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TESO ANURIA District HAZARD, RISK AND VULNERABILITY PROFILE June 2014





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Acronyms

DDMC	District Disaster Management Committee
GIS	Geographic Information System
GPS	Global Positioning System
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immune Deficiency Syndrome
IDP	Internally Displaced Person
LRA	Lord's Resistance Army
MAAIF	Ministry of Agriculture, Animal Industry and Fisheries
MS	Microsoft
NAADS	National Agriculture Advisory Services
NGO	Non-Governmental Organization
NUSAF	Northern Uganda Social Action Fund
OPM	Office of the Prime Minister
PEAP	Poverty Eradication Action Plan
PRDP	Peace, Recovery and Development Plan
TC	Town Council
UBOS	Uganda Bureau of Statistics
UNDP	United Nations Development Programme



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Hon. Hilary O. Onek

Minister for Relief, Disaster Preparedness and Management



EXECUTIVE SUMMARY

This Amuria District Hazard, Risk and Vulnerability Profile integrates scientific information provided by GoU agencies and hazard and vulnerability knowledge provided by communities onthe district base map to contribute to a Ugandan at lasof disasterrisk. 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	Preliminary activities
Phase II	Field data collection, mapping, verification and ground truthing
Phase III	Participatory data analysis, mapping and report writing
Phase IV	Refinement, validation and final map production/reporting

The report characterizes the district in terms of location, geography, climate, administrative arrangements, natural resources, gender demographics by sub-county, livelihoods, agricultural production, poverty and environmental degradation.

The discussion of the nature of each hazard and its geographic extent in terms of subcounties 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.

Amuria District is located in north-eastern Uganda and bordered by Katakwi to the east, Soroti to the south, Kaberamaido to the west and Napak and Alebtong to the north.

The profile identifies endemic hazards in thirteen classes: floods, crop and animal epidemic, pest infestation, land conflict, human epidemic, mines and unexploded ordinances, environmental degradation, extended drought, food insecurity, vermin, cattle rustling, internally displaced persons and armed conflict, heavy storms and hail, and bush fires.

A table showing the variation of severity of hazards among the sub-counties suggests that land conflict is the most serious threat overall, with high risk in every sub-county. Acowa and Were have high flood risk; the rest of the district has medium flood risk. Acowa also suffers from high risk of drought and plant/livestock disease.

All of the sub-counties manifest almost all of the thirteen hazards to some degree, with the consequence of serious aggregation of multi-hazard risk. In Amuria, disasters involving several hazards simultaneously or in close sequence are likely. Acowa has the most aggregate risk, faced with floods, drought, animal disease, pest infestations, plant disease, vermin, food insecurity, environmental degradation, cattle rustling and land conflict.



INTRODUCTION

Amuria District Local Government was created in July 2005 through a resolution of Parliament. It comprises two counties: Kapelebyong and Amuria. The district was subdivided out of Katakwi district which was also at one time part of Soroti district. Like the other districts in the sub-region, Amuria is prone to a range of hazards and associated disasters including floods, crop diseases, animal epidemics, hail storms, land conflict, pests, environmental degradation, drought and food insecurity. The disasters reported in the Teso sub-region are increasing in frequency and severity, especially flooding, which severely damages infrastructure and livelihoods.

This multi-hazard mapping in Amuria district is motivated to reduce the population's vulnerability to natural disasters and also to prepare district disaster profiles that will aid decision-making and planning. Hazards such as flood and hail storms pose risks to life, property and livelihoods. Physical exposure and proximity to hazard-prone areas, and socio-economic, cultural and behavioral conditions compound these risks.

The mapping is a critical resource for optimizing development gains and minimizing potential economic and infrastructural loss in physical assets, human resources, and environmental capital.

Objectives

The objective of the hazard, risk, and vulnerability mapping is to produce a District Profile that will aid planning and decision making processes for managing disaster risks in Amuria District.

Methodology

The multi-hazard, risk and vulnerability mapping approach employed a people-centered, multi-sectoral, and multi-stakeholder approach. A mapping team led by the Office of the Prime Minister (OPM) and involving representatives from UNDP and district sector offices deployed on a field mission to Teso sub-region to capture the required information and produce the district profile.

The team employed a variety of data-collection methods including use of a mix-scale approach involving the integration of primary and secondary data. Secondary data were acquired through government sources (relevant ministries, departments and agencies, the districts in Teso and Rwenzori sub-regions) and data bases from other organizations/NGOS operating in these districts. The raw spatial data and satellite images were assembled from relevant sources and analysed with descriptive statistics and remote sensing technology.



The mapping exercise involved four critical phases as follows:

Phase I	Preliminary activities
Phase II	Field data collection, mapping, verification and ground truthing
Phase III	Participatory data analysis, mapping and report writing
Phase IV	Refinement, validation and final map production/reporting

Phase I: Preliminary Activities

In this phase the mapping team undertook a series of planning and programming activities before start of field activity including holding meetings with relevant teams, mobilizing required resources, acquiring required equipment and materials, review of relevant literature, establishing relevant contacts and developing a checklist of activities to be undertaken in Phase Two.

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

The phase was also useful for preparing the resource deployment plan, and outlining procedure and field work plans, etc. It articulated, among other issues, the utilization of various stakeholders to ensure maximum participation in locating disaster prone locations and any other information relevant to the mapping exercise.

Phase II: Field Data Collection and Mapping

Stakeholder mapping and local meetings. A preliminary field meeting was held in each district to capture key local issues related to disaster incidence and trends. The meetings gave opportunities for the mapping team and stakeholders to identify other key resource persons and support staff from within the local community for consultation.

Stakeholder participation practices. Stakeholder participation was a key component of the mapping exercise. The team conducted consultations with district technical sector heads under the overall purview of the District Disaster Management Committee (DDMC) involved in the ground truthing exercises to ensure district leadership and ownership of the data and results. During exit meetings, stakeholders, particularly those at district level, were given the opportunity to validate, update and also contribute any other relevant information vital to the mapping process.

Capture of spatial data. Spatial data were captured and complemented by base maps prepared at appropriate scales. The base maps contained relevant data including location of existing social-infrastructure and services, district area boundaries, environmental



elements, forest areas, utilities like roads, drainage and river course, contours and flood prone settlements.

Secondary data or desktop research. A desk review of relevant documents at the district and other umbrella organizations, including policy and legal documents, previous maps/ report and studies, was conducted. A checklist summarized the required information according to the multi-disaster risk indicators being studied/mapped. Data from documents were analysed using various methods including content analysis.

Critical observation and ground truthing. This approach was used to critically assess the conditions, nature and location of disaster prone zones, "current human activity" and settlement patterns along disaster prone areas. Critical observation and ground truthing included inspection and observation of social infrastructure, major household economic activities being practiced, natural drainage lines, rivers etc. Non-mappable and non-physical situations were captured through remote sensing (e.g. satellite images) and physical observation.

Main instruments of data collection. The main instruments used for data collection were manuals of instructions (guides to mapping assistants), use of key informant guides and notebooks, high resolution GPS receivers, digital camera for taking critical photographs, high resolution satellite images and base maps/topographic sheets of the mapping areas.

Exit/feedback meetings with stakeholders. After field activities and data collection, feedback and exit meetings with stakeholders were carried out in the district. These meetings provided additional information regarding the disaster mapping exercise, validated the data generated, and provided clarity on the expected outputs and the way forward into the next phase.

Phase III: Data Analysis and Verification

Analysis of collected data. The mapping team and district government officials analyzed the collected data, and developed thematic disaster maps by integrating features generated from GPS data with base maps and high resolution satellite images. The main activities at this phase included:

- Data entry, cleaning and coding
- Preparation of base maps and process maps
- Preparation of disaster risk and vulnerability maps

Methods used for data analysis. Data analysis methods used are the following:

- Geo-processing, data transformation and geo-referencing
- Discussions/FGDs
- Drafting, digitizing and GIS Overlays
- Compiling of different data and information



Data editing, coding and cleaning. Data entry clerks, data editors and coders digitized, edited, coded and cleaned data collected using the various tools mentioned above. Both qualitative and quantitative data obtained from the field were entered via a data entry interface customized to the layout of the field data forms. Data coding and analysis started immediately the data was available. Arrangements were made in the field to handle manual editing and coding as and when data was received from the field crew. Furthermore, data entry, verification, screens editing and system development followed sequentially to enable the preparation of draft maps.

Data analysis package. The mapping team analysed acquired data using MS Word and MS Excel for Windows, and spatial data using ArcGIS 10 software and mobile GIS applications. They performed rapid and systematic GIS overlays to generate base maps and 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, they merged it for cross tabulation and eventual production of thematic maps for the various types of hazards.

Generation and appraisal of draft Maps: Prioritization set by the districts determined the various hazards presented on the thematic maps. The team convened a field workshop to present, appraise and validate the risk and vulnerability maps with respect to their accuracy and completeness. Information gaps were identified and filled in the final risk and vulnerability maps.

Phase IV: Refinement, validation and reporting

A final workshop was conducted by the OPM to facilitate validation and dissemination of the district hazard, risk, and vulnerability profile to relevant partners.

Brief Overview of the District

Location and neighbours

Amuria District is located in north-eastern Uganda and bordered by Katakwi to the east, Soroti to the south, Kaberamaido to the west and Napak and Alebtong to the north. The district total area is estimated at 2,613 km².

Geomorphology

The soils throughout the district are predominantly shallow grey brown sandy loams over laterite and greyish brown sands and sandy loams whose parent material is Lake Deposits derived from basement complex granite, gneisses and other materials. These can support agricultural production of fast maturing cereals, leguminous and tuber crops. However significant area in the wetlands/swamps is covered by often calcareous black and grey



clays whose parent material is River Alluvium. Other soil types that cover small patches of the district include grey clays with occasional sand (found in Morungatuny and parts of Obalanga sub-counties), brown sandy loams over mottled grey clay and black calcareous clays and clay loams (these are found in the northern parts of Kapelebyong sub-county).

Climate

The district is characterized by a bimodal type of rainfall with peak periods in the months of March-June and September-November. However, the district experiences pronounced erratic weather conditions quite frequently, manifesting as excessive rainfall within a short period leading to water-logging, or lack of rainfall over a long period of time (not less than three months), resulting in drought. Thunderstorms accompanied by heavy winds usually occur at the onset of every rainfall season, often resulting in destruction of buildings, trees, vegetation, crops and sometimes life. Occasional hailstorms during rainfall peaks can result in the destruction of crops and even livestock.

Administrative arrangements

The district comprises two counties – Amuria and Kapelebyong. Amuria County is made up of eleven LLGs which include Amuria Town Council and six rural lower local governments of Abarilela, Asamuk, Kuju, Orungo, Morungatuny Wera, Apeduru, Wila, Ogolai and Akeriau. Kapelebyong County is made up of Obalanga, Acowa, Kapelebyong, Okungur and Akoromit sub-counties. Six of the LLGs (Apeduru, Wila, Ogolai Okungur, Akoromit and Akeriau) are newly created sub-counties which started functioning in July 2011. All the old LLGs have functioning local councils made up of elected councilors with a chairperson each. New parishes and several villages were also created by sub-counties. The Ministry of Local Government gazetted a number of town boards that are equivalents of parishes.

Natural resources

Amuria District is covered by a large network of wetlands with 13 major local systems. The surface area covered by the wetlands in the district is approximately 14.6% of the total area. There are no major rivers in the district. River Moroto forms a boundary with Alebtong and Abim and it has water throughout the year although it dries during extreme drought. Another seasonal river, Kirik, flows from Karamoja through the district at the border with Katakwi district. Other streams traverse the wetland network on a seasonal basis.

The People

The 2002 Population and Housing census report shows that the two counties of Amuria district had a population of 180,022 people. By mid-2011 the population of the district was projected to be 375,700 people (Source UBOS Sub national projections report 2008-2012).



Population characteristics, size distribution and growth

Sub-County	Men	Women	Total (2011)	Total (mid 2012) Projections
Abarilela	17,200	19,700	36,900	40,100
Asamuk	23,300	26,600	49,900	54,400
Kuju	21,900	24,600	46,500	50,500
Morungatuny	20,400	23,200	43,600	47,300
Orungo	18,400	21,000	39,400	42,800
Wera	14,700	17,700	32,400	35,300
Acowa	31,000	35,300	66,300	72,000
Kapelebyong	10,500	12,400	22,900	24,800
Obalanga	17,700	20,100	37,800	41,000
Total	175,100	408,200	375,700	200,600

Table 1 Gender composition of the population



Local economic development and livelihoods

Increasing Agricultural production and productivity

Increasing agricultural production and productivity provide the best opportunity for Amuria district to fight poverty, food insecurity and malnutrition because well-managed agriculture is able to contribute to food security and poverty reduction. Increasing agriculture production may come from increased factor inputs (primarily cultivated area of crops, number of livestock or fishing waters) and improved productivity of existing crops, livestock and fish. In the past increased agricultural production was largely accounted for by expansion of' area although this effects environmental sustainability, especially with a population growth rate as high as Uganda's. As the population continues to increase, the land availability will be severely constrained in the coming years. Evidently there is limited scope for area expansion, implying that is not a viable source of future growth in agricultural production.

Increasing agricultural production in Amuria will therefore have to rely on a combination of more intensive agriculture practices, to raise the level of land and lake productivity with the adoption of more modern intensive agricultural practices.

Agricultural profitability

Market is the key driver for agricultural production and productivity if adequate household incomes are to be derived from agriculture, specifically for local farmers. In the farmer's context, there is limited evidence of past investment in agricultural resources because agriculture was not handled as a business but rather a way of life. When their products are not bought, or bought at poor prices, peasant farmers abandon market production and revert to subsistence cultivation. The challenge is not only to improve production, but to develop and sustain viable markets for farmers' outputs.

The District Production Department works in five sectors: agriculture, livestock, fisheries, entomology, and trade and industry. All these sectors are active and have staff on the ground with the exception of entomology which is without any staff. The Department is crucial to the district because over 90% of the population depends on agriculture as a means of livelihood. The community practices subsistence farming, characterized by use of draught animals, rudimentary tools like hand hoes and rearing of indigenous breeds of livestock. Their production mechanisms heavily rely on nature, which has become unreliable hence impacting on the local economy negatively. This has resulted in low production and productivity in all sectors.

For most households in the district, access to food is critically dependent on the level of agricultural production achieved. This varies from household to household, with the well to do being able to produce more. The Production Department is seriously understaffed to the extent that some lower local governments either share staff or have none. This makes



implementation of planned activities extremely difficult. The situation is not helped following the restructuring exercise which was not concluded in the department where it still awaits the agreement between the parent ministries of MAAIF and Public Service.

A new challenge has even emerged in the utilization of field extension staff to carry out advisory services under the NAADS programme. This therefore means that there is need to have all the production sectors equipped with staff based at sub-counties.

Socio-economic background and population livelihoods

The economy of Amuria district is predominantly based on agriculture and livestock, with over 90% of the district population so engaged. It is largely subsistence-based with little organized commercial farm production. Communities' livelihoods depend on these activities for food, income, employment and other social benefits. However, their practice has changed in recent years. During the late 1980s and early 1990s, there was massive loss of livestock due to cattle rustling by armed Karimojong from the neighboring districts of Moroto and Kotido. This was coupled by an insurrection which led to disruption of livelihoods of the communities in the region. Over the years there have been attempts at restocking but numbers have never risen anywhere near the previous levels because the Karimojong have never ceased to rustle. In 2003 when the rebels of the Lord's Resistance Army (LRA) invaded the district they displaced the entire population from their homes and forced many to either abandon or dispose of their stock. Some populations continued living in IDP camps as recently as 2009 until their settlement camps were closed.

There are other forms of livelihood that communities engage in depending on the season in the year and their location in the district. During the dry season, a considerable proportion of people is engaged in gathering and hunting. Men go out in groups to trap and hunt wild animals. This is common in areas along the border with Karamoja where there is a vast expanse of land abandoned by people but convenient for wildlife habitation. On the other hand, in wetland areas communities engage in fishing. This is widespread in the rest of the district.

A small percentage of the community earns its livelihood through engaging in trade and formal employment, in the district public service and the non-government sector. The trading community deals in farm produce and manufactured goods which they sell in shops and open air weekly markets. Those engaged in employment also support extended family members by remitting part of their earnings to dependents in the villages.

Poverty and the population

The Amuria community understanding of poverty is no different from that of many communities in Uganda. As outlined in the Government of Uganda's Poverty Eradication Action Plan (PEAP) 2004/05-2007/08, a national planning framework built on a participatory process,



poverty is understood as having aspects of low incomes, poor human development and low empowerment. The wider community perception of the phenomenon of poverty however is linked to having low incomes or no money.

Although poverty levels are reported to be falling over time nationally, the communities of Amuria do not perceive this locally. According to the PEAP the proportion of Ugandans who lived below the poverty line fell from 56% in 1992 to 38% by 2002/03. When considered on regional terms, Amuria is classified as being in the Eastern region of Uganda with its proportion of population living below the poverty line as 46%. If considered on a district basis the proportion of the population living below the poverty line in Amuria exceeds 50%. It approaches the regional average for Northern Uganda, (part of the PRDP/NUSAF Supported region) which is put at 63%. Continued insecurity in some parts of the district and the incursions of the LRA rebels in the district in 2003 have set many households back and worsened their poverty situation. Recovery from that shock will take time.

Environmental degradation (Deforestation, mining, waste disposal and pollution, wetlands and river bank degradation, etc.)

All endeavors for human development depend on the environment. Human activities have impacted in one way or another on the natural environment. Improper use and unsustainable exploitation of the natural environment have negative effects on ecosystem services on which the wellbeing of species, including humans, depends. Failure to respect this relationship will inevitably result in reduced returns from the environment, diminishing biodiversity and a deteriorating quality of life for communities.

Loss of vegetation cover

In Amuria District, vegetation cover has diminished over time. Gazetted forest reserves are depleting and trees on privately owned land are felled without replacement at alarming rates. Commercial forestry mainly exploits the following species:

Charcoal: Shea nut tree (Vitellaria paradoxa), Ekungur, and Ekulony (Combretum collinu)
Firewood: Combretum collinum, Vitellaria paradoxa, and Ekoboi.
Timber: Acacia sieberiana (Etirir), Albizia coriaria (Etekwa), Albizia zygia (Ebata) and Ficus sp (Ebule).

Commercial tree cutting

The scale of commercial tree cutting in the district is so devastating that an immediate intervention is required to regulate the practice. The heaviest damage has resulted from charcoal production, but firewood and timber exploitation are also significant. The licensing of persons involved in tree cutting has not been undertaken despite the large number involved (597) and the large quantity of trees felled per week (483).





Table 2 Hazard Summary

Sub-county	Floods	Crop and Animal Disease	Pest Infestation	Land Conflict	Human Disease	Mines & Unexploded Appliances	Environmental Degradation	Extended Drought, Food insecurity	Vermin	Cattle Rustling	Internally Displaced Persons and armed Conflict	Heavy storms and hail	Bush fires	Total
Orungo	\checkmark	\checkmark	\checkmark	\checkmark			\checkmark	\checkmark				\checkmark		7
Kuju	\checkmark	\checkmark		\checkmark			\checkmark	\checkmark				\checkmark	\checkmark	7
Willa	\checkmark	\checkmark		\checkmark			\checkmark	\checkmark				\checkmark	\checkmark	7
Asamuk	\checkmark	\checkmark		\checkmark				\checkmark	\checkmark			\checkmark		6
Wera	\checkmark	\checkmark		\checkmark			\checkmark	\checkmark	\checkmark			\checkmark		7
Acowa	\checkmark	\checkmark	\checkmark	\checkmark			\checkmark	\checkmark	\checkmark			\checkmark		8
Abarilela	\checkmark	\checkmark		\checkmark			\checkmark	\checkmark	\checkmark			\checkmark		7
Akoromit	\checkmark	\checkmark		\checkmark			\checkmark	\checkmark	\checkmark			\checkmark	\checkmark	8
Apeduru	\checkmark		\checkmark	\checkmark				\checkmark				\checkmark		5
Akeriau	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark	\checkmark				\checkmark		9
Ogolai	\checkmark	\checkmark	\checkmark	\checkmark			\checkmark	\checkmark	\checkmark			\checkmark		8
Morugatuny	\checkmark	\checkmark	\checkmark	\checkmark			\checkmark	\checkmark	\checkmark			\checkmark		8
Obalanga	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark		10
Okungur	\checkmark	\checkmark	\checkmark	\checkmark		\checkmark		\checkmark		\checkmark		~		8
Kapelebyong	\checkmark	\checkmark	\checkmark	\checkmark				\checkmark		\checkmark	\checkmark	\checkmark		8
Amuria TC	\checkmark	\checkmark	\checkmark	\checkmark			\checkmark	\checkmark				\checkmark		7
Total	16	15	10	16	1	3	12	16	8	3	1	16	3	120



Table 3 Hazards

Hazard	Status	Sub-County	Rank
Floods See Figure 1	Instances of floods are reported in the wetland areas/low lying areas due to heavy rains for 2 to 3 days in August-October each year. The peak flooding years were 2007 and 2011 and the most affected infrastructure were roads and schools. A network of swamps spans the district, ranging from small marshes to large wetlands with a variety of hydrological characteristics. According to the survey done by the Natural Resources Department in 2009 at parish level, an estimated 30,262 persons, or 13% of the district population, are directly involved in wetland resources use/harvesting, with livelihoods threatened by flooding. These activities affect the ecological status of the wetlands, reducing its capacity to provide ecological services to the population. Key activities include grazing, cultivation, brick making and extracting water for domestic use and livestock.	District wide but mostly affects low lying areas of Kapelebyong County which is comprised of Obalanga, Okungur, Acowa and Akoromit sub-counties, the worst hit by flooding and water logging.	1
Severe storms and hail See Figure 2	At the onset of rains in both the first and second seasons, sporadic electrical storms with high winds and hail occur.	District wide but mainly in the following sub-counties: Acowa, Asamuk, Apeduru, Akeriau, Morugatuny, Kuju, Willa and Orungo	2
Drought See Figure 3	Possibly as a result of climatic changes that have affected the amount of rain- fall for crop growth and development, droughts lead to poor yields	This affects all of the 16 sub-counties in the district.	3
Land Conflict See Figure 4	Incidences reported in all sub-counties, mainly caused by increasing population pressure on land, greed for more land and returning IDPs disputing grabbed land. Lack of permanent boundary landmarks and inadequacy of the local land courts in arbitrating land issues contribute to conflict.	Exists in all sub-counties.	4



Hazard	Status	Sub-County	Rank
Crop and Animal Epidemic See Figure 5	There is crop loss to diseases especially to cassava, sorghum, citrus, groundnuts and rice. Mainly attributed to climatic changes and declining soil fertility which has reduced plant vigor. The endemic livestock diseases are tick borne, followed by internal and external parasites, and worms. In 2011 and 2012 there was an outbreak of foot and mouth disease which affected the district. Sporadically bacterial, metabolic, nutritional and poisoning occurs in livestock. Polythene bags (buveras) are a problem to farmers and livestock.	This is more pronounced in the sub-counties of Asamuk, Acowa, Obalanga, Akoromit, Willa, Orungo and Morugatuny.	5
Environmental Degradation See Figure 6	The degradation is mostly caused by reclaiming of the wetlands for paddy rice production, sand quarrying, brick making, charcoal burning and bush burning, deforestation to clear land for agricultural purposes due to increasing population. The situation is worsened by fragmentation of land and loss of wildlife corridors. LRA insurgency in 2003 forced people to stay in camps, exhausting local ecological services.	Orungo Kuju Willa Acowa Abarilela Akoromit Wera Akeriau Ogolai Morugatuny Obalanga Amuria T/C	6
Pest Infestation See Figure 7	The main crops affected by pests are citrus, groundnuts, cassava and sor- ghum. The major citrus pests are cit- rus fruit fly, mites, aphids and scales. Groundnut pests are aphids and leaf miners. Cassava pests are cassava mealy bugs, scales and mites. Sorghum pests are strigar, central shoot fly and stem borers.	Orungo Apeduru Akeriau Ogolai Morugatuny Obalanga Okungur Kapelebyong Amuria T/C	7
Vermin See Figure 8	Monkeys and baboons raid crops from their safe havens in forested areas, eating maize, groundnuts, sweet potatoes, cow pease, cassava and bananas. In isolated cases, bush rats eat the same crops, especially sism sim and millet	More serious in the sub-counties of Kuju, Willa, Apeduru, Morugatuny and Ogolai.	8
Mines and unexploded ordinance See Figure 9	The source was the LRA insurgency of 2003-2005.	The main areas that where worst affected Obalanga, Orungo, Kuju, Asamuk, Willa, Okungur, Ogolai and Morugatuny.	9



Hazard	Status	Sub-County	Rank
Cattle Rustling/theft See Figure 10	The incidence of cattle rustling has fallen significantly with improved security, the disarmament programme in the Karamoja region and the deployment of the Anti-Stock-Theft Unit along the Karamoja border	Obalanga Kapelebyong and Okungur Sub-counties	10
Bush fire See Figure 11	Fires are common during the dry season where farmers burn the grass in order to generate new growth pasture for their livestock, and the fires get out of their control. There are cases of hunters burning the bush in order flush out wild game. Arson may contribute also.	Akomorot, Apeduru, Kuju, Willa,	11
Human Epidemic	There has not been any outbreak in the half-decade apart from HIV/AIDS and infant Malaria.	Mainly reported in Akeriau Sub-county	12





Table 4 shows the communities' perception of risks of the hazards endemic in their sub-counties. Empty cells indicate no instance of that hazard in that sub-county.

Table 4 Hazard risks assessment

Hazard category	Orungo	Kuju	Willa	Asamuk	Were	Acowa	Abrilela	Akomorot	Apeduru	Akeriau	Ogolai	Morugatuny	Obalanga	Okungur	Kapelabyong	Amuria TC
Floods	Μ	Μ	Μ	Μ	Н	Н	М	Μ	Μ	М	М	M	Н	Н	Н	Μ
Drought/Food Inse- curity	М	М	М	М	М	Н	М	Н	Н	L	М	М	Н	н	н	М
Crop and Animal Disease	М	L	М	М	М	Н	М	М	М	L	L	М	Н	М	М	L
Pest infestations	L					Н	М	Μ	М	М	М	М	М	М	М	L
Vermin				L	L	L	L	L			L					
Hailstorms and Light- ning	М	М	М	М	М		L	L	L	М	L	L	L	L	L	L
Bushfires		L	L					L	L				Н	Н	Н	
Environmental Deg- radation	М	М	М	М	М	М	М	М	М	Н	М	М	М	L	L	н
Mines, unexploded	1			1									I		1	
ordinance					L											
Cattle rustling	L	L	L	L	L	L	L	L	L	L		L	L	L	L	L
Land Conflict	Η	Η	Η	Η	Η	Η	Η	Η	Η	Η	Η	Н	Η	Н	Η	Н
Key: ⊦	Key: High = H, Medium = M, Low = L, Blank = Not reported															



Flood risk



Figure 1 Flood risk map

Floods have become almost annual events during the wet season, affecting farmers



especially those in the valleys and near wetlands areas. Heavy rains contribute to the flood situation in the district, exacerbated by silting of the streams as a result of upstream soil erosion, in turn due to deforestation and overgrazing. Also, geographically, the district is a low lying area and thus receives all the waters from the Karamoja hills that settle in the wide wetlands. The impacts of floods in the district are felt especially when roads are submerged and bridges washed away.

Floods affect the entire district and more seriously the low lying areas of Kapelebyong County, with Obalanga, Okungur, Acowa and Akoromit sub-counties the worst hit by flooding and water logging. In 2007 for instance, excessive rains caused floods throughout the district at a time when most farmers in the district were either planting or about to harvest. Widespread damage with almost 100% crop losses exposed many households to food insecurity. The floods also damaged houses and infrastructure, including roads, water sources and schools.

High flood risk hot spots are reported in Alito, Labira, Opot, Obalanga and Ayola parishes (Obalanga Sub-County); Agonga, Aridai, Akodoko and Amootom (Okunguru Sub-County); Atiira, Kapelebyong, Okoboi, and Amaseniko (Kapelebyong Sub-County); Olekat and Amerro (Acowa Sub-County) and Were, Aten, Sugur, Opam and Angole risk hot spots in Were Sub-County respectively. The rest of the sub-counties report medium risks and with equally numerous risk spots identified.



Heavy storms and lightning risk



Figure 2 Heavy storms and lightning risk map

Amuria and other districts in the region have lately suffered the effects of unpredictable climatic changes. The district experiences instances of heavy rains and lightning with occasional fatalities and destruction of property. At the onset of rains, sporadic lightning, hail and wind storms occur in Asamuk, Apeduru, Akeriau, Morugatuny, Kuju, Willa and Orungo sub-counties.



Drought risk



Figure 3 Drought and food insecurity risk map



Among the flood years, long dry spells occur at a time of the year which farmers have traditionally known to be the rain season. For instance, in 2008 farmers across the sub-counties suffered losses due to drought as crops withered in gardens resulting in food insecurity. These patterns have caused the poverty levels of the communities to worsen despite efforts to improve their conditions through various development programmes.

Long intervals without rain result in diminished pasture and less productive cultivation, with consequent food insecurity, social disintegration and migration.

High risk levels are reported in Obalanga, Kapelabyong, Ocowa, Okoromit and Opeduru sub-counties with risk hot spots recorded in each of the above sub-counties, as shown in figure 3.



Land conflict risk



Figure 4 Land conflict risk map

Land conflicts are on-going in all sub-counties in the district, mainly between institutions and communities. Previously-displaced people returning to reclaim their land come into conflict with other communities who have in the meantime settled there. Population pressure, land-grabbing, an inadequate land registration system and stressed land arbitration courts contribute to tensions in the land sector throughout the district. The dense distribution of conflict hot spots shown in Figure 4 indicate the high level of risk.



Crop and animal disease risk



Figure 5 Crop and animal disease risk map



With relative peace returning into the district, people are beginning to re-stock livestock from nearby districts like Kotido, contributing to spread of animal diseases. Prevalent livestock diseases in the district are CBPP (endemic), lumpy skin disease (endemic), African swine fever (sporadic), newcastle disease (sporadic), worm infestation (endemic), tick borne diseases (endemic), and rabies (endemic).

In the first quarter of 2008/09 an outbreak of foot and mouth disease in the sub-county of Acowa spread to the sub-counties of Orungo, Obalanga, Morungatuny and Kuju.

CBPP and rabies have attained endemic status due to re-stocking from nearby districts and lack of vaccination. African swine fever has become endemic due to stocking from affected areas including Soroti by projects generated through NUSAF and NGOs.

Crop and animal diseases are common in the district putting the livelihood of the entire population at risk. The district reports high, medium and low risk levels in the various sub-counties, most pronounced in Asamuk, Acowa, Obalanga, Akoromit, Willa, Orungo and Morugatuny sub-counties and lowest in Amuria, Akeriau and Ogalai. Pests and diseases affect cassava, sorghum, citrus, groundnuts and rice. Foot-and-mouth disease, tick-borne diseases and parasites are the main animal diseases.



Environmental degradation risk



Figure 6 Environmental degradation risk map

The environment in the district, especially in Amuria Town council, Akeriau and Morungatuny Sub-Counties, suffers from a variety of harmful human activities, particularly charcoal burning, wetland reclamation for rice cultivation, brick making and sand quarrying. Unproductive management and weak monitoring of forest reserves, clearing land for agriculture, and uncontrolled bush fires are the most significant environmental threats.



Pest infestation risk



Figure 7 Pest infestation risk map

Pests and diseases are prevalent in livestock and crops in the district. Pests are a widespread problem in the north and west of the district, affecting citrus, groundnuts, cassava and sorghum. Amuria experiences pest infestations in most sub-counties but most severely in Ocowa sub-county. No significant reports were available for Wera, Asamuk, Kuju and Willa sub-counties.



Vermin risk



Figure 8 Vermin risk map

Monkeys and baboons raid gardens from adjacent forest reserves in the district, destroying crops and livestock, especially in Kuju, Willa, Apeduru, Morugatuny and Ogolai sub-counties, and eating maize, groundnuts sweet potatoes, cow pease, cassava and bananas. Bush rats eat simsim (sesame) and millet, in isolated cases. Risk levels in the district are generally low.



Unexploded ordinance risk



Figure 9 Mines and unexploded ordinance risk map

Abandoned ordinance including grenades, land mines, rockets and bullets have resulted in accidental explosions in former battle zones or military camps. The LRA insurgency resulted in continuing hazards of mines and unexploded ordinance in Obalanga, Orungo, Kuju, Asamuk, Willa, Okungur, Ogolai and Morugatuny sub-counties.



Cattle theft risk



Figure 10 Cattle rustling risk map



During the late 1980s and early 1990s, massive losses of livestock to cattle rustling by armed Karimojong from the neighbouring districts of Moroto and Kotido, coupled with a war of rebellion against government, caused disruption of livelihoods of communities in the region. Attempts at livestock restocking have not returned numbers to previous levels since the Karimojong continued to raid or steal livestock. In 2003 the rebels of the Lord's Resistance Army (LRA) invaded the district displacing the entire population from their homes and forcing many to either abandon or sell off their animals. However, lately cattle rustling has diminished due to improved security, a disarmament program in the Karamoja region and deployment of the Anti-Stock-Theft Unit along the Karamoja border.

Risk hot spots are reported in Obananga, Okungur and Kapelebyong sub-counties.



Bushfire risk



Figure 11 Bush fire risk map

During the dry season rampant burning of bush by members of most communities has contributed to loss of vegetation cover in the district. With farmers' intentions of clearing land for agriculture, burning grass for pest control, charcoal production, restoring pasture and flushing out hunted animals using fire, bushfires often get out of control, leading to destruction of houses and food sources, and biodiversity loss.

High risk levels in the district are reported in Kapelebyong, Obalanga and Okungur subcounties. Kuju, Okoromit and Opeduru reported low risk levels. The rest of the sub-counties report low and non-bush fire cases.



VULNERABILITY

Table 5 shows the communities' perception of the magnitude of hazard risks in their respective sub-counties. Empty cells indicate subcounties where that risk has not been reported.

Table 5 Risks vulnerability

Hazard	Orungo	Kuju	Willa	Asamuk	Were	Acowa	Abrilela	Akomorot	Apeduru	Akeriau	Ogolai	Morugatuny	Obalanga	Okungur	Kapelabyong	Amuria TC
Floods	2	2	2	2	3	3	2	2	2	2	2	2	3	3	3	2
Drought/Food Insecurity	2	2	2	2	2	3	2	3	3	1	2	2	3	3	3	2
Crop and Animal Disease	2	1	2	2	2	3	2	2	2	1	1	2	3	2	2	1
Pest infestations	1					3	2	2	2	2	2	2	2	2	2	2
Vermin				1	1	1	1	1			1					
Hailstorms and lightning	2	2	2	2	2		1	1	1	2	1	1	1	1	1	1
Bushfires		1	1					1	1							
Environmental degradation	2	2	2	2	2	2	2	2	2	3	3	3	3	1	1	3
Mines, unexploded ordinance	1	1		1	1					1			1		1	
Cattle rustling	1	1	1	1		1	1	1	1	1		1	1	1	1	1
Land conflict	3	3	3	3		3	3	3	3	3	3	3	3	3	3	3
Score: High = 3,	Me	ediu	m =	2, I	_ow	' = -	1, N	ot re	por	ted	= B	lanl	<			



Risk vulnerability



Figure 12 Vulnerability map



Table 4 estimates the relative vulnerability to endemic hazards of communities in the subcounties. The incidence of hazards across the district is not homogeneous, and consequently aggregate vulnerability conditions in Amuria District vary from one sub-county to another, as is evident in Figure 12. Based on the frequency of hazard events and the magnitude of loss suffered, Acowa and Obalanga sub-counties are assessed at high risk and vulnerability levels. Wera reports low risk levels; Acowa and Obalanga report high risk levels; and the rest of the sub-counties register moderate risk and vulnerability levels.

Significant risks registered in the most vulnerable sub-counties are in Acowa and Obalanga are floods, drought/food insecurity, crop and animal disease and land conflict. Environmental degradation and pest infestations are reported high in Akeriau, Ogolai, Morugatuny, Obalanga and Amuria TC.



CONCLUSIONS

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

Relative to other districts, Amuria has an active hazard environment, with large potential for disaster events due to the thirteen hazards endemic there: floods, drought, animal disease, pest infestations, plant disease, vermin, severe storms, food insecurity, bush fires, environmental degradation, mines and unexploded ordinance, cattle rustling and land conflict.

The findings show that the communities regard land conflict as the most dangerous hazard in the district, distributed over all sub-counties. Disputes about public land have high risk and inter-household conflict over land boundaries and ownership have medium risk. Because land courts do not have the necessary capacity to resolve these disagreements to the satisfaction of the claimants, the disputes often descend into violence.

Flooding occurs with high risk in two sub-counties, Were and Acowa, and with medium risk throughout the rest of the district. Drought risk is also high in Acowa, low in Akeriau and medium elsewhere. Other high-risk hazards occur as animal disease and pest infestations in Acowa, food insecurity in Acowa, Akomorot and Apeduru, and environmental degradation in Akeriau.

All of the sub-counties manifest almost all of the thirteen hazards to some degree, with the consequence of serious aggregation of multi-hazard risk. In Amuria, disasters involving several hazards simultaneously or in close sequence are likely. Acowa has the most aggregate risk, faced with floods, drought, animal disease, pest infestations, plant disease, vermin, food insecurity, environmental degradation, cattle rustling and land conflict.

The mapping exercise demonstrates the value of integrating spatial information with community perception of hazards in the understanding of disasters in Amuria District. This disaster risk knowledge should therefore inform the disaster mitigation plans developed by the Amuria district local government that direct actions to minimize the impacts of hazards.



DEFINITIONS OF TERMS

Drought. Drought is the prolonged shortage of water usually caused by lack of rain. Drought and famine 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, 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. 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 results 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.





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