.5 persons per square kilometer with a population growth rate of 3.39% per year

Table 2: Population Projection

District	Population Census 12/01/1991	Population Census 13/09/2002	Population Projection 01/07/2012	Population Census 27/09/2014
Otuke District	43,457	62,018	86,000	105,318

Table 3: Summary of Otuke district Preliminary 2014 Census results

No	Sub-County	No. H/Hs	Male	Female	Total
1	Okwang	5,736	10,732	11,459	22,191
2	Orum	2,115	4,905	5,221	10,126
3	Olilim	2,867	6,806	7,078	13,884
4	Ogwette	3,083	7,509	7,762	15,271
5	Alango	2,588	5,945	6,489	12,434
6	Adwari	2,192	4,997	5,249	10,246
7	Ogor	3,059	7,354	7,589	14,943
8	Otuke T.C	1,418	3,067	3,156	6,223
	GRAND-TOTAL	**23,058**	**51,315**	**54,003**	**105,318**

Cultural and Ethnic Issues

The main ethnic group is Langi which consists of many Clans headed by "Awitong" (Clan leader). All these clan leaders are headed by Won nyaci-the Paramount Chief. Due to migration over the years, diverse tribes now residents in Otuke Town Council including Iteso, Bagishu, Karimojong and Acholi

Relief, Climate and Vegetation

The relief of Otuke district is generally flat, gently undulating. The altitude is between 1075 and 1100 meters above sea level. The area is generally well drained except for the peripheral area, which is occupied by poorly drained swamps

The soils of Otuke District are categorized as ferruginous sandy loam. The soil has a high percentage of sandy soil and therefore it is vulnerable to erosion. Since the soil is sandy in nature, it has a low water retention capacity and a high rate of water infiltration and this implies the moisture content of the soil is generally low.

The natural vegetation is mainly savannah woodland with scattered trees dominated by Shea butter trees (*Vitellaria paradoxa).* Other tree species incldes *Terminalia, Cambretum spp*, *Ficus spp, Accacia spp* and *Phoenix reclinata .* The shea butter trees are under serious threats from the communities for charcoal production because it is believed to produce good quality charcoal.

The communities however are embracing tree planting with the major species being *Pinus caribea, Grevilla, Teak, Malina* and *Euclyptus*

Environmental issues

Otuke district is endowed with a number of natural resources; however the district still faces numerous challenges in ensuring sustainable development. The rate of deforestation and wetland degradation is very high in the district. Trees are being cut for charcoal burning, bricks purpose and the driven demand for more land for agricultural activity thus exacerbating the rate of environment degradation in the district.

Wetlands are severely being encroached and degraded for rice, vegetable growing and brick making. Wild fire is a common phenomenon in dry season across the district as the communities set fire during hunting, preparation of garden and rejuvenation of fresh pasture for their livestock.

Economic Activities

The main economic activities in the district are subsistence farming constituting about 95% of the economic activities. The major crops grown include rice, cassava, sorghum, millet, pigeon peas, G/nuts, simsim, sunflower, maize and beans. Due to the prevailing peace, the community is engaging in animal rearing majorly cattle, goats, sheep, pigs and chicken. Fish farming and Apiary is also developing especially in Adwari, Olilim and Town Council.

Livelihoods

The majority of the people in the district relay on agriculture for their livelihood through sale of harvests like rice, g/nuts, simsim, sorghum, beans, millets, pigeon peas and maize. The number of animals is on increase especially the local zebu and local East African goats. The cattle are used for ploughing and also sold in cases of pressing problem. Village saving is also taking up as a means of improving saving culture among the communities and easy access to short loans to meet household basic needs. During dry seasons, men also engage in charcoal production, hunting and fishing along R. Moroto tributaries and seasonal wetlands

Table 4: Otuke district main Livelihoods, by Sub-County and Town Council

Sub-county	Major Livelihoods
Adwari S/C	Farming, Small scale business , Livestock rearing, Poultry keeping, Charcoal burning and fish farming
Alango S/C	Farming, Seasonal fishing, Charcoal burning, brick making
Ogor S/C	Farming, trade in Shea Oil (Moo yao), Charcoal burning, seasonal fishing, brick making and sand mining.
Ogwete S/C	Farming, Small scale business, poultry, Charcoal burning and Fish farming
Olilim S/C	Farming, stone/rock quarrying, brick making, sand mining, charcoal burning, small scale business and Produce, Poultry and trade in Shea Oil (Moo yao)
Okwang S/C	Farming, Charcoal burning, small scale business and produce, and trade in Shea Oil (Moo yao)
Orum S/C	Farming, Small scale business , Livestock rearing, Poultry keeping, Charcoal burning and fish farming
Otuke T/C	Medium scale trade and produce, Farming, Aquaculture, Piggery, Livestock raring, Metal fabrications, Poultry

Women's livelihoods

The women in Otuke are considered the hardest working group and are responsible for most of the household work including crop farming, animal rearing, petty trading in grains and produce, vegetables and fresh foods in market places, fetching wood fuel and village saving schemes for their livelihood. Men are mostly engaged in charcoal burning, grazing, brick making and sand mining and running of small scale business. Most families are being taken care of by women as they spend their time running the family business.

HAZARDS

Table 5:   Hazard status

Hazard	Status	Sub County	Rank
Prolonged dry spell	Widespread in the District which affects crops especially first season Otuke district for the last five years has been hit by prolonged dry spell stretching from December to April on a yearly basis throughout the entire district. This prolonged dry spell has altered the farming season as the first cultivation period is rendered unproductive. This has also resulted into food short as no harvest occurs in the first season	All Sub Counties	1
Heavy Storms	Incidences of hailstorm, heavy strong winds and lightning reported Heavy storms are experienced mostly in the second rainy season in the months of August to late November where crops, buildings are destroyed, roads are cut off. Pronounced throughout the entire district since it is a flat land. Cases of Lightening strikes were reported in Amoni P/S in Ogwete Sub County, Ikwee P/S in Olilim Sub County and Anylima P/S in Ogor among others.	Otuke T/C, Ogor S/C, Oililim S/C, Otuke T/C, Adwari S/C, Okwang S/C and Orum S/C	2
Environmental Degradation	Incidences of Wetland Encroachment, Deforestation, reported Otuke district is currently experiencing escalated increase in environmental degradation as people cut down trees to produce charcoal especially shea nut butter trees (*Vitelleria paradoxa*). Otuke is the main supplier of charcoal not only in Lango sub region but also Teso	Ogor S/C, Oililim S/C, Otuke T/C, Adwari S/C, Okwang S/C and Orum S/C	3
Bush/wild fires	Incidences of massive fires reported especially between December to April as people still it is a method of garden preparation, hunting and fresh pasture for the animals	All sub counties	4

Hazard	Status	Sub County	Rank
Floods/Water logging	Incidences of water logging reported in the district as the soil is mainly sandy-loam and the water table is high Flash floods resulting from heavy down pour that destroys crops and block roads. In 2012/2013 Floods destroyed people's crops in Anylima, Omwonylee, Oluro and Atnagwata in Ogor Sub County and Angetta, Anepkide and Gojowang in Olilim Sub County	Okwang, Ogor, Orum, Ogwete and Olilim Sub Counties	5
Internal/Land Conflict	Incidences of Land disputes and Domestic Violence reported involving district boundaries, schools, hospitals and individual lands No proper documents of land transaction and land transfers	All Sub Counties	6
Crop Pests and Diseases	Incidences of Aphids reported which destroys pigeon peas Incidences of caterpillars affecting Soya beans reported	Otuke T/C, Ogor S/C, Olilim S/C and Orum S/C	7
Animal vector and diseases	Incidences of CBPP, African Swine Fever reported, Incidences of New Castle and fowl pox Disease among chicken reported especially in Olilim Incidences of Tsetse Flies reported especially along R. Moroto tributaries Incidences of Nagana reported	Ogor S/C, Otuke T/C, Orum S/C, Olilim S/C, Okwang S/C and Adwari	8
Invasive species	Incidences of Lantana Camara, Strigger and Yellow cassia reported	Olilim S/C and Orum Otuke T/C,	9
Human Epidemics	Incidences of Sleeping Sickness reported in Ogor.	Ogor S/C	10
Vermin	Incidences of Velvet Monkeys destroying crops reported especially at the foot of Olilim hills and in Ogor	Olilim and Ogor S/C	11

Table 6: Summary of Hazards by Sub County

Sub county	Heavy Storms	Crop Pests and Diseases	Animal Vectors and Diseases	Environmental Degradation	Internal Conflicts	Prolonged dry spell	Human Epidemics	Flooding	Bush Fires	Proliferation of Invasive Weed Species	Vermin	Total
Adwari S/C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**11**
Alango S/C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		**10**
Ogor S/C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**11**
Ogwete S/C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		**10**
Olilim S/C	✓	✓	✓	✓	✓	✓		✓	✓	✓	✓	**11**
Okwang S/C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	**11**
Orum S/C	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		**10**
Otuke T/C	✓	✓	✓	✓	✓	✓		✓	✓			**09**
Total	8	8	8	8	8	8	8	8	8	7	4	**83**

Hazard Risk Assessment

Table 7 expresses the communities' assessment of severity and likelihood of risk in their respective sub-counties. Each of the columns in table 7 below translates into respective hazard risk maps in the following section. The colours red, yellow, and green showing the severity of the hazard risk in the table are also reflected in the corresponding maps.

Table 7: Hazard risk assessment

Sub county	Heavy Storms	Crop Vectors and Diseases	Animal vector and Diseases	Environmental Degradation	Internal Conflicts	Prolonged dry spell/drought	Human Epidemics	Floods/Water logging	Bush Fires	Invasive species	Vermin
Okwang	M	M	M	H	M	H	L	H	M	L	N
Adwari	H	M	L	M	M	H	L	M	H	L	L
Ogor	H	M	L	H	M	H	M	H	H	M	M
Alango	H	L	L	H	M	H	L	L	M	L	N
Orum	H	M	M	M	M	H	L	M	H	L	N
Otuke T/C	M	L	L	L	L	H	L	L	L	N	N
Olilim	H	M	M	H	H	H	L	H	H	H	M
Ogwette	H	M	H	H	H	H	L	H	M	H	L
Key: H = High, M = Medium, L = Low, N = Not reported											

Hazards

Table 8: Hazard status and rank

| Hazard	Status	Sub County	Rank
Heavy Storms	Incidences of strong winds, hailstorm and lightning reported. Roofs of classrooms blown off YY Okot, in many schools with cases of death due to lightening on the rise. One child struck dead in Omiya Anyima; crops were destroyed by hailstones as well.	Orom S/C, LabongoAmida S/C, Kitgum Matidi S/C Omiyanyima S/C Mucwini S/C Labongo Akwang Labongo Layamo Namokora, Kitgum T/C	5
Crop Pests and Diseases	Incidences of Aphids reported.	LabongoAmida S/C, Kitgum Matidi S/C Omiyanyima S/C Mucwini S/C Labongo Akwang Labongo Layamo	3
	Incidences of Cassava Brown Streak, G/Nut Rossette, Bean Blight and Anthracnose reported	Widespread in all the sub counties	
	Simsim Gall midge	Wide spread in all sub counties.	
	Citrus canker	Wide spread in all sub counties.	
Animal Vectors and Diseases	Incidences of CBPP, African Swine Fever reported	Labongo Layamo S/C Widespread in all the sub counties	8
	Incidences of Foot and Mouth Disease suspected (not confirmed).		
	Incidences of New Castle Disease among chicken reported		
	Incidences of Tsetse Flies reported along the courses of rivers Aringa and Pager Incidences of Nagana reported	Kitgum Town Council, Labongo Akwang, Pager, Kitgum Matidi and Labongo Amida Sub Counties, Omiyanyima S/C Namokora S/C, Lagoro S/C	
	17 cases of rabies between July 2013 and June 2014reported	Mucwini, Orom, Labongo Amida Sub Counties and Kitgum Town Council.	
	Worms and manges in Goats	Wide spread in all S/Cs	
Environmental Degradation	Incidences of Wetland Encroachment, degradation especially along Pager and Aringa Deforestation (illegal timber cutting, Charcoal burning and large chunks of woodlands cleared for charcoal and agric land, reported. Wetland degradation is in form of encroachment, dumping of non-biodegradable wastes and grazing.	Orom S/C, NamokoraS/C, Lagoro S/C, KitgumMatidi S/C, Mucwini S/C, LabongoAmida S/C, Kitgum T/C Labongo Akwang S/C, Labongo Amida Labongo Layamo S/C	3

RISKS

Prolonged dry spell/drought Risk
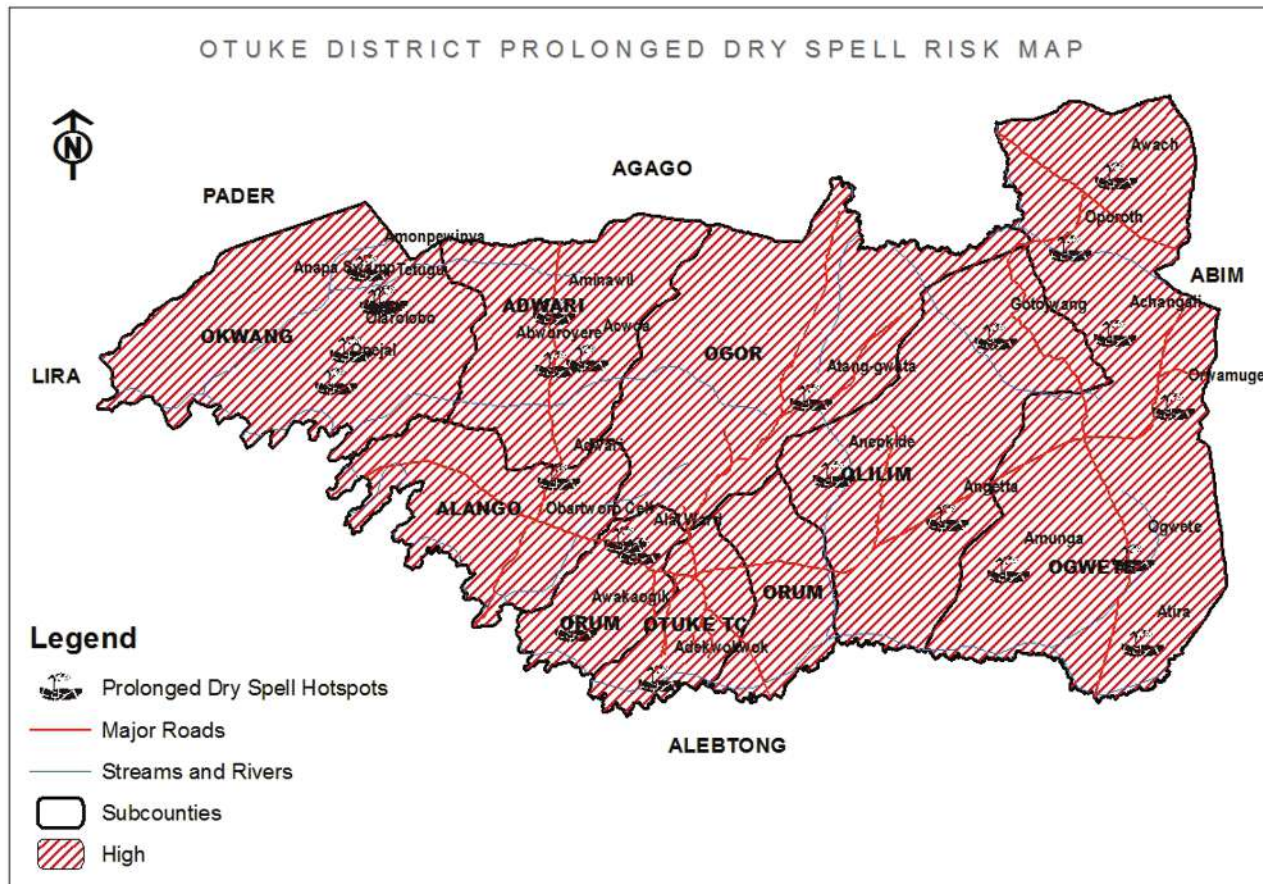
Figure 1 Prolonged Dry Spell Risk Map

Source: Field Data Collected by OPM (May, 2014)

Otuke district experiences prolonged dry spell stretching from December to April on a yearly basis throughout the entire district. This prolonged dry spell has altered the farming season as the first cultivation period is rendered unproductive. This results into food insecurity as no harvest occurs in the first season. The extreme effects are reported in Ogor, Ogwete and Olilim Sub Counties

Heavy storms Risk
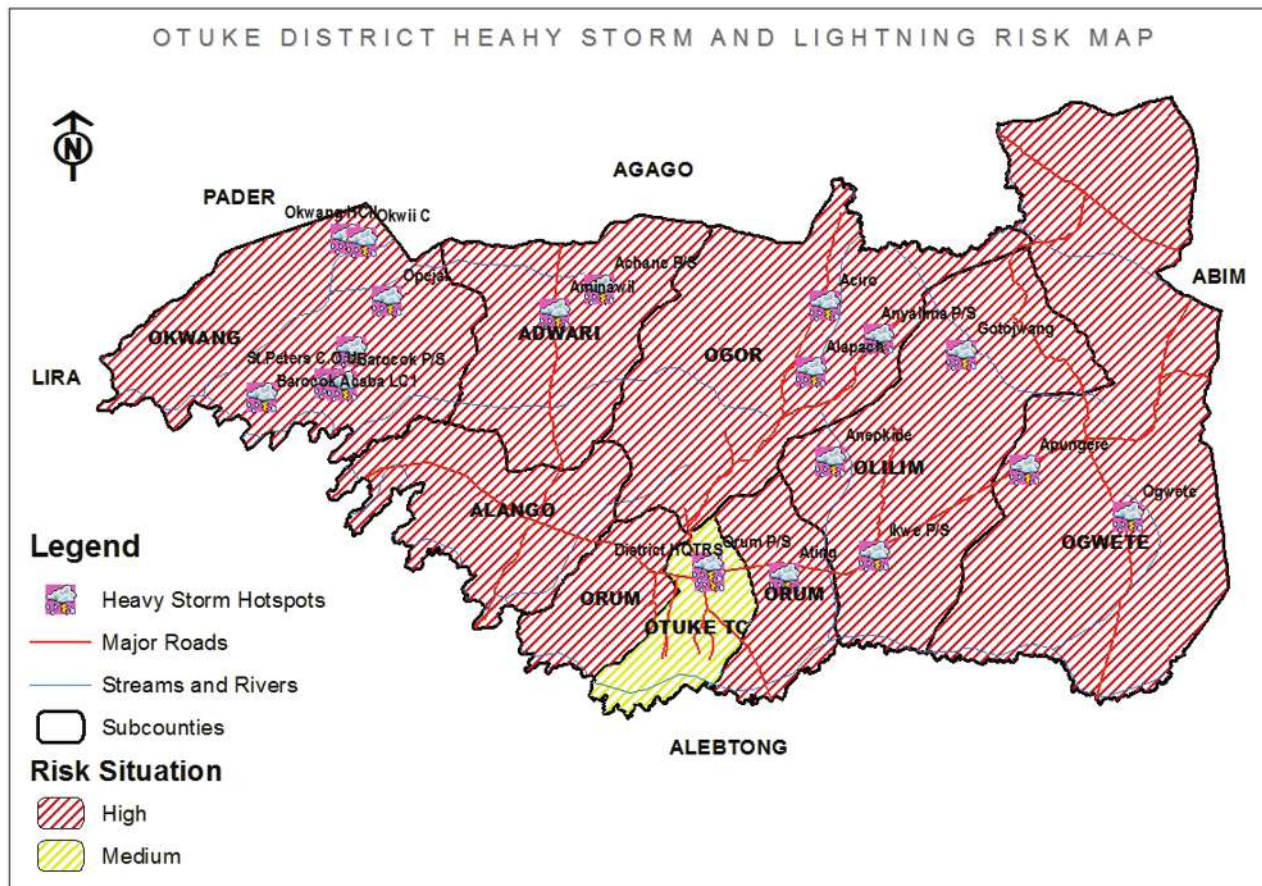
Figure 2 Heavy Storms Risk Map

Source: Field Data Collected by OPM (May, 2014)

Heavy storms are experienced mostly in the months of August to late November where cases of crop damage, buildings collapsing, and roads being cut off were reported. For instance classroom blocks in Ociro P/ S and Anyalima P/S (Ogor sub County) were destroyed, Roof of DHO's office and one classroom block in Orum P/S (Otuke Town Council) was blown off by strong wind. Some cases were also reported throughout the entire district since it is a flat land. This comes along with hailstorms and lightening and cases of strikes were reported in Amoni P/S (Ogwete Sub County), Ikwee P/S in Olilim Sub County and Anylima P/S and Atangwata P/S in Ogor Sub County among others. Human and livestock lives were lost

Environmental Degradation Risk
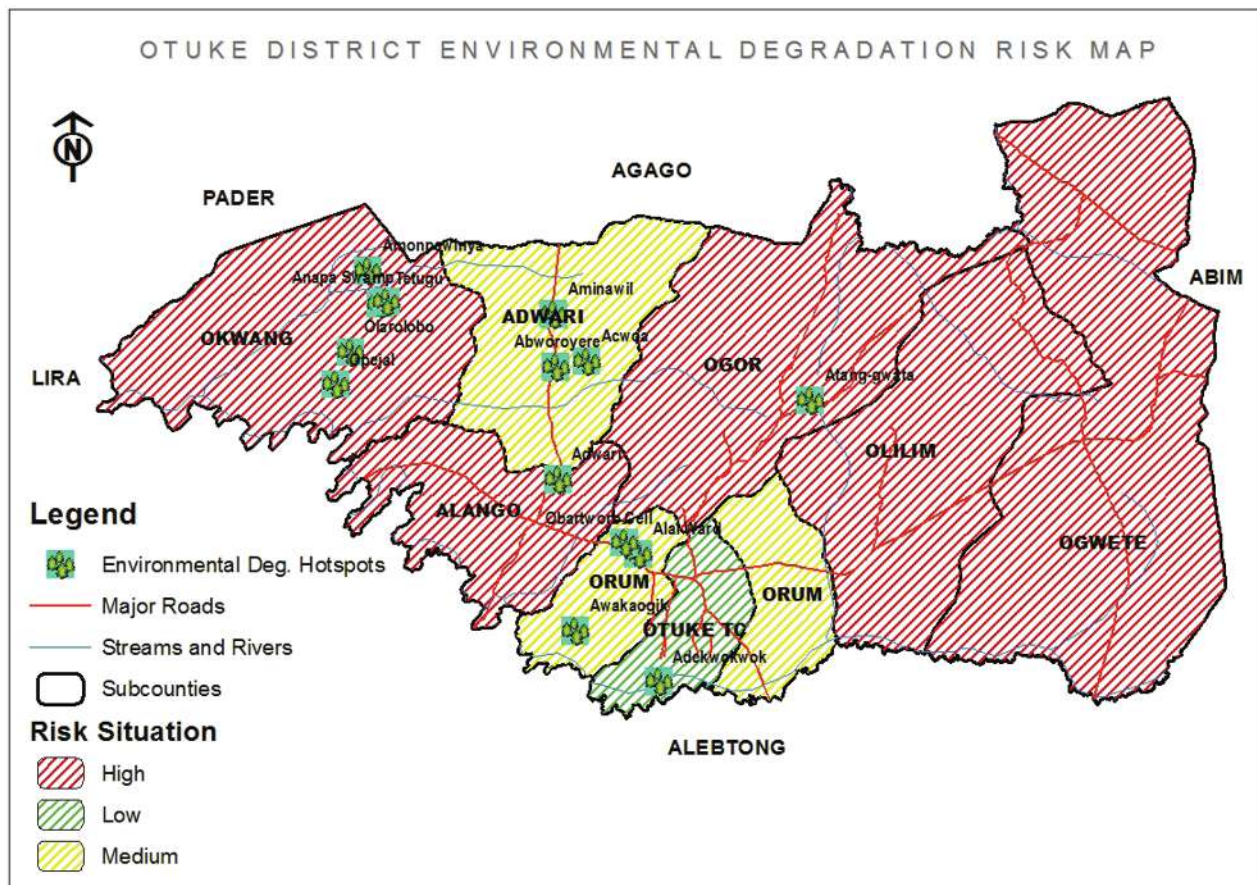
Figure 3 Environmental Degradation Risk Map

Source: Field Data Collected by OPM (May, 2014)

Otuke district is currently experiencing escalated increase in environmental degradation as people cut down trees to produce charcoal especially shea butter trees (*Vitellaria paradoxa*). Charcoal production is a big problem especially in Ogwete, Olilim, Ogor and okwang Sub Counties. Otuke is the main supplier of charcoal not only in Lango sub region but also Teso and Busoga regions. There is also wetland degradation as people are highly engaged in rice growing in the wetlands due to increasing population and uplands becoming unfertile

Bush Fires Risk
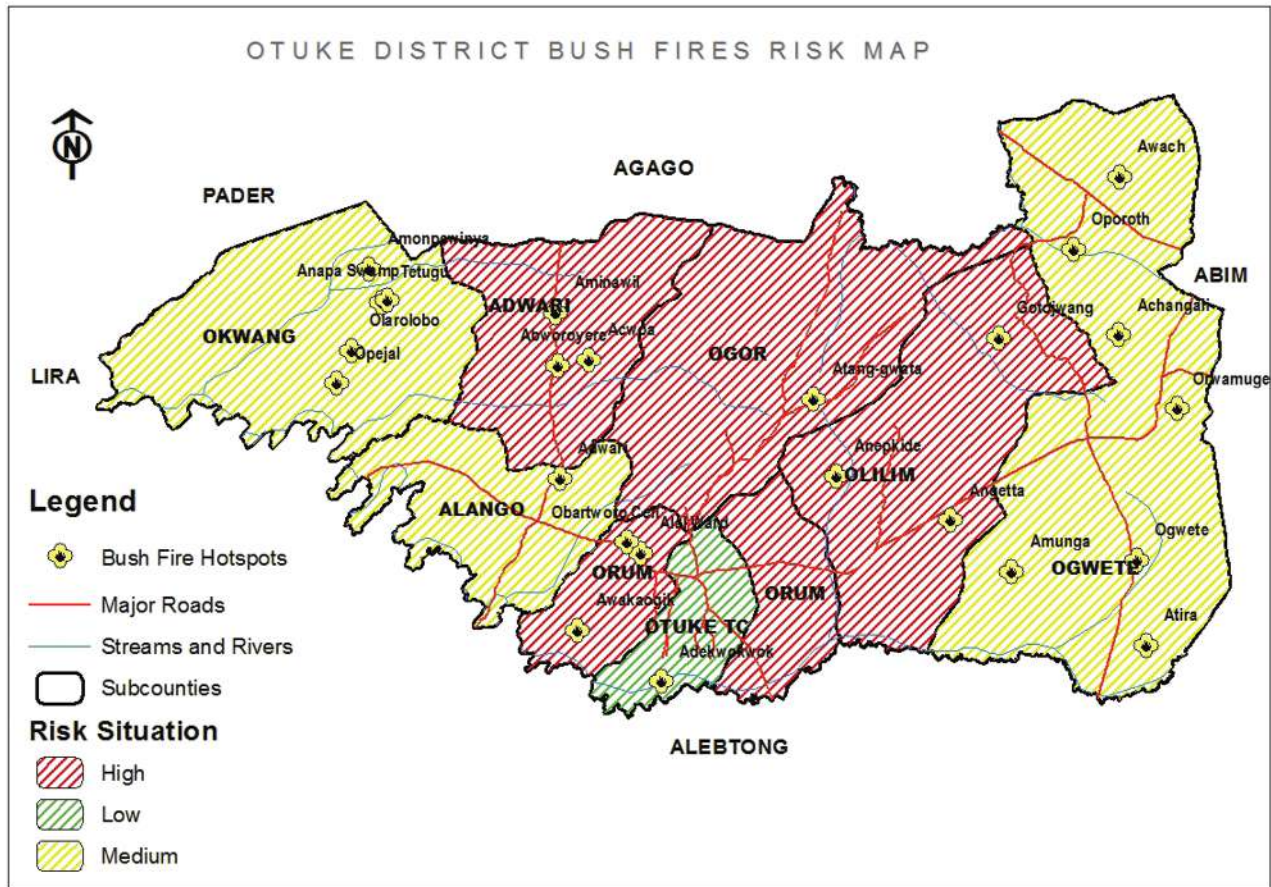
Figure 4 Bush Fires Risk Map

Source: Field Data Collected by OPM (May, 2014)

Wild fires are a common phenomenon in the dry season. Communities set fires to prepare gardens for crop cultivation, hunting and flush out wild animals. However, they lose control of these fires which become destructive. Cases of wild fires are wide spread across all the Sub counties in the district but more severe in the Sub Counties of Adwari, Ogor, Ogwete, Orum and Olilim.
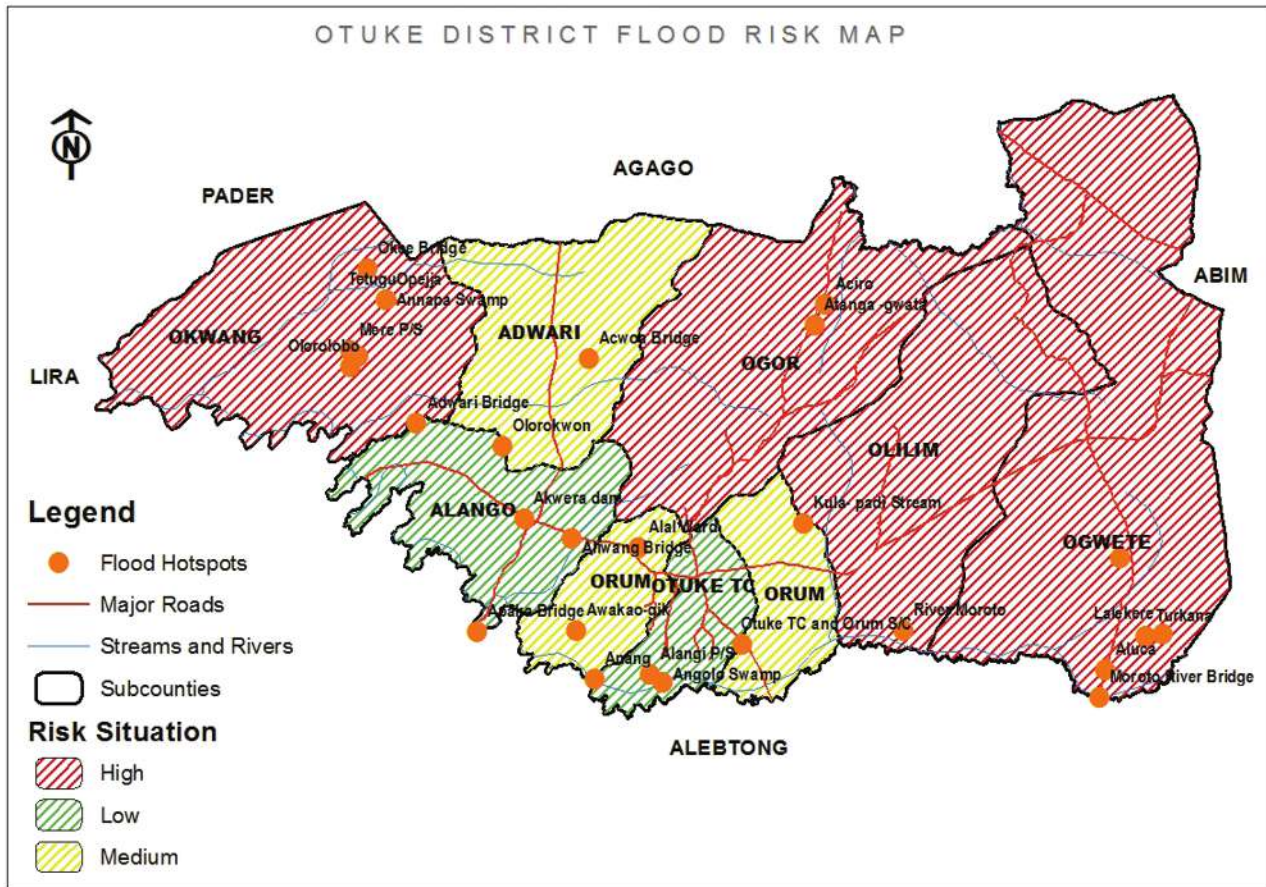
Floods Risk

OTUKE DISTRICT FLOOD RISK MAP

Figure 5 Floods Risk Map

Source: Field Data Collected by OPM (May, 2014)

All the Sub Counties in the district are reported to have suffered from water logging. However, these were severe in Okwang, Ogor, Olilim and Ogwete Sub Counties were hectares of crops were destroyed and less severe in Orum Sub County and Town Council. In FY 2012/2013 OPM had to respond by supplying relief food when all the crops in Ogor and Olilim were submerged and destroyed and buildings collapsed.

Internal/ Land conflicts Risk
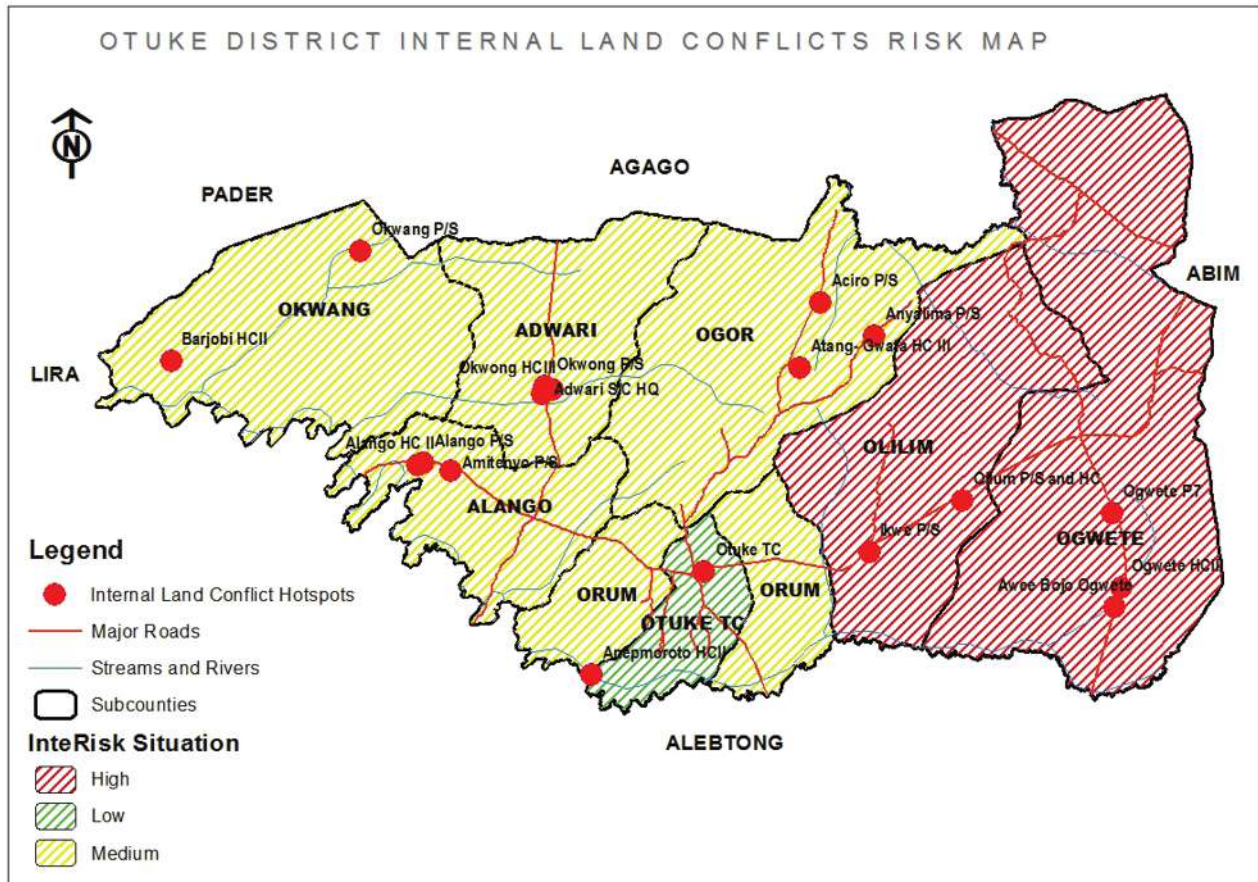
Figure 6 Internal/ Land conflicts Risk Map

Source: Field Data Collected by OPM (May, 2014)

Land disputes have become an increasing problem. There are inter-boundaries like a case between Otuke and Abim district, between communities and government institutions and amongst Clans and families. In Adwari SS, Amintenyo P/ S, Adwari sub county H/ Q, Okwongo H/ C and Okwongo P/ S. the communities are claiming part of the lands, in Barjobi H/ and Okwang P/S (Okwang Sub Conuty), Orum H/C IV (Otuke Town Council), Anepmoroto H/ C and Alangi P/ S (Orum Sub County), Olilim H/ C, Olilim P/ S, Ikwee P/ S (Olilim Sub County) and Ogwete H/ C Ogwette P/ S (Ogwete Sub Conuty).

All these were caused by unclear boundaries and no proper documentation of land transactions and transfer of ownership
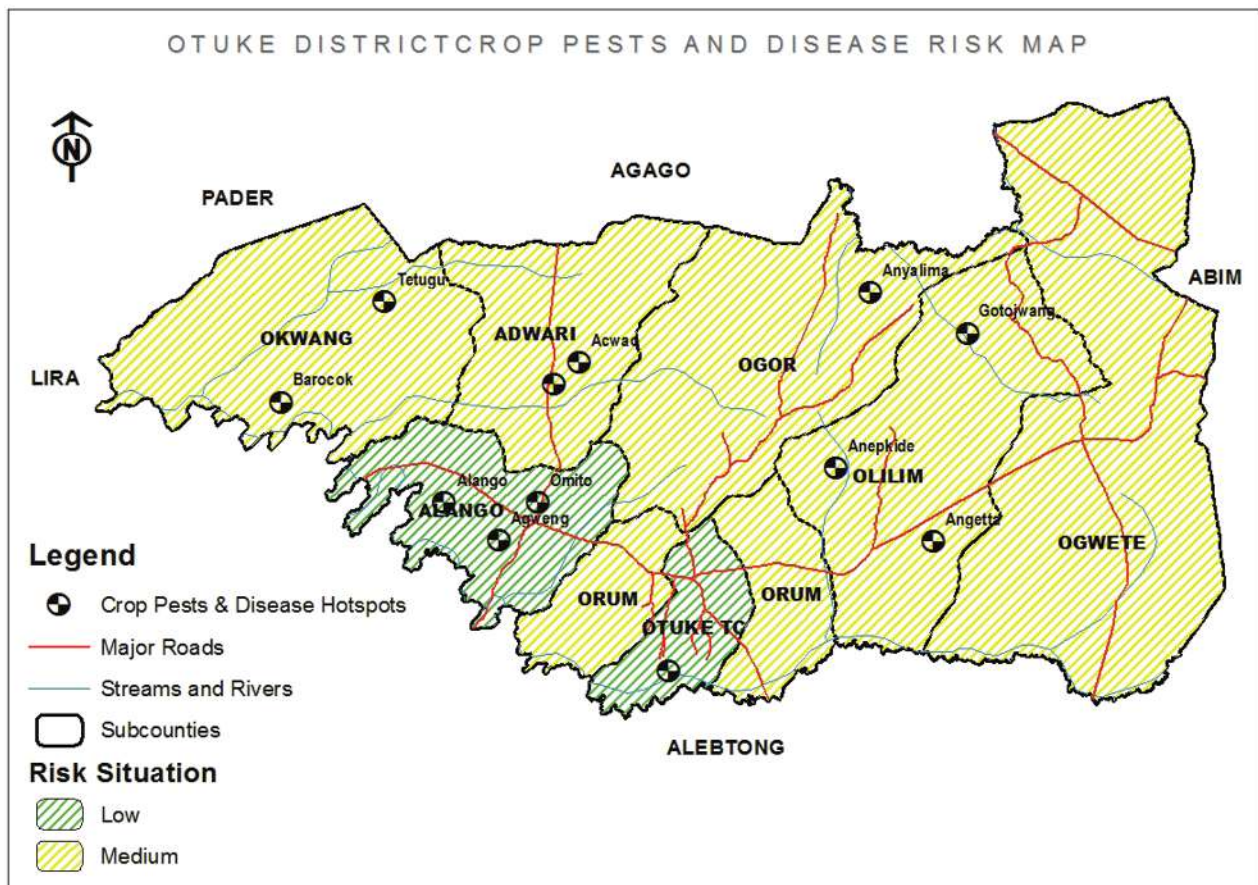
Crop Pests and Disease Risk

Figure 7 Crop Pests and Disease Risk Map

Source: Field Data Collected by OPM (May, 2014)

There are isolated cases of crop pests and diseases reported in Sub Counties of Orum, Adwari, Olilim, Ogor and Ogwete especially Aphids which destroy pigeon peas; Caterpillars which destroys soya beans. The level of these pests however has been controlled through extensive agricultural extension service.
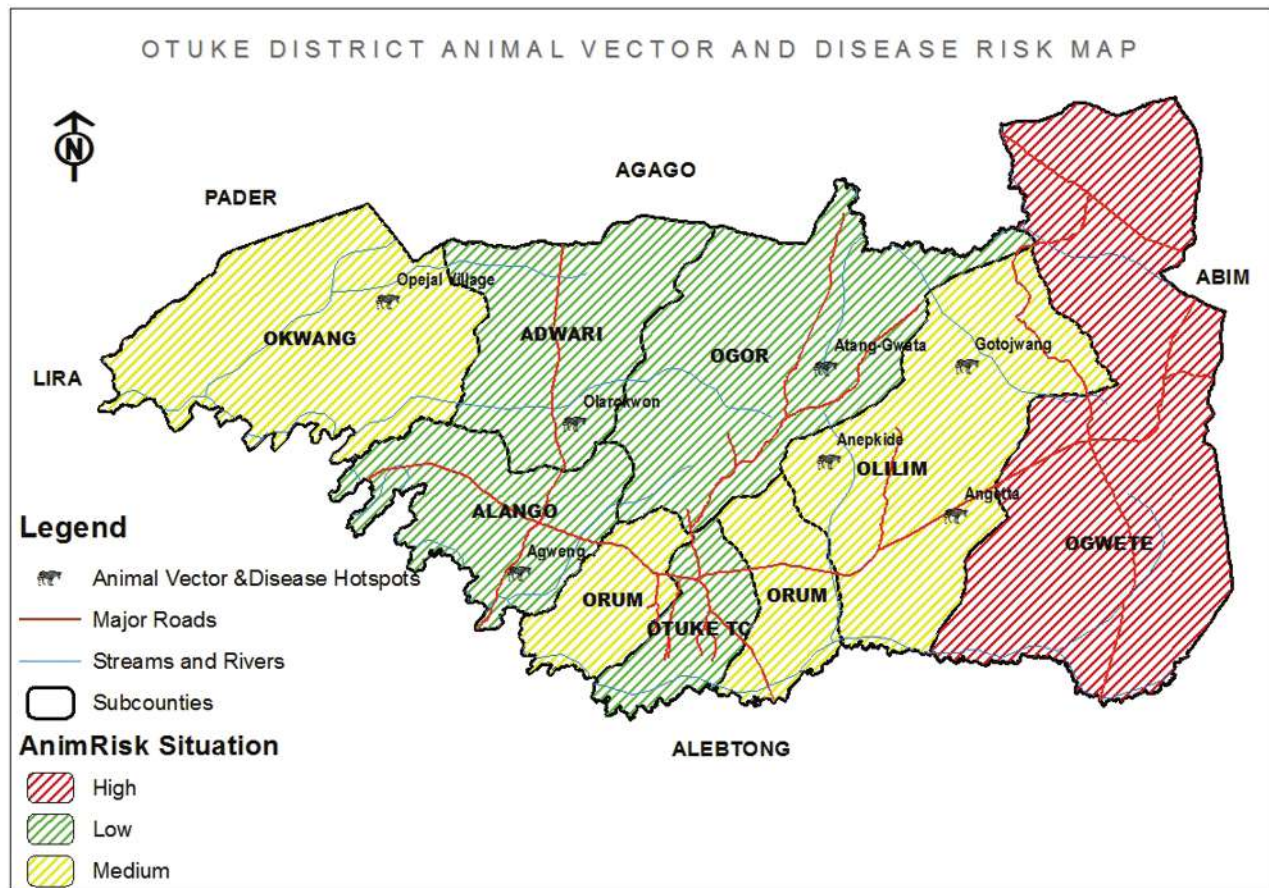
Animal Vector and Diseases Risk

Figure 8 Animal Vectors and Diseases Risk Map

Source: Field Data Collected by OPM (May, 2014)

Animal vectors and diseases are not big problem in Otuke district however there were few cases of African swine fever reported in Olilim and Orum. Incidences of New Castle and fowl pox disease on chicken were reported in the Sub County of Olilim. There have been also cases of Tsetse Flies and Nagana especially in those Sub Counties adjacent to R. Moroto tributaries (Orum S/C, Olilim S/C,Ogor S/C, Adwari S/C and Okwang S/C)

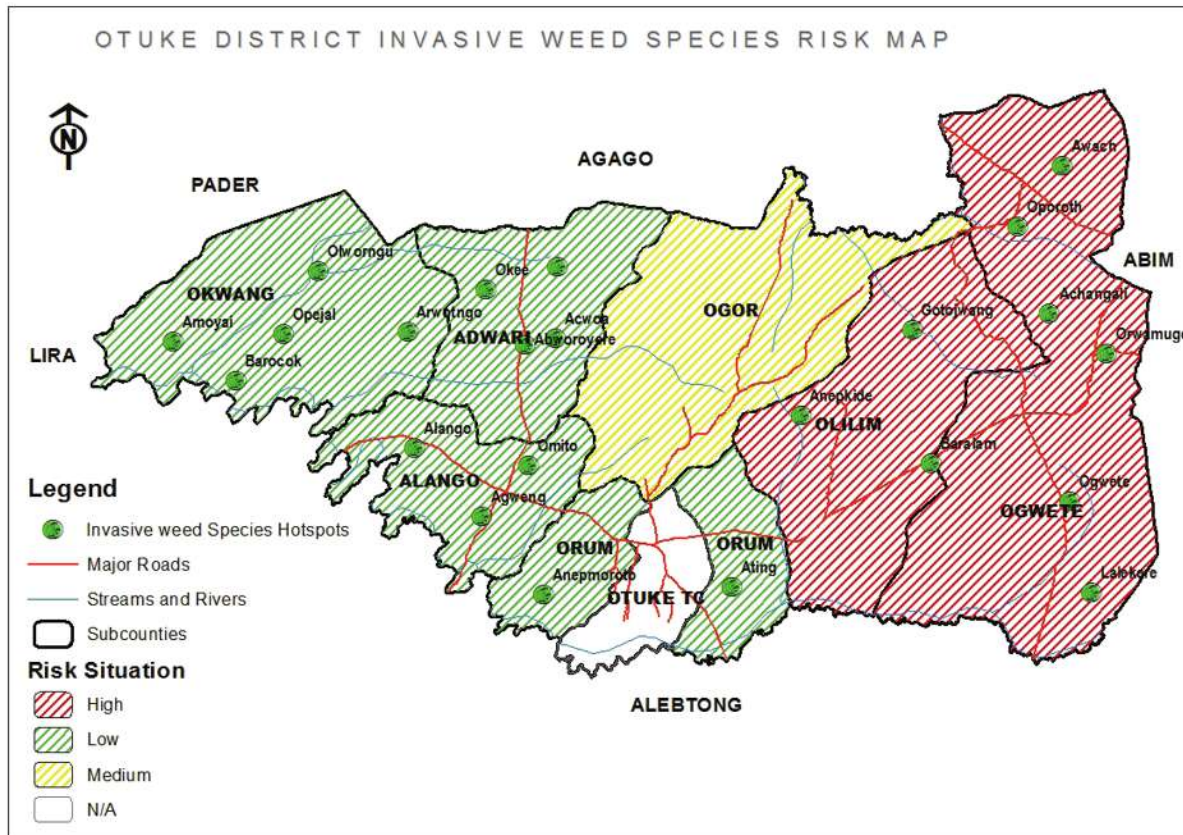## Proliferation of Invasive Weed Species Risk

Figure 9 Proliferation of Invasive Weed Species Risk Map

Source: Field Data Collected by OPM (May, 2014)

Otuke district is not much affected by Invasive species though there are incidences of Lantana Camara in Orum and Olilim where there are plantation of Pine are established. In Olilim Sub County there was also a case of Strigger which has invaded the entire garden.
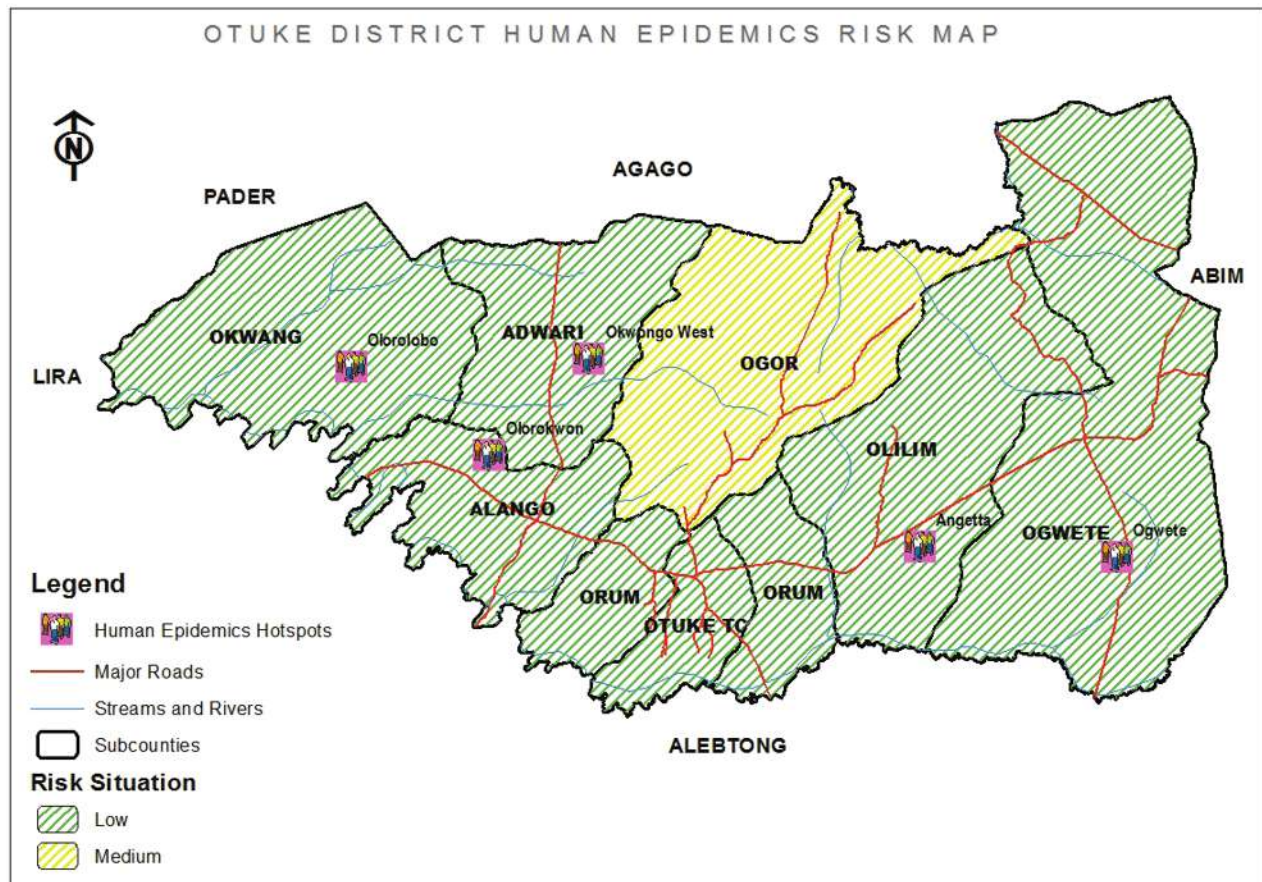
Human Epidemic Risk

Figure 10 Human Epidemic Risk Map

Source: Field Data Collected by OPM (May, 2014)

Otuke district has not seriously affected by human epidemics however, there were cases of sleeping sickness reported in Ogor Sub County which did spread wild.
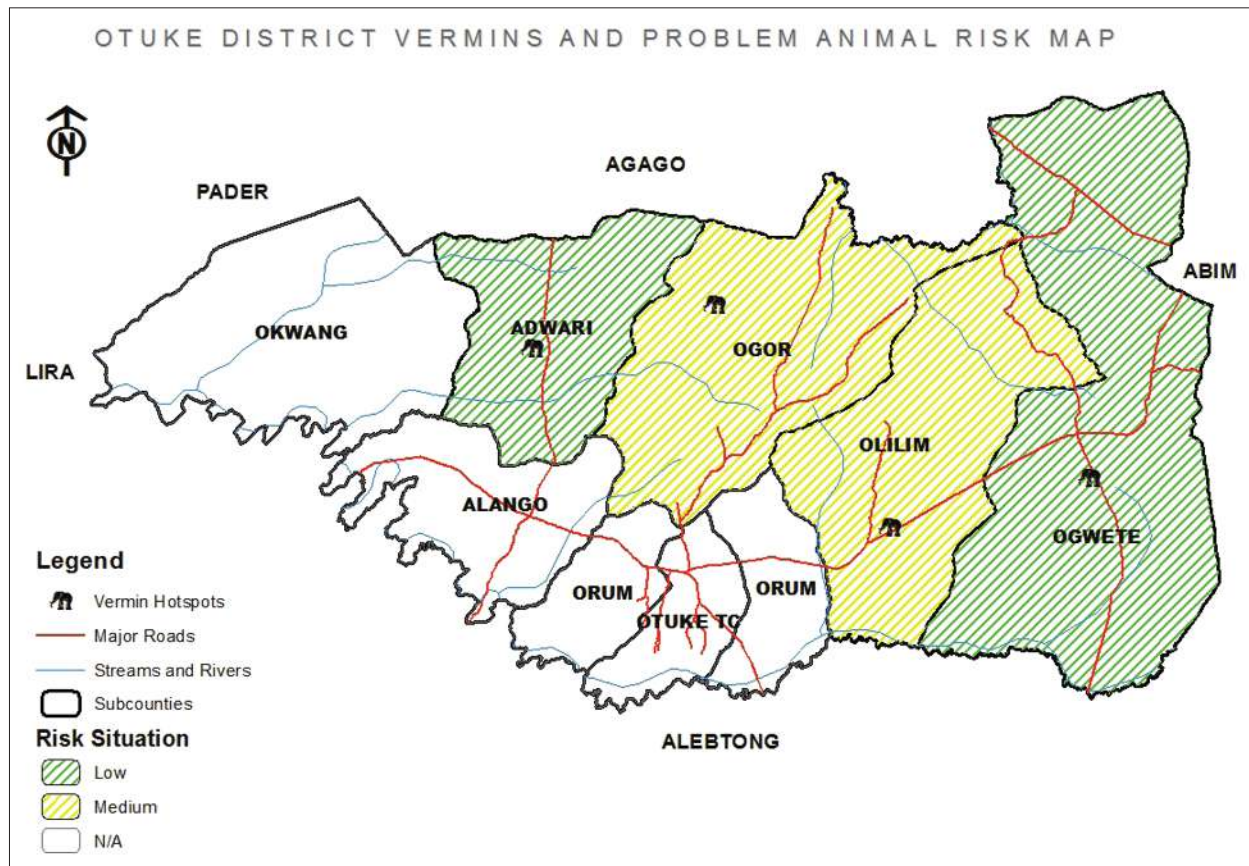
Vermin and other Problem Animals Risk

Figure 11 Vermin and other Problem Animals Risk Map

Source: Field Data Collected by OPM (May, 2014)

Cases vermin's and other problem animals of problem animals are reported in Olilim and Ogor sub Counties where velvet monkeys destroy people's crops. In Ogor Sub County also a case of Lion was reported which threatened people's lives. Cases of rats and hares are minimal as most times they are hunted by the communities

VULNERABILITY

Table 7 summarizes the communities' assessment of hazard severity and frequency in the sun-counties. Table 9 below transforms those qualitative low/medium/high judgements to numerical values 1/2/3 which when summed vertically show the relative risk per hazard. The horizontal sums show both cumulative and weighted vulnerability

Table 9: Risk and Vulnerability Assessment

| Sub county	Hazards											Cumulative Vulnerability (Absolute)	Weighted vulnerability (Cumulative/3)
	Heavy Storms	Crop Pests and Diseases	Animal Vectors and Diseases	Environmental Degradation	Internal Conflicts	Prolonged dry spell/drought	Human Epidemics	Floods/Water logging	Bush Fires	Invasive species	Vermin		
Ogor	3	2	1	3	2	3	2	3	3	2	2	26	9
Ogwette	3	2	3	3	3	3	1	3	2	3	1	27	9
Olilim	3	2	2	3	3	3	1	3	3	3	2	28	9
Okwang	2	2	2	3	2	3	1	3	2	1	0	21	7
Adwari	3	2	1	2	2	3	1	2	3	1	1	21	7
Orum	3	2	2	2	2	3	1	2	3	1	0	21	7
Alango	3	1	1	3	2	3	1	1	2	1	0	18	6
Otuke T/C	2	1	1	1	1	3	1	1	1	0	0	12	4
Totals	22	14	13	20	17	24	09	18	19	12	06	174	
Key: 3 = High, 2 = Medium, 1 = Low, 0 = Not reported													

Vulnerability
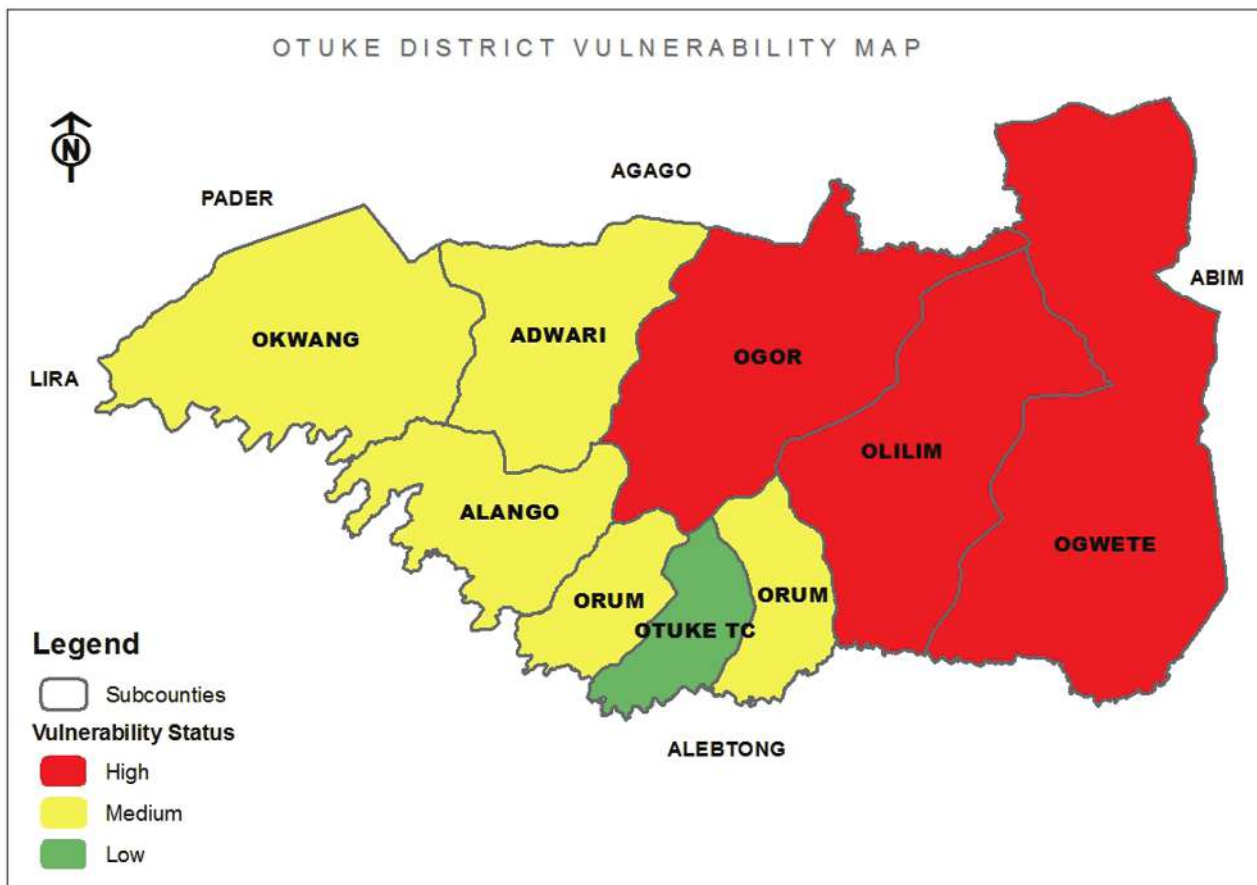
Figure 12 Risk Vulnerability Map

Source: Field Data Collected by OPM (May, 2014)

The vulnerability map in Figure 12 shows the areas of low, medium and high vulnerability according to the risk and vulnerability table (Table 8) above. In this analysis, the cumulative vulnerability of each sub-county is calculated and then weighted to provide weighted vulnerabilities for individual sub-counties. Therefore sub-counties with weighted vulnerability values less than 4 are coded "low", termed low vulnerability areas and are assigned green, those from 5 to 7 are coded "medium", termed medium vulnerability areas and are assigned yellow while those whose weighted vulnerabilities are 8 or more are coded "high", termed high vulnerability areas and are represented by red.

Otuke district is exposed to 11 hazards namely prolonged dry spell, heavy storms, environmental degradation, bush fires, floods/water logging, internal conflicts, crop pests and diseases, animal vectors and diseases, invasive species, human epidemics and vermin arranged in their order of risk from highest to lowest with total risks of 45, 44, 33, 32, 31, 24, 22, 18, 18, 15 and 7 respectively. These are due to lack of access to health facilities, lack of capacity to control pests and diseases, charcoal burning and cultivation in wetlands, internal conflicts due to competition for resources, land ownership, Alcoholism and lack of awareness regarding human rights. People have also often burnt bushes in search of cultivation land, pastures for the animals, hunting and sometimes accidentally. The invasive weeds were introduced with the food ratio distributed during the IDP camps and are mostly concentrated

around those camps. Their rate of spreading is very high due to lack of capacity to contain and their mode of dispersion i.e. run off and wind.

As shown by both the table and map, Olilim, Ogwette and Ogor sub-counties reported the highest vulnerability in Otuke district with cumulative vulnerability values of 28, 27 and 26 respectively and a weighted vulnerability value of 9 which lies in the top (red) category of the vulnerability scale as shown in the map above. Most of the sub-counties displayed medium (yellow) vulnerability with weighted vulnerabilities between 5 and 7. Otuke T/C was the least vulnerable sub-county in the district with a weighted vulnerability value of 4.

Then most vulnerable communities are Anylima, Omwonylee and Oluro parishes in Ogor sub-county, Gotojwang, Angetta and Amunga parishes in Olilim sub-county and Atira in Ogwete sub-county. The highly vulnerable social groups are the women, children, elderly, poor and the disabled. This is because women have to shoulder all the household responsibilities to ensure survival in the homestead.

CONCLUSIONS

This multi hazard, risk and vulnerability profile for Otuke District was produced after conducting a rigorous people centred, multi-sectoral, and multi stakeholder field data collection/mapping, analysis, and map production. It is therefore a synthesis of primary data, secondary data and the perception/experiences of the local people, the community leadership at all levels. Thus it portrays how the people of Otuke perceive each of the hazards based on the past trends and the predicted likelihood of their occurrences and impact on the communities.

The stakeholders perceive that Otuke district is vulnerable to eleven hazards, in order of decreasing risk: prolonged dry spell, heavy storms, environmental degradation, bush fires, floods/water logging, internal conflicts, crop pests and diseases, animal vectors and diseases, invasive species, human epidemics and vermin

The Eastern and Nothern sub-counties of Olilim, Ogwette and Ogor reported the highest vulnerability in Otuke district with cumulative vulnerability values of 28, 27 and 26 respectively and a weighted vulnerability value of 9 which lies in the top (red) category of the vulnerability scale. Most of the sub-counties displayed medium (yellow) vulnerability with weighted vulnerabilities between 5 and 7. Otuke T/C was the least vulnerable sub-county in the district with a weighted vulnerability value of 4. This sub-county though less vulnerable, should also be fortified against occurrences of new hazards and exacerbation of resident hazards now occurring at lower magnitudes but which may be worsened by climate extremes expected in the near future.

Timely early warning systems and other DRR interventions would be able to enhance the resilience of the people of Otuke to the effects of climate change.

This profile is therefore a compelling outcome of an integration of the spatial information obtained from the mapping exercise and the community perception of the hazards. It should henceforth inform the contingency as well as the district development planning process towards disaster proof plans.

DEFINITION OF TERMS

Drought. Drought is the prolonged shortage of water usually caused by lack of rain. Drought and food insecurity are related because crop and livestock productivity suffer in droughts.

Food insecurity. Food Insecurity is the severe shortage of food that may lead to malnutrition and death.

Floods. A flood occurs when large amounts of water cover a place that is meant to be dry. Floods usually occur with high rainfall.

Epidemics. This is the occurrence of a disease, in a particular community and at a particular period, beyond normal levels and numbers. Epidemics may affect people, crops or livestock.

Human epidemics. The diseases include cholera, meningitis, hepatitis E, marbug, plague, avian influenza, ebola and sleeping sickness among others.

Crop and animal epidemics. Animal epidemics include swine fever, foot and mouth disease, naganan, and bird flu. Crop disease epidemics include coffee wilt, banana bacterial wilt, cassava mosaic and cassava brown streak disease.

Heavy storms. Heavy storms in Uganda are often accompanied by hail, lightning and violent winds. Storms can result in destruction of crops, animals, public facilities and human settlements. Lightning can be deadly and may be mitigated by lightning ground conductors on buildings.

Pest infestation. These are destructive insects, worms, caterpillars or any other animal that attacks crops or livestock. Common pests in Uganda include weevils, locusts and caterpillars.

Vermin. Velvet monkeys, hares, bush pigs and other animals which raid crops cause damage and losses which may significantly diminish agricultural productivity.

Land conflict. These are disputes arising from ownership and use of land and other land resources.

Environmental Degradation. This results from poor land use and other unsustainable ecosystem exploitation that lead to deterioration of the environment. Overgrazing, cultivation on sloping land, unguided and uncontrolled use of fertilizers and pesticides, bush burning, overfishing, deforestation, mining, poor wastewater treatment, inappropriate waste disposal and wetlands reclamation are examples of causes of environmental degradation.

Bush fires. Fires set deliberately to clear forest or pasture for agricultural purposes may go out of control and consume far more than intended.

Invasive Species. A non-native plant or animal that invades a habitat or bioregion with adverse economic, environmental, and/or ecological effects. An example is a grass that is dominating pasture in the Rwenzori sub-region, reducing the grazing capacity of the land.

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