THE REPUBLIC OF UGANDA

Amuru District

Hazard, Risk and Vulnerability Profile

2016

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Acknowledgement

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Hon. Hilary O. Onek
Minister for Relief, Disaster Preparedness and Refugees

Executive Summary

This Amuru 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 Ugandan disaster risk atlas. 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.

Amuru is a district found in Northern Uganda. It is located between longitude 30-32 degrees East; latitude 02-4 degrees North. It is bordered by the Sudan in the North, Gulu District in the East, Lamwo District in the North East, Nwoya District in the South, Adjumani District in the North West, and Arua District in the West. The District headquarters, Amuru is at a road distance of 394km from Kampala (the Country's capital city) via Gulu town. It's 62km away from Gulu town.

The findings identify 11 hazards; Heavy Storms, Crop Pests and Diseases, Animal Pests and Diseases, Environmental Degradation, Internal Conflicts, Prolonged dry spell, Human Epidemic, Floods, Bush Fires, Invasive species and Vermin. Internal Conflicts, Prolonged dry spell, Floods and environmental Degradation are ranked to be the most dangerous and high-risk hazards for people in Amuru District.

The district is most vulnerable to internal conflicts and Bush fire resulting from long dry season experienced in the district annually.

All of the sub-counties have significant vulnerability to disaster, accumulating risk from these hazards. The sub-counties of Pabo and Atiak record high aggregate vulnerability levels compared to others. The risk to internal conflict, bush fires, prolonged dry spell and Environmental degradation are very high throughout the district and are considered the compound hazards. This aggregated vulnerability to several hazards is a compound exposure to disaster risk and the complexity of managing it.

The discussion of the nature of each hazard and its geographical extent in terms of sub counties provides a qualitative assessment of the situation 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 hazards.

Acronyms

ALREP	Agricultural Livelihood and Recovery Programme
BBW	Banana Bacterial Wilt
BW	Bacterial Wilt
CBPP	Bovine Contagious Pleuropneumonia
CBSD	Cassava Brown Streak Disease
DDMC	District Disaster Management Committee
DRM	Disaster Risk Management
FMD	Foot and Mouth Disease
GIS	Geographical Information System
GoU	Government of Uganda
GPS	Global Positioning System
HC	Health Centre
HCII	Health Centre Two
HCIII	Health Centre Three
HCIV	Health Centre Four
IDPCs	Internally Displaced Peoples Camps
LRA	Lord's Resistance Army
NAADs	National Agricultural Advisory Services
NCD	New Castle Disease
NUSAF	Northern Uganda Social Action Fund
S/C	Sub County
T/C	Town Council
UNDP	United Nations Development Programme
UPDF	Uganda Peoples' Defence Force
UTM	Universal Transverse Mercator

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.

Landslides. These are rapid movements of large mass of mud, rocks, formed from lose soil and water. Landslides occur mainly during the rainy season, but they can also be precipitated by earthquakes. Community settlement on steep slopes and other uncontrolled land use practices increase the probability of landslides.

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, nagana, 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. Baboons, chimpanzees, bush pigs and other animals which raid crops cause damage and losses which may significantly diminish agricultural productivity.

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

Cattle rustling. This is when one community raids another to steal livestock.

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.

Mines and unexploded ordinance. Mines are devices designed to explode with fatal effect when disturbed. Unexploded ordinance are unspent bullets, grenades, rockets, etc., which are discarded or stored.

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

Earthquakes. Earthquakes result from sudden violent movements of the earth's surface, sometimes causing massive loss of lives and property due to building collapse.

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.

Introduction

The Amuru District Local Government and the Department of Relief Disaster 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 Pader 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 Pader District.

Methodology

The hazard, risk and vulnerability mapping employed a people-centred, multi-sectoral, and multi-stakeholder approach. To capture the required information for production of the district profiles, a team of four led by the Office of the Prime Minister (OPM) visited stakeholders in a field mission to Acholi 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, and community members. They acquired secondary data through government sources (relevant Ministries, Departments and Agencies, and District authorities in the Acholi Sub-Region) and data bases from other organizations/NGOS operating in these districts. The mapping team integrated the field data, secondary data and 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 teams 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

Location

Amuru is a district found in Northern Uganda. It is located between longitude 30-32 degrees East; latitude 02-4 degrees North. It is bordered by the Sudan in the North, Gulu District in the East, Lamwo District in the North East, Nwoya District in the South, Adjumani District in the North West, and Arua District in the West. The District headquarters, Amuru is at a road distance of 394km from Kampala (the Country's capital city) via Gulu town. It's 62km away from Gulu town.

The Great North Road (Juba Road), the Gulu – Nimule which passes through the District gives access to South Sudan and thus potential for cross border trade.

Amuru District covers a total land area of 4,851.68Km^2 broken down as in table 2 below.

Table 2: Land Area of Amuru District

No.	Sub-county	Area
1	Amuru and Amuru TC	2,536.26
2	Atiak	1,052.61
3	Lamogi	422.05
4	Pabbo	840.76
Sub-total (Kilak County)		**4,851.68**

Source: MOES, Rapid School Mapping Exercise, 1999

Brief History

Various systems of administration have existed with similar but modified structures under different rules in Uganda. All the districts have ever copied these systems. Under the colonial rules, the district was represented by a Commissioner, who was all sorts of things: judge, administrator, prosecutor, etc. The Commissioner had a set of appointed and imposed chiefs and clerks to enforce law and order through native courts. Infrastructure was developed through compulsory and forced labour, taxes and fines were quite often determined arbitrarily. The colonial administration established in Acholi land around about 1912 covered present day Amuru, Gulu, Pader and Kitgum Districts with its administrative center in Gulu. The colonial administrative structure was largely used to enforce cotton production and establishment of administrative units in the district.

After independence the colonial structure was recognized and embraced wholesome. A level of decentralized authority existed in the district but was far from being democratic.

The 1967 Republican Constitution had very drastic effects on the district. The district lost the most lucrative power of levying and collecting taxes, licenses and dues. This made it difficult to have enough funds to provide services.

In 1970s, the old Acholi district was demarcated into Gulu and Kitgum Districts, though dictatorship and militarism undermined personnel security and production that denied the district administration its revenue. Throughout the 1970s, no improvement was made on social services in the district, let alone the physical infrastructure. It was a decade of dehumanization and moral degeneration.

In the early 1980s nothing much was done by Ugandan Government to repeal the Local Administration Act of 1967. In the district, Technical Planning Committee was in name and could at best organize feasts. Its mandate to plan and execute projects was largely undermined by lack of authority and finances as everything was directed from the central government.

When the National Resistance Movement Government came to power, the rebellion by disbanded soldiers and disgruntled and discredited politicians in the district lagged behind rehabilitation of infrastructure, development of the new local administrative concepts of popular democracy and participation through elected councilors. This however improved with the 1992 elections, where attempts were made to fill all elected posts with politicization and sensitization equally slow and haphazard at times. Actual rebellion was over that year, though pockets of rebels continued to disrupt activities from time to time in limited and inaccessible areas. The cruelty of rebellion left many people in a state of abject poverty, apathy and lack of sense of direction.

Terrain

The relief of Amuru consists of complex low landscape with relatively uniform topography marked by few sharp contrasts like Kilak hills in the north-eastern part of the district (Kilak County). Generally, the altitude ranges between 1,000 -1,200 meters above sea level.

Administration Units

Administratively, the District is made up of 5 Lower Local Governments (4 Sub-counties and 1 Town Council). Other administrative units include 1 county, under the supervision of an Assistant Chief Administrative Officer. There are 32 parishes and 63 villages in Amuru District.

Table 3: Administrative units in the District

Political and Administrative Units	Number
Number of County	1
Number of Sub-counties/Town Council	5
Number of Parishes/Ward	32
Number of District Councilors	15
Number of Standing Committees	2
Number of Villages	63

Source: Office of the Chief Administrative Officer

Population and Demographics

The population of Uganda as of March 2005 is 26.2 million persons, up from 24.7 million in 2002, with a growth rate of 3.3% and sex ratio of 95 males per 100 females. The census results of the 2002 population and housing census indicated that the total population of Amuru District was 176,733 of which 99 percent lived in rural areas. The population density was 21 persons per square kilometer, while the average household size was 4.5 persons per household and sex ratio was 97 males per 100 females. The possible reason here is that more males than females must have died during the conflict, and other biological sex survival intricacies. See below the population distribution by sub-county and estimated population by age groups.

In July 2006, the counties of Kilak and Nwoya were curved out of the then Gulu District to constitute Amuru District and in July 2010, Nwoya county was curved out of Amuru to for the present day Nwoya District. Amuru District, like any other district of Acholi (Gulu, Kitgum and Pader) has experienced insecurity.

Gender Composition of the Population

The sex composition of the human population is one of the demographic characteristics which is extremely vital for any meaningful analysis and therefore very useful in understanding the past trends of population changes (past trends of fertility, mortality, migration). The sex ratio, defined as the number of males per 100 females, is an index for comparing the numerical balance between the population of either sex in different population groups irrespective of the size, location and time reference. According to the 2002 census, the gender ratio for Amuru district stood at 97 males per 100 females. Insecurity that targeted mainly males is responsible for this index. Table 4 below gives the gender composition of the population by county and sub-county.

Table 4: Sex Composition of the Population by County and Sub-County

		2002			2008	
County/Sub-county	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
Kilak County						
Amuru sub-county	14,448	14,521	28,969	16,400	16,800	33,200
Attiak sub-county	13,281	13,732	27,013	15,100	15,900	31,000
Lamogi sub-county	18,663	18,962	37,625	21,300	21,900	43,200
Pabbo sub-county	20,527	21,589	42,116	23,300	24,900	48,200
Total (Kilak)	**6,919**	**68,804**	**135,723**	**76,100**	**79,500**	**155,600**

Source: UBOS – 2002 Housing and Population Census Final Results

Age Composition

To aid the study of the age composition of a given population, we make use of the usual functional age groups in addition to the five age groups used in demographic analysis. The results of the 2002 census indicated that the population of Amuru is youthful and is becoming even younger over time. Children (those less than 18 years) constituted 55 percent of the population, those less than 15 years constituted 49 percent, while the elderly (those 60+) made up 4 percent. This age structure implies that a significant proportion of the population is dependent (dependency ratio was 108). This implies looking after a large number of dependents with few resources which encourages consumption of savings (dissaving) and ultimately results into disinvestment. Table 5 below gives the age composition of the population

Table 5: The Age Composition of the Population by County and Sub-county

County/ Sub-county	Children					Adolescents		Adults		
								All Adults	Youths	Elderly
	Under 1	Under 5	6-12	Under 15	Under 18	10-14	15-24	(18+)	(18-30)	(60 +)
Kilak	6200	27912	30299	69251	76899	17940	24867	58824	31305	4697
Amuru	1294	6089	6701	15115	16586	3897	4833	12383	6346	1007
Atiak	1259	5383	5799	13293	14953	3426	5149	12060	6322	1040
Lamogi	1864	7827	8229	19046	21188	4919	6972	16437	8510	1392
Pabbo	1783	8613	9570	21797	24172	5698	7913	17944	10127	1258

Source: UBOS – 2002 Housing and Population Census Final Results

Kilak County had the largest population with 135,723 people (76.8%), which was more than three-quarters of the entire district population. The population of Amuru is unevenly distributed across the sub-counties. The majority (99%) of the population lives in rural area.

Table 6: Population Growth and Distribution

	1980	1991	2002
Uganda	12,636,179	16,671,705	24,746,977
Amuru	-	-	176,333
Share of Uganda's Population (%)	-	-	0.71
Density	-	-	21

The average population density in the district was 21 persons per square kilometer. This density is insignificant if compared to those of neighboring districts like Apac (106 persons per square kilometer) and Lira (104 persons per square kilometer). It should be remembered that were it not for the insecurity in Amuru, the population density would be very near to those of these two neighbours.

Table 7: Population Growth Rate and Doubling Time

Year	Growth	Doubling Time (Years)
1969/1980	1.81	17
1980/1991	2.05	15
1991/2002	2.0	10

Amuru then a component of Gulu District experienced an increase in population growth rate from 1.81 percent in 1980 to 2.9 percent in 2002. The population is growing faster and its doubling time has decreased from 17 years to 10 years during the same period. At this rate the population of 176,733 in 2002 should double to 353,466 in just 10 years by the year 2012. The question is, will essential services like education, health, water, etc. grow fast enough to take care of the increasing population? This is a challenge, which all development partners should be considering now.

The Settlement Pattern

Spatial distribution of population in Amuru is uneven. Central and local forest reserves and ease of accessibility to social and economic infrastructures have largely determined population distribution in the district. Soil fertility factors have not greatly influenced the settlement pattern since much of the soils support most of the crops grown in Amuru District. However physical features like hills, rivers, forests and swamps have played significant roles in influencing the population settlement patterns. The physical features provide natural resources for social and economic activities but have not attracted settlements nearby.

It is worthwhile to mention that the population settlement pattern in the district has had a departure from natural resource endowment potentials and existence of socio-economic activities to security concerns. Consequently more than 90% of the population has settled temporarily in the IDP camps where relative security can be provided. Therefore many of the settlements (IDP camps) are found along the main roads, trading centers, town centers and its suburbs. Currently with the advent of the Juba peace talks the IDPs are decongesting and settling in satellite camps where they can access their lands

Climate

The type of climate experienced in Amuru consists of dry and wet seasons. The average total rainfall received is 1,500 mm per annum with the monthly average rainfall varying between 14 mm in January and 230 mm in August. Normally the wet season extends from April to October with the highest peaks in May, August and October, while the dry season begins in November and extends up to March. The average maximum temperature is 30 degrees centigrade and the minimum being 18 degrees centigrade. The relative humidity is high during the wet season and low in the dry season.

Soil

According to Langland's (1974) classifications, the soil of Amuru consists of ferrugineous sandy loam which has a high percentage of sandy soil and therefore susceptible to erosion. Due to its sandy nature the soil has low water retention capacity and high rate of water infiltration. The soils are usually deep with little differentiations into clearly defined horizons and possess fine granular structure, often molded into larger, weakly coherent clods, which are very porous. Amuru district is endowed with vast fertile soils in the corridors from Amuru and Pabbo sub-counties to Atiak sub-county.

The up-warping and down-warping of underground rocks accompanied by faulting, shearing and jointing has influenced the drainage pattern of Amuru District to form a dendrite type of drainage pattern, where many rivers and streams are held responsible for the formation of this drainage pattern. The major ones are those flowing into the Nile, which include rivers of Unyama, Tochi, Ayugi, Ayago and Apar.

The major rock types that form the geology of Amuru District are composed of remnants of low land surfaces and scarps related to rift or Aswa, sediments of western rift valley, zone of Tors and inselbergs areas of infill, remnants of upland and hot springs.

Regarding minerals distribution in the district, no detailed geological mapping has been carried out to reveal their economic potentials. However limited reconnaissance geological investigations were carried out in some parts of the district and some minerals were found to occur. Among these minerals are Kynite, which is found to occur in pennatitic vein rocks in the area North of Attiak trading center (border town). Gold is found to occur in Attiak–Bibia area up to the Sudan border (here detailed geological investigation is needed). Clay suitable for good quality roofing tiles and building bricks are found to occur in some parts of the district and this needs evaluation. Murram suitable for road surfacing is found to occur in almost all parts of the district. Several rocks have been identified to have good quality for building and construction industries (stone quarry).

Vegetation

The vegetation of Amuru as classified by Langland's (1974) consists of intermediate savannah grassland. This type of vegetation is that found between the moist and the dry savannah.

The vegetation type is characterized by open canopy of trees of 10-12 meters high and underlying grasses of 80 centimeters high. The trees are fire resistant and therefore able to regenerate themselves after being burnt by fire.

The common tree species here include Acacia, Ficus Natalensis, Combretum, Borasus, Aethiopum (Fanpalm), while the common grasses include Imperata Cyndrica, Haperrhanirufa, and Digitaria Scalarum. There are also some herbs like Biden Pilosa, Ageratum Coinzolds, Amarathus Species and Lantana Camara.

However man's activities have tended to interfere with the natural vegetation of the place and this has led to the development of secondary vegetation. The common tree and grass species here include Eucalyptus, Jacaranda, Cupressus, Thevita, Oeruvian, Pines, Hibiscus, Bougain Villae and Flamboyant.

Relevant cultural and ethnic issues

Every clan in the District has got a traditional chief and all these chiefs do pay allegiance to the Paramount Chief of Acholi. The district has one tribe i.e. the Acholi. However, most trading centers and border points have got multiple tribe and other nationals who come mainly for private business.

Environmental issues

Environment can be defined in terms of its four major components: Lithosphere includes land and everything underneath, e.g. rocks, minerals and soil; Atmosphere includes air and anything in the space; Hydrosphere includes water bodies like wells, springs, oceans and seas; Biosphere includes living things, flora and fauna.

There is observed to be massive environmental degradation, indicated by reduced variety and unavailability of elements in the environment. Of serious concern is the declining soil productivity in terms of crop yield per acreage and high prevalence of crop diseases. The main factors behind this deteriorating state of the environment is thought to be caused by poverty, population pressure on the natural resources especially near IDPs camps, ignorance on sustainable use and management of these resources, increased urbanization, poor enforcement and implementation of environmental policies, laws and regulations among others. The parish and sub-county environment action plans bring out the major environmental concerns, which are integrated in the various sector plans, and those specific to environment sector are being addressed by the office concern.

Environmental Indicators

The indicators measuring environmental issues are: existence of environmental policy, percentage change in on farm tree cover and percentage change in tree cover in forest reserves.

Threats to Environment

The potential and actual problems that are holding back progress can be grouped under two main headings, namely IDPs activities and lack of awareness. IDPs activities of concern are poor waste management; devastation of vegetations; wetlands reclamation, e.g. sugarcane growing in wetlands; and poor farming methods. Lack of awareness includes primitive farming methods; indiscriminate cutting of trees; charcoal burning; brick making; uncontrolled grazing of livestock; rapid population growth that affects natural resources consumption; inadequate funding to carry out environmental activities in response to the needs on the ground; and under staffing in the sector that leads to inefficiency.

The negative trends that should be observed include low productivity brought about by desertification (climatic change), greenhouse effect (ozone layer depletion), biodiversity loss, soil erosion and contamination of water table.

Potential for Improving Sustainable Environment and Natural Resources

Productivity

The potential for improving sustainable environment and natural resources productivity entails the following: production of district environment action plan (DEAP); formation of DEC/LEC; recruitment of more staff and building capacity; planting more trees through promotion and practicing of agro-forestry by farmers; sensitizing the community on tree nursery bed establishment and management; sensitizing community on proper methods of waste management; drilling the community on the construction and use of energy saving stoves.

Economic activities

Main Industries

The private sector in Amuru is constituted by very minor and small enterprises. Only a few grinding mills and rice hullers are present.

Agriculture

Crop production is the major economic activity in Amuru, employing about 98% of the population. Arable land is very fertile and makes up about 90% of the total land area. However, less than 1% of the land is utilized yearly. The limited utilization of land is partly due to the security situation. It is estimated that 20% of farm families have been unable to produce due to displacement and the average household food production have therefore reduced during the last twenty years.

The traditional cash crops are cotton and tobacco, but due to decreasing prices and limited access to markets, their production has declined rapidly in the last 25 years. The Cotton Sector Development Programme is currently being implemented and the hope is that the crops will be revitalized. The major food crops are maize, finger millet, sorghum sweet potatoes, cassava, groundnuts, simsim, beans, peas and sunflowers. These major food crops now constitute what we call the non-traditional cash crops.

Livestock

Livestock used to rank very high on the list of assets and economic activities in the distinct. Before 1986, livestock was the financer of school fees, dowry, and security of the family welfare and source of protein. Ox ploughing was further a more vital part of crop production of the population of Amuru. However at present there are only a few hundred dairy farmers in the district. The loss of cattle (oxen) in 1986 explains the widespread use of conventional manual ploughing instead of ox ploughing. Manual ploughing is the reason for declining productivity and limited acreage under crops.

Fisheries

Fishing as an economic activity does not feature very much in Amuru though the district is endowed with the River Nile that borders it on the western side and some small rivers, streams and swamps. Fish is therefore supplied by other sources outside the district mainly Lake Kyoga, Lake Albert and as far as Lake Victoria. Before the civil war, however, fish farming was a very common activity among the people. Amuru District Council is currently exploring the possibility of revitalizing this lucrative source of income.

Service Industries

The common telephone networks are the same ones available nationally, namely Airtel, MTN, Orange, and UTL. Other service industries include lodges, barbers shops, bicycle taxi (boda-boda) and motor transport.

Livelihoods

Table 8: Amuru District Main Livelihoods, by Sub-County and Town Council

Sub - County	Main Livelihoods
Amuru Town Council	Subsistence farming, petty trade
Amuru	Subsistence farming, petty trade, animal rearing, charcoal burning, brick marking and sand mining.
Lamogi	Subsistence farming, petty trade, animal rearing, charcoal burning, brick marking and sand mining.
Pabo	Subsistence farming, petty trade, animal rearing, charcoal burning, brick marking and sand mining.
Atiak	Subsistence farming, petty trade, animal rearing, charcoal burning, brick marking and sand mining.

Discussion of women's livelihoods

Women in Amuru do not own land. As a result, most of them are dependent on their men. Their major sources of livelihoods are subsistence agriculture on the land owned by their men, petty trade like produce selling, charcoal burning, Hotels and small eating houses and shop keeping.

Hazards

Table 9: Hazard Summary in Amuru District

Hazard	Status	Sub County	Rank
Heavy Storms	Incidences of heavy strong winds reported to have blown off roofs in Health Centers (Atiak H/C IV, Parabongo H/C II & Bira H/C II) and Schools (Oliya P/S, Parabongo P/S, Keiya P/S and Agole P/S; lightning struck 10 children in 9 schools in a year.	Atiak S/C, Pabbo S/C, Lamogi S/C and Labongo S/C.	**5**
Crop Pests and Diseases	Incidences of Fire flies eating leaves of beans, peas and other vegetables reported	Lamogi S/C	**9**
	Incidences of weaver birds destroying maize reported	Lamogi S/C	
	Incidences of grass hoppers destroying cereals reported	Lamogi S/C	
	Cassava mosaic reported	Lamogi S/C	
	Beans bacteria blight reported	Lamogi S/C	
	Ground nut rosette reported	Lamogi S/C	
	Banana bacteria wilt reported	Lamogi S/C	
	Citrus Cankers reported	Lamogi S/C	
	Fruit flies affecting improved varieties of mangoes reported	Lamogi S/C	
Animal Pests and Diseases	Incidences of CBPP, African Swine Fever reported	Pabo, Lamogi	**6**
	Incidences of Foot and Mouth Disease reported		
	Incidences of New Castle Disease among chicken reported		
	Incidences of Tsetse Flies reported in Labala Parish (along Apaa, Ayugi Ceri and Omee Rivers) Pogo Parish (Ayugi and Ceri river banks) and Gaya Parish (Unyama river bank)	Pabbo and Lamogi Sub Counties	
	Incidences of Nagana reported	Lamogi S/C	
	African swine fever reported	Lamogi S/C	
	New castle in poultry	Lamogi S/C	

Hazard	Status	Sub County	Rank
Environmental Degradation	Incidences of Wetland Encroachment, Deforestation, Quarrying reported	Lamogi and Pabbo Sub Counties	**3**
Internal Conflicts	Incidences of Land disputes in Health center (Amoyokoma H/C II and Otwee H/C III); Primary and Secondary schools reported (Agole P/S, Amuru-Lamogi P/S, Layima P/S, Luyar P/S and Pabbo SS)	Pabbo, Amuru and Atiak Sub Counties and Amuru T/C	**1**
Prolonged dry spell	Widespread in the District. Pogo Parish in Pabbo sub county is the most affected. The parish has sandy soils mixed with gravels misses rain between March and May then August to October	All Sub Counties	**4**
Human Epidemic	Incidences of Nodding syndrome reported	Atiak Sub County	**11**
	Incidences of Polio reported in 2009. This was traced to South Sudan	Uganda – Sudan border point (Elegu in Atiak S/C).	
	Incidences of Cholera and Meningitis reported in the neighboring districts of Adjumani and Moyo. **A potential threat**	Pabbo and Atiak Sub Counties	
	Sleeping sickness in Labala, Pogo, Gaya and Parubanga Parishes	Pabbo Sub County	
	River Blindness	Pabbo Sub County	
Floods	Incidences latrines collapsing in Guruguru primary school; water logging in gardens; bridges washed away/submerged by waters reported	Lamogi and Pabbo Sub Counties	**8**
Bush Fires	Incidences of massive fires reported	The entire District	**2**
Invasive species	Incidences of Lantana Camara and Yellow cassia reported	Atiak & Pabo	**10**
Vermin	Incidences of Velvet Monkeys destroying crops reported	Atiak, Pabo, Lamogi & Amuru S/Counties.	**9**

Table 10: Summary of Hazards in Amuru District by Sub -County

Sub - County	Hazards											Total
	Heavy Storms	Crop Pests and Diseases	Animal Pests and Diseases	Environmental Degradation	Internal Conflicts	Prolonged dry spell	Human Epidemic	Floods	Bush Fires	Invasive species	Vermin	
Atiak	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
Pabbo	✓	✓			✓	✓		✓	✓	✓	✓	8
Lamogi	✓	✓	✓	✓	✓			✓	✓		✓	8
Amuru S/C	✓	✓	✓	✓	✓	✓			✓		✓	8
Amuru T/C	✓	✓	✓	✓	✓	✓			✓			7
TOTAL	**5**	**5**	**4**	**4**	**5**	**4**	**1**	**3**	**5**	**2**	**4**	**43**

Table 11: Hazard Risk Assessment by Sub-county

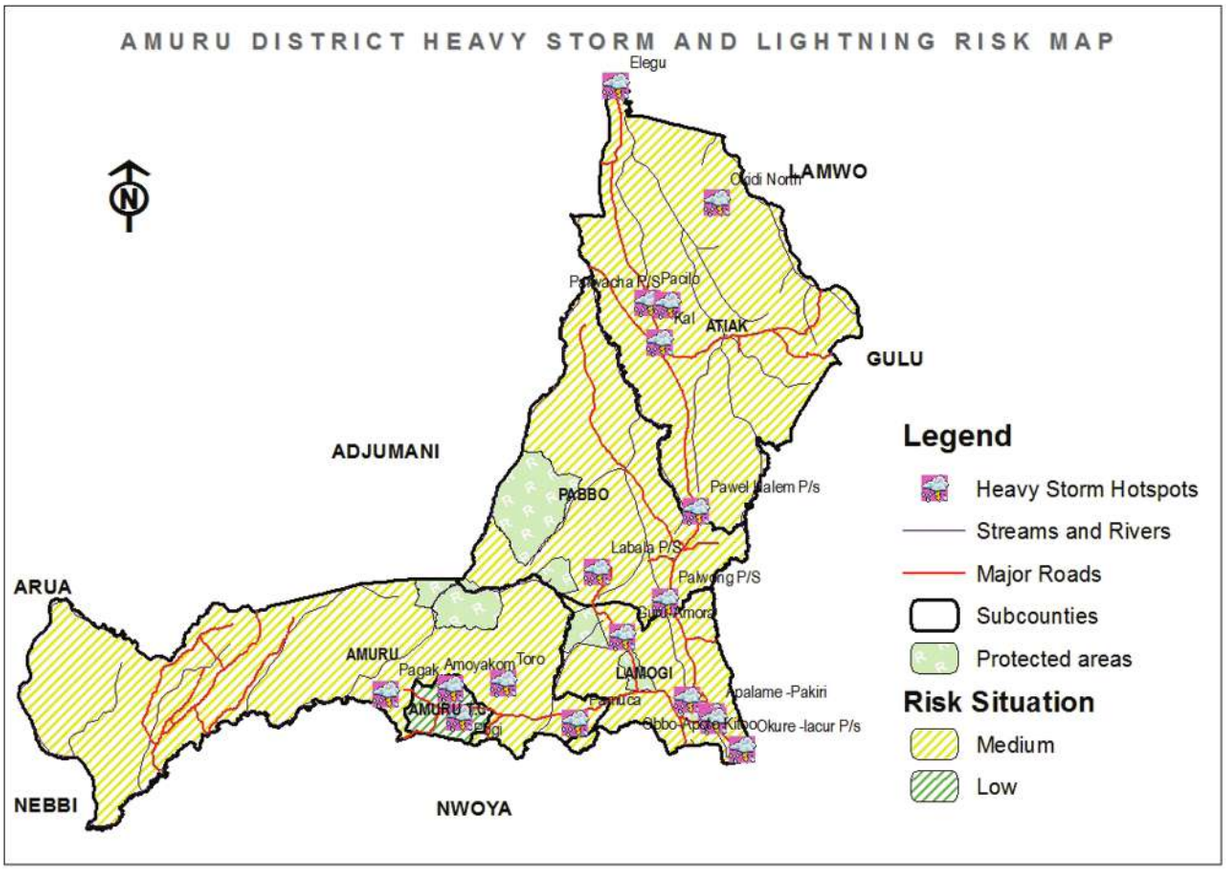
Sub county	Hazards										
	Heavy Storms	Crop Pests and Diseases	Animal Pests and Diseases	Environmental Degradation	Internal Conflicts	Prolonged dry spell	Human Epidemic	Floods	Bush Fires	Invasive species	Vermin
Atiak	M	L	M	H	H	H	M	H	H	L	M
Pabbo	M	M	N		H	M	N	M	H	L	M
Lamogi	M	M	H	M	H	M	N	M	H	N	M
Amuru S/C	M	L	M	M	H	M	N	N	H	N	M
Amuru T/C	L	L	M	M	M	M	N	N	L	N	N

KEY H – High, M – Medium, L-Low

Risks

Heavy Storms

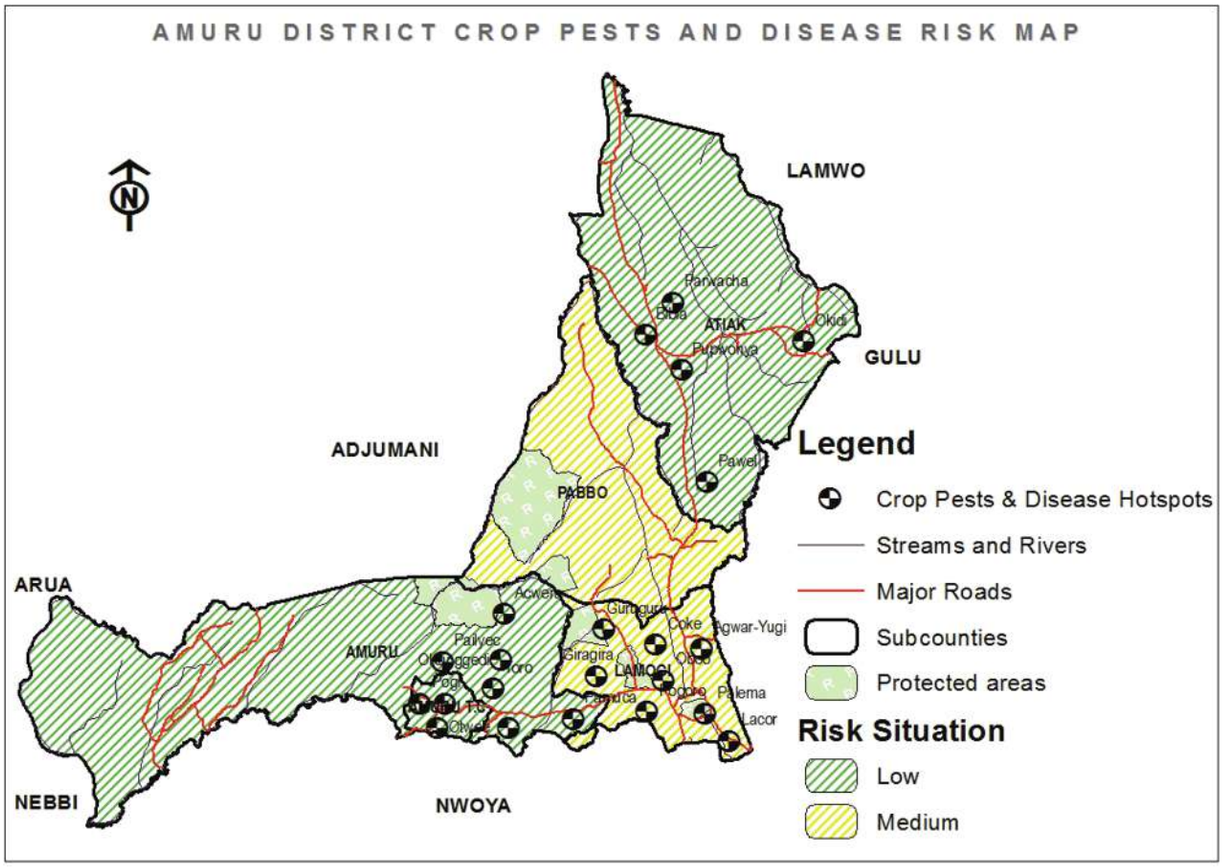
Figure 1: Heavy Storm and Lightning Risk Map



Incidences of heavy strong winds have been reported in the Sub – Counties of Atiak, Pabo, and Lamogi. In particular, the heavy storms have blown off roofs in Health Centers (Atiak H/C IV, Parabongo H/C II & Bira H/C II) and Schools (Oliya P/S, Parabongo P/S, Keyo P/S and Agole P/S. Lightning also struck 10 children in 9 schools (Otong P/S, Pabo P/s, Palwong P/S, Pogo Ogwera P/S, Pogo Okuture P/S, Olinga P/S, Labala P/S, Abera P/S, and Abot P/S. All these schools are in Pabo Sub – County. Ayugi Bridge which connects Olamnyungu - Atiak was also washed away. Hailstones destroyed crops in Lacor, Pagoro, Guru – Guru, Gira – Gira, Agwayugi and Palema in Lamogi Sub – County. The heavy storms normally occur at the beginning of the rainy season i.e. March – May and July – November. These occurrences are mainly due to climate change triggered by human activities like clearance of vegetation to open farmland, charcoal burning, drainage of wetlands, rampant bush burning.

Crop Pests and Diseases

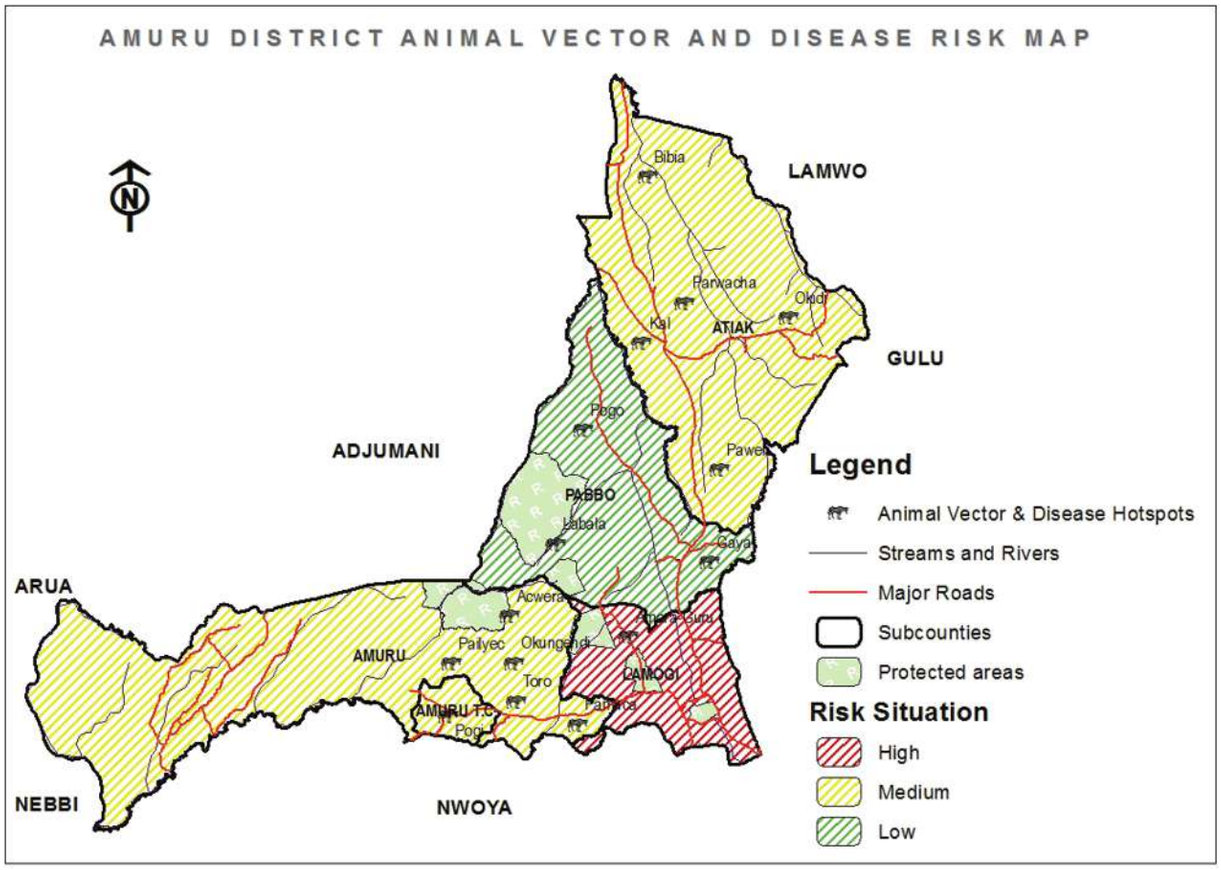
Figure 2: Crop Pests and Disease Risk Map



Fire flies eating leaves of beans, peas and other vegetables, weaver birds destroying maize, grass hoppers destroying cereals, cassava mosaic, groundnut rosette, banana bacteria wilt, citrus Cankers and fruit flies affecting improved varieties of mangoes have been reported in the entire District. The high rate of pests and diseases in the district is attributed to the introduction of improved varieties under National Agricultural Advisory Services (NAADS) and NUSAF that are less resistant to such threats. This has led to reduced yields, hence; food insecurity in the District. This problem can only be controlled through the use of pesticides, getting rid of the affected plants and introduction resistant varieties.

Animal Vector and Diseases

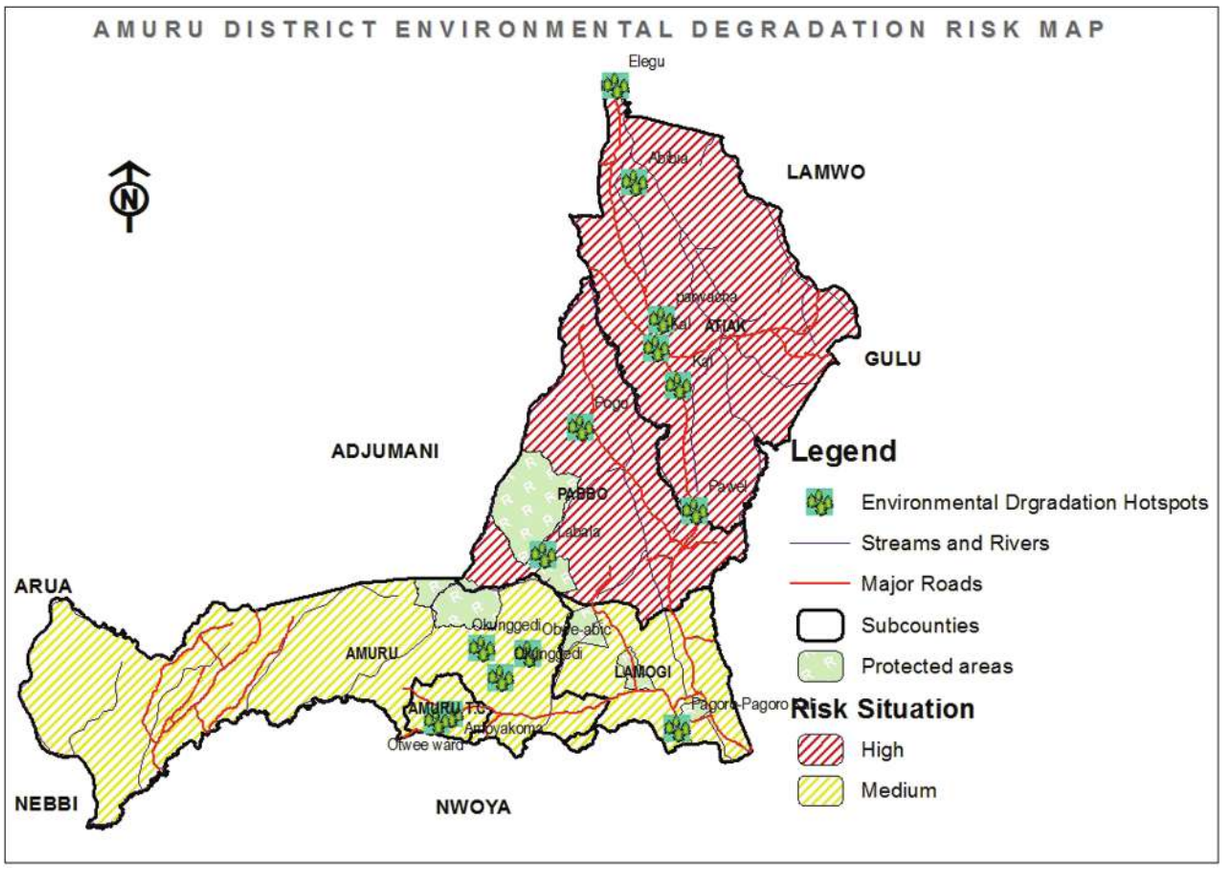
Figure 3: Animal Vector and Disease Risk Map



Cases of CBPP, African swine fever, Foot and Mouth disease and New Castle Disease among chicken have been reported in Pabo and Lamogi Sub – Counties. Incidences of Tsetse Flies was reported in Labala Parish (along Apaa, Ayugi Ceri and Omee Rivers) Pogo Parish (Ayugi and Ceri river banks) and Gaya Parish (Unyama river bank) in Pabo Sub – County. Nagana and African swine fever were reported in Lamogi Sub – County. Communities attributed the rampant causes to the current animal diseases to the restocking program conducted in the Greater North. This has led to loss of livestock in most households. This has in turn led to reduced income level in the District. This can be controlled through increased use of pesticides, regular treatment and checkup of the animals by the veterinary doctors.

Environmental Degradation

Figure 4: Environmental Degradation Risk Map

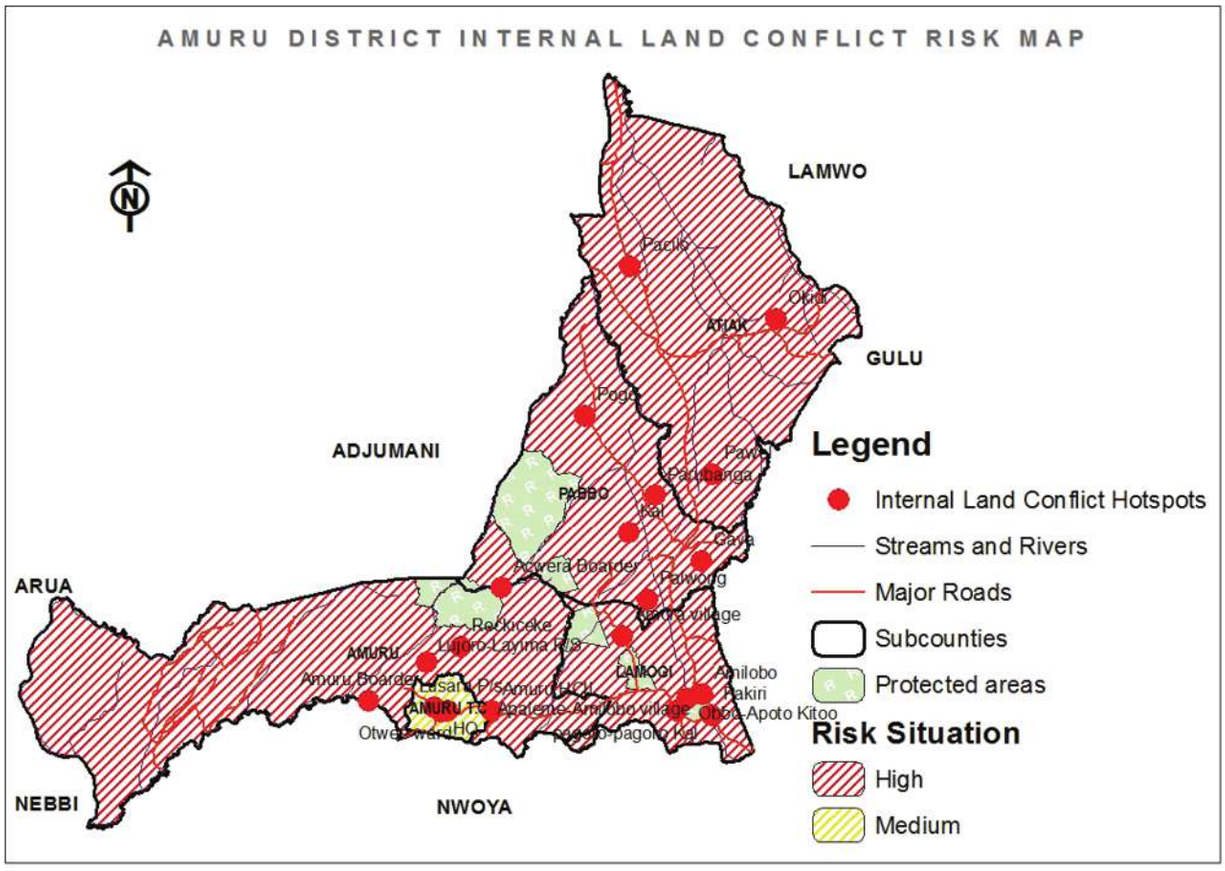


Wetland encroachment has been reported in the entire District. It's a common practice in the District that most households resort to wetlands for vegetable growing during the long dry spell i.e. between December – March mainly for household consumption. Some few households practice it for commercial reasons since the prices of vegetables tend to rise during the dry season due to scarcity. This is also escalated by the Ready market for vegetables provided by both the local community and the neighboring Country; South Sudan has also led to increased wetland encroachment.

Deforestation is also common in the entire District. The worst affected Sub – Counties are Pabbo, Atiak and Amuru. This is due to increased demand for charcoal by some factories in Jinja for the production of Shoe polish, radios and iron sheets as reported by the producers/ buyers in the District and for household consumption in Amuru and other districts like Gulu, Lira and Kampala. Lack/low level of enforcement of existing laws by the lower local government has led to high level charcoal burning and other illegal activities in the District.
Stone quarrying has been reported in Palukere and Pacilo Parishes in Atiak Sub – County and Palema Parish in Lamogi Sub – County. This is caused by high demand for stone aggregates for the construction of Gulu – Nimule road (The Great North Road).

Internal Conflicts/Land Conflict

Figure 5: Internal Conflicts/Land Conflicts



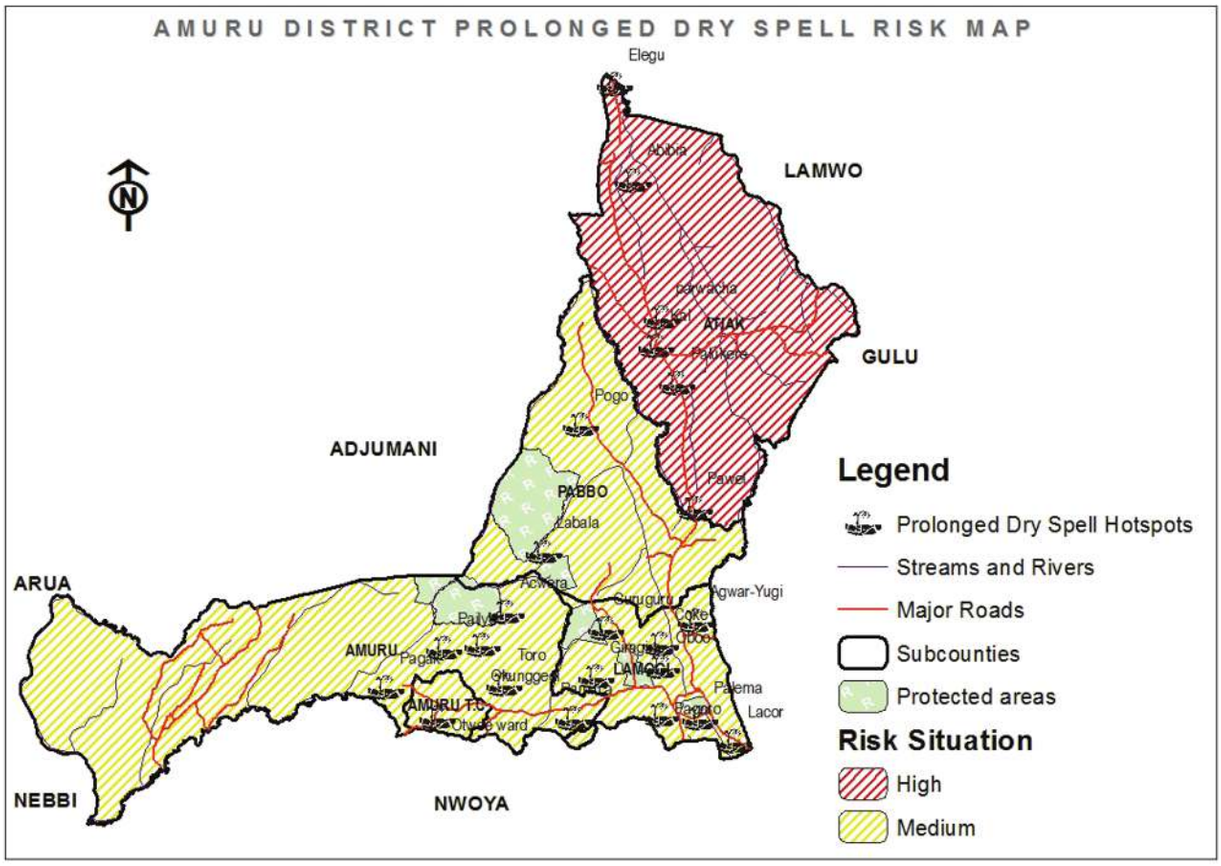
Land conflicts exist in the entire district for example. Communities are claiming ownership of institutional land especially in Health centers (Amoyokoma H/C II and Otwee H/C III); Primary and Secondary Schools; incidences have been reported in (Agole P/S, Amuru-Lamogi P/S, Layima P/S, Lujoro P/S etc. There are also conflicts between Districts over administrative boundaries between Adjumani and Amuru, Gulu and Amuru and Nwoya and Amuru. The communities are also having land conflicts between themselves and with Uganda Wild Life Authority (UWA) and the National Forest Authority (NFA) over boundaries of the Central and Local Forest Reserves.

All these conflicts are occurring because all government institutions do not have land titles, communal land tenure system makes it very difficult for households to have land titles, the over two decade insurgency in the northern region displaced people from their homesteads to the camp and by the time they were returning home, most of the boundary markers could not be traced because they were either destroyed or not being maintained. The elders who knew the boundaries had also died and their family members who have remained do not know the exact boundaries since most of them grew up in the camps. Some elders had also given land on good will basis for the establishment of government infrastructures like Schools, Health Canters, boreholes and Sub – County headquarters without any documentation but now their grandchildren are claiming ownership of such Lands.

The boundaries of protected areas, District boundaries and institutional boundaries have never been opened. The process of titling government land should be expedited; both UWA and NFA should open up their boundaries. The district boundaries should be opened with active participation of the local community.

Prolonged Dry Spell

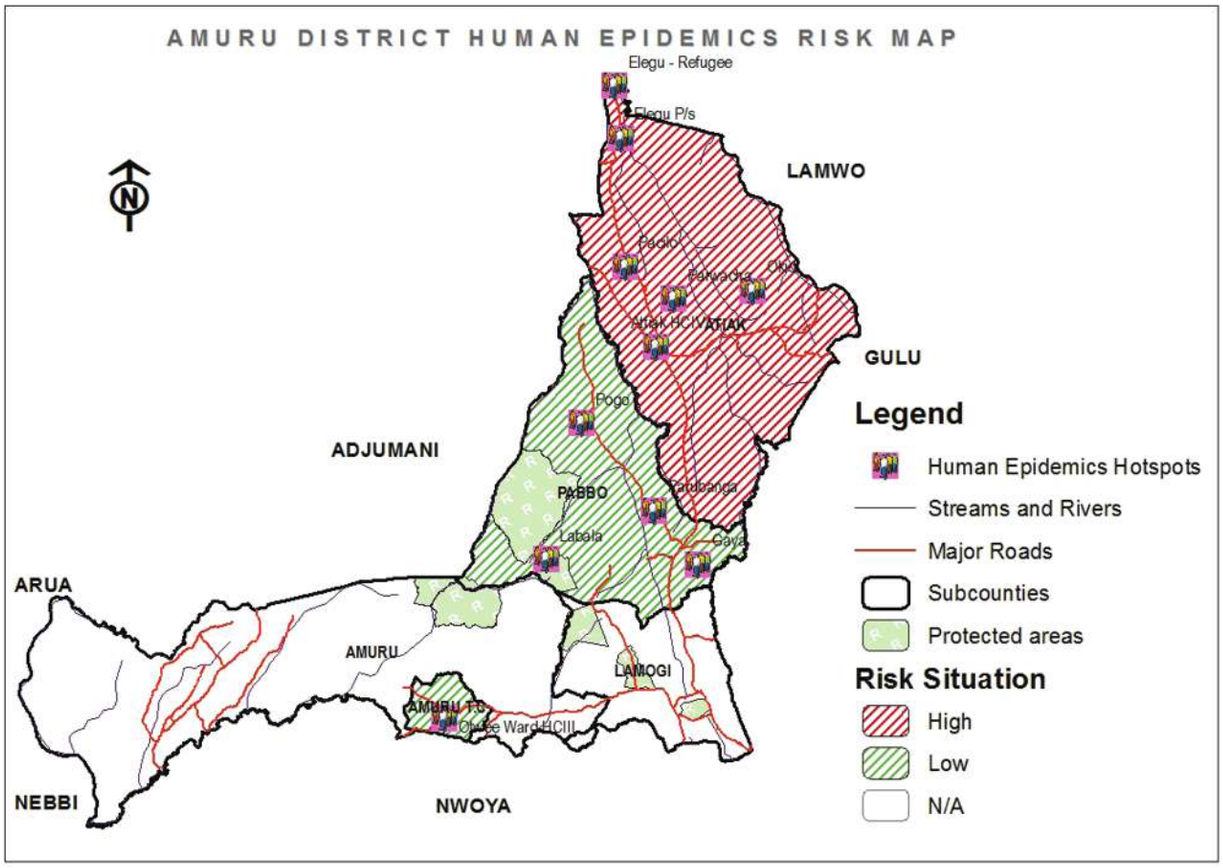
Figure 6: Prolonged Dry Spell



This is wide spread in the entire District. It is normally experienced from December – Mid March and June – July. The worst affect Sub – Counties are Atiak and Pabo because most of their areas have got sandy soils mixed with gravels. They also experience drought between March and May then August to October. Its frequency and intensity is increasing due to the high level of environmental degradation in the district. Drought is one of the major causes of food insecurity in Amuru District. This can be reduced through community sensitization, massive tree planting and enforcement of existing laws.

Human Epidemic

Figure 7: Human Epidemics Risk Map

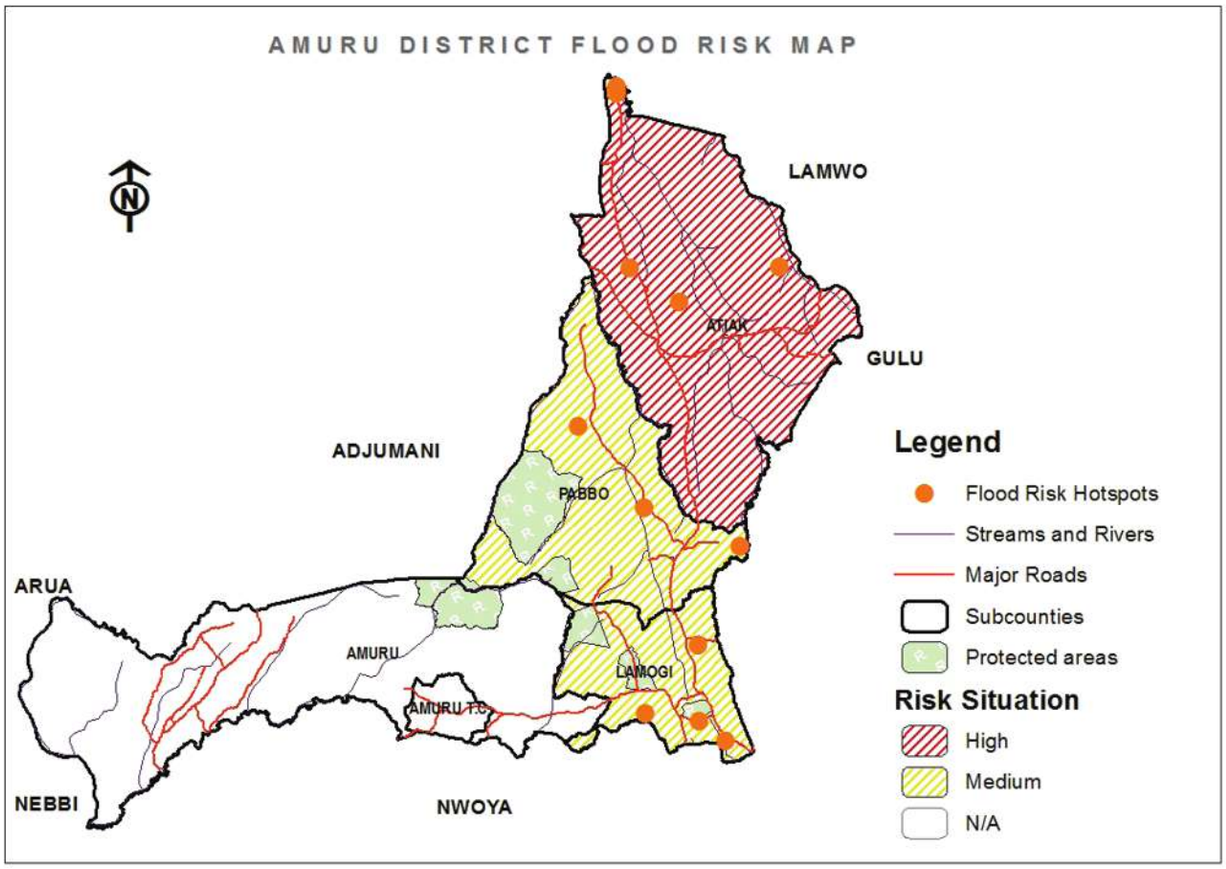


Nodding syndrome has been reported in Okidi and Parwacha parishes in Atiak Sub – County, Polio was reported in 2009 at Elegu border point in Bibia West Parish; Atiak Sub – County (Uganda – South Sudan border).This was traced to Sudan. Much as the government has managed to kick Polio out of Uganda, there is a still potential threat from the neighboring

Countries especially Sudan and DR. Congo due to free movement of people across the border points. Potential threats of cholera and Meningitis have also been reported in the neighboring districts of Adjumani and Moyo as a result of the refugee influx from South Sudan. Atiak Sub – County is more at risk because the refugee reception center is situated at Elegu border point in Atiak Sub – County. Sleeping sickness and river blindness were reported in Labala, Pogo, Gaya, and Parubanga parishes in Pabo Sub – County. The nodding syndrome is being contained and no new cases have been reported and the District has formed a District Nodding Syndrome Task Force for monitoring purposes. There is also a District Epidemic surveillance team in place.

Floods

Figure 8: Flood Risk Map

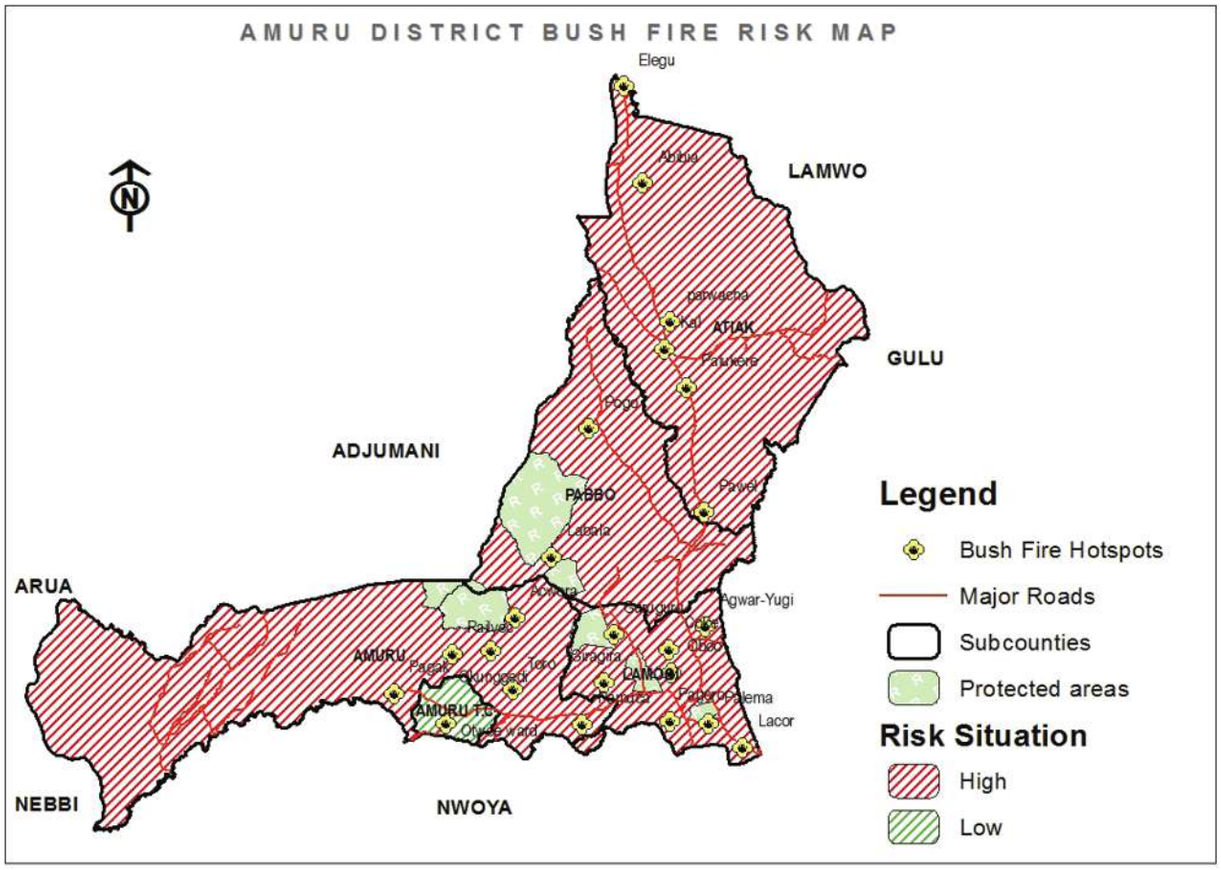


Seasonal flooding is much more serious in Elegu in Atiak Sub – County. This happens in the peak of the second rainy season (August – October) when R. Unyama normally bursts its bank. It is caused by over population at the border which has led to encroachment in the protection zone of R. Unyama, dumping of wastes in some parts of the wetland and excessive overflow of water from other rivers and tributaries that drain into R. Unyama. Much as the flooding does not last for over a week, the damages caused to property are enormous. Other parts of the District that are affected are; Acwera and Pailyec in Amuru Sub – County, Guru – Guru and Lacor Parish in Lamogi Sub – County, the level of water logging is minimal and last for less than two days. Flooding in the district has led to the collapse of toilets at Guru – Guru Primary School, loss of crops and Ayugi Bridge which connects Olamnyungu – Atiak was washed away.

Risks

Bush Fires Risk

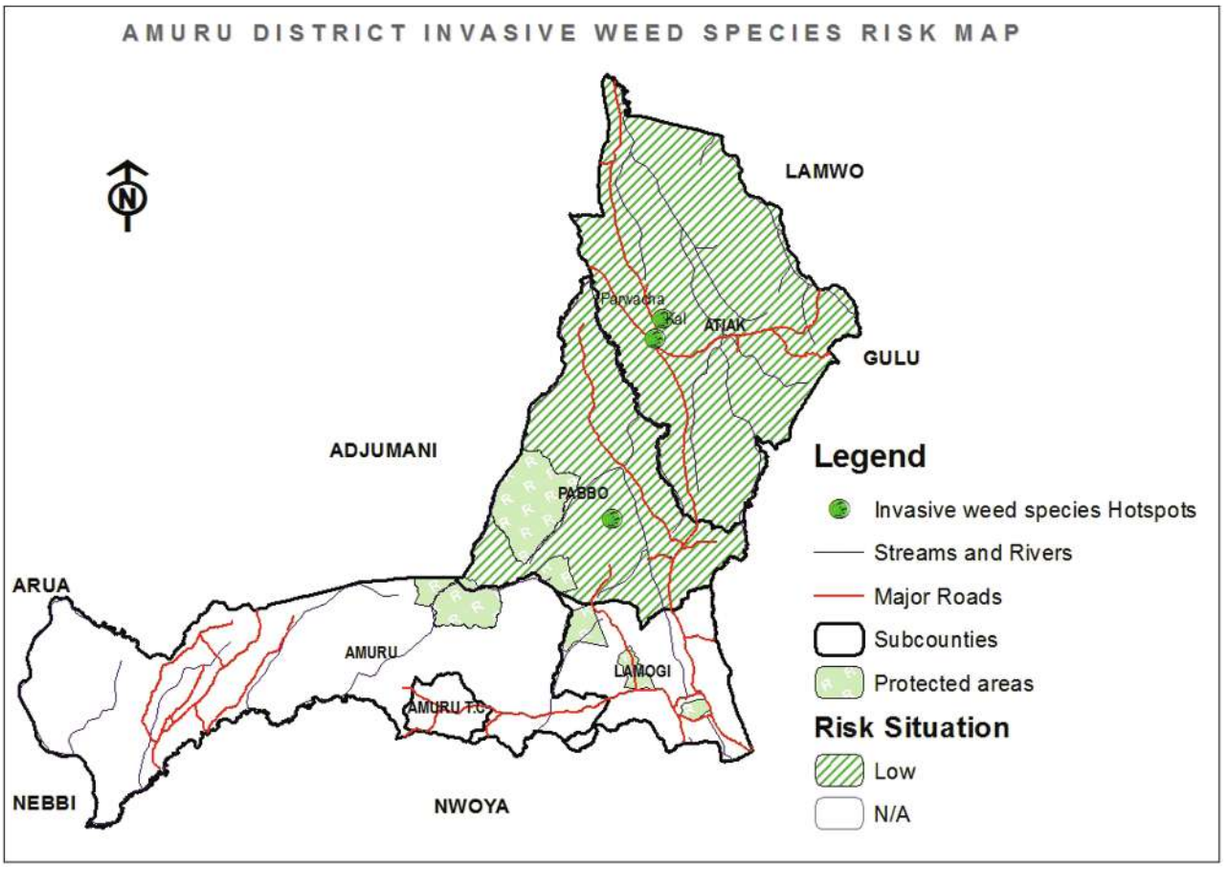
Figure 9: Bush Fire Risk Map



Uncontrolled bush fires are common in the entire district and in every dry season from December – March. It is mainly due to the need to open up farmlands, hunting, smoking, culture and land conflicts. It causes a lot of dangers to lives and property in very many households in the District. Despite the regular sensitization, communities have yet remained rigid to such practice and yet it is also very difficult to get the offenders.

Invasive Species

Figure 10: Invasive Species Risk Map



This is not yet common in the District but lantana camara, striger weeds and yellow cassia have been observed in Atiak and Pabo Sub – Counties especially in kal and parwacha Villages. They might have invaded the area as a result of relief distribution during the camp days and seed distribution under NAADs.

Vermin and other Wild Animals

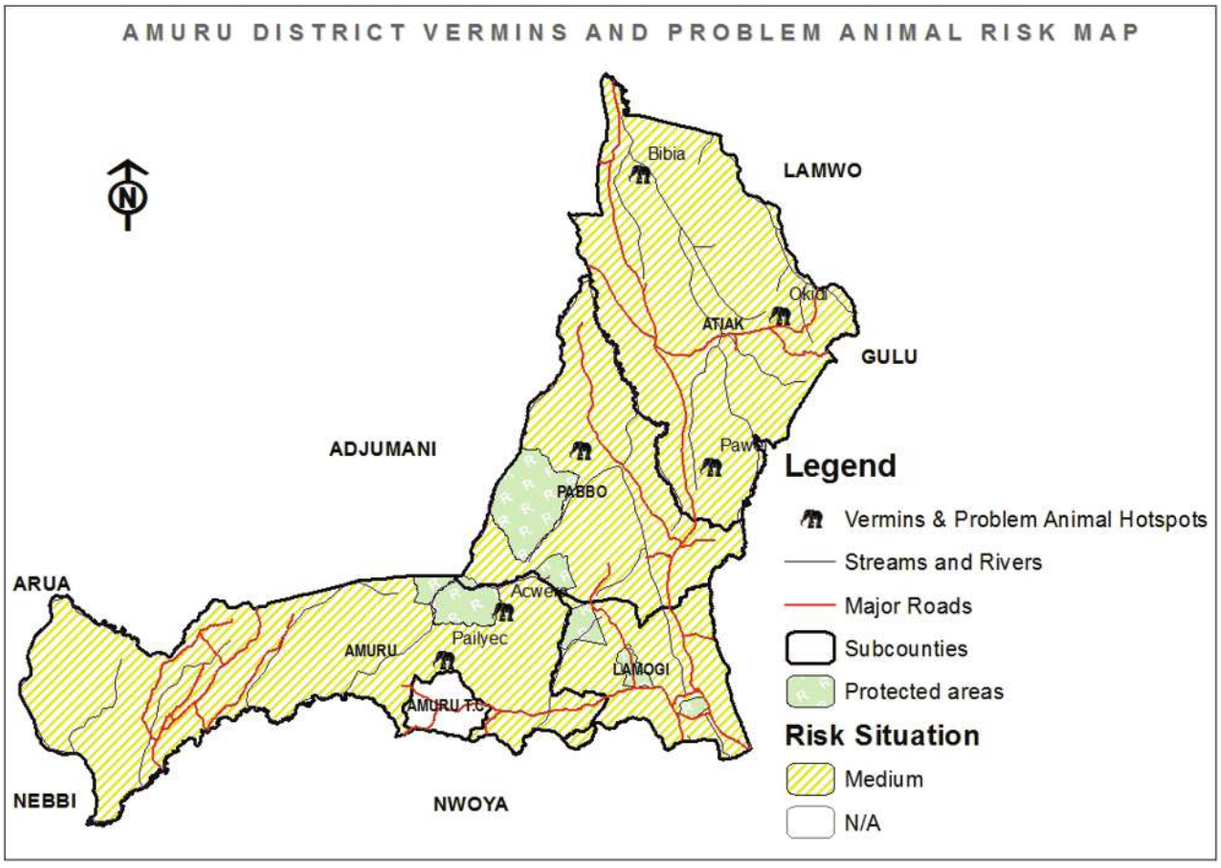


Figure 11: Vermin and Problem Animal Risk Map

Incidences of Velvet Monkeys destroying crops and tsetse flies have been reported in Atiak, Pabo, Lamogi & Amuru S/Counties. Hippopotamus have also killed more than two people in Okidi parish in Atiak Sub – County. Some of the hotspots identified include; Pailyec, Acwera, Pawel, Bibia and Okidi in both Amuru and Atiak respectively.

Vulnerability

Risk and Vulnerability Assessment

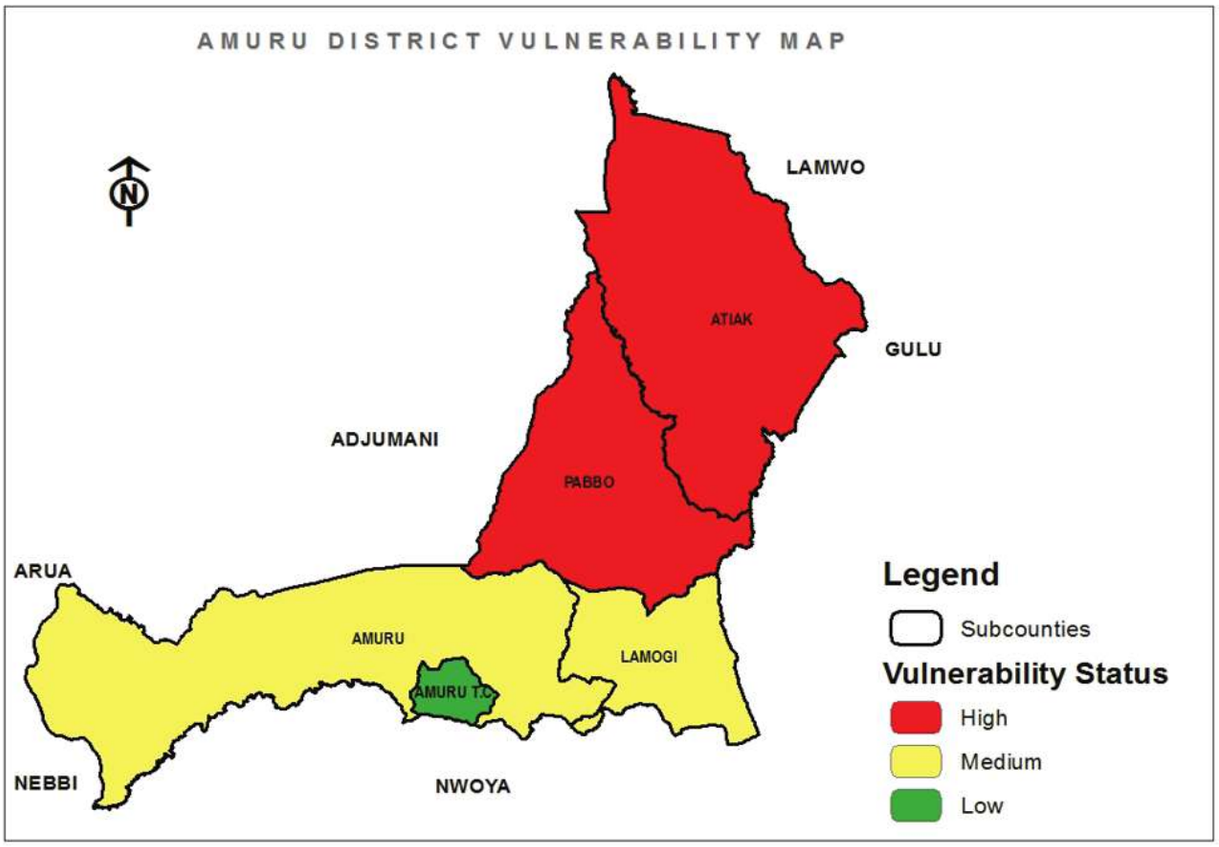
Table 6 summarizes the communities' assessment of hazards severity and frequency in the sub counties. The Table below transforms the qualitative analysis of Hazards represented in terms of low /medium and high judgements to numerical values which, when summed horizontally and sorted in descending order, rank the hazards by risk. The vertical sums indicate the relative aggregate vulnerability of the sub counties.

Table 12: Risk and Vulnerability Assessment

Sub county	Hazards											Cumulative Vulnerability	Weighted Vulnerability (Cumulative/3)
	Heavy Storms	Crop Pests and Diseases	Animal Pests and Diseases	Environmental Degradation	Internal Conflicts	Prolonged dry spell	Human Epidemic	Floods	Bush Fires	Invasive species	Vermin		
Atiak	2	1	2	3	3	3	2	3	3	1	2	25	8
Pabbo	2	2	1	3	3	2	1	2	3	1	2	22	9
Lamogi	2	2	3	2	3	2	0	2	3	0	2	21	7
Amuru S/C	2	1	2	2	3	2	0	0	3	0	2	17	6
Amuru T/C	1	1	2	2	2	2	1	0	1	0	0	12	4
Totals	9	7	10	12	14	11	4	7	13	2	8	97	

Risk and Vulnerability Assessment

Figure 12: Vulnerability map



Amuru District is exposed to 11 hazards; Heavy Storms, Crop Pests and Diseases, Animal Pests and Diseases, Environmental Degradation, Internal Conflicts, Prolonged dry spell, Human Epidemic, Floods, Bush Fires, Invasive species and Vermin.

The communities of Atiak and Pabbo Sub – Counties are more vulnerable because they are near the border which means there is high demand for natural resources in their Sub – counties which leads to environmental degradation. Atiak Sub – County has got a refugee reception centre for South Sudanese which exposes them to high risks of communicable diseases.

Women, children, elderly and the disabled are at risk because they do not own or have the factors of production like land and capital. Land disputes and poor ways of resolving them makes them more vulnerable because it's normally very violent.

Internal conflicts are more rampant in the entire district due to lack of land titles or clear boundaries and proper documentation. Communal land tenure system also makes it difficult to plan and title the land. This is followed by uncontrolled bush fires which is common during the dry season. It's done to open up farm lands and have fresh pasture for the animals. Floods also occur in Elegu in Atiak Sub-County and Guru – Guru and Lacor Parishes in Lamogi Sub-County at the peak of the rainy season. It causes loss of property and crops but no death has ever been reported.

Conclusions

The multi-hazard, risk and vulnerability profile produced in this mapping exercise combines physical data and perceptual information captured with participatory methods in Amuru District. It provides an understanding of how the district perceives each hazard based on likelihood of occurrence and its impact on the local communities.

The findings identify 11 hazards; Heavy Storms, Crop Pests and Diseases, Animal Pests and Diseases, Environmental Degradation, Internal Conflicts, Prolonged dry spell, Human Epidemic, Floods, Bush Fires, Invasive species and Vermin. Internal Conflicts, Prolonged dry spell, Floods and environmental Degradation are ranked to be the most dangerous and high-risk hazards for people in Amuru District.

The district is most vulnerable to internal conflicts; because Communities are claiming ownership of institutional land especially in Health centers and schools, conflicts between Districts over administrative boundaries, also land conflicts between communities themselves with Uganda Wild Life Authority (UWA) and the National Forest Authority (NFA) over boundaries of the Central and Local Forest Reserves but also Bush fire resulting from long dry season experienced in the district annually.

All of the sub-counties have significant vulnerability to disaster, accumulating risk from these hazards. The sub-counties of Pabo and Atiak record high aggregate vulnerability levels compared to others. This aggregated vulnerability to several hazards is a compound exposure to disaster risk and the complexity of managing it. The risk to internal conflict, bush fires, prolonged dry spell and Environmental degradation is very high throughout the district and are considered the compound hazards.

The mapping exercise demonstrates the value of integrating spatial information with community perception of hazards in the understanding of disasters in Amuru District. This disaster risk knowledge should therefore inform the disaster management committee of Amuru to develop disaster mitigation and response plans, which directs actions to minimize the impacts of hazards.

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