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# **TESO**

# **SOROTI District**

## **HAZARD, RISK AND VULNERABILITY**

## **PROFILE**

**June 2014**



**With support from:**

United Nations Development Programme

Plot 11, Yusuf Lule Road

P.O. Box 7184

Kampala, Uganda

For more information: [www.undp.org](http://www.undp.org)



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## Acronyms

CAO	Chief Administrative Officer
DDMC	District Disaster Policy Committee
GIS	Geographical Information Systems
GPS	Global Positioning System
LC	Local Council
LRA	Lord's Resistance Army
NGO	Non-Governmental Organization
OPM	Office of the Prime Minister
RDC	Resident District Commissioner
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 Soroti 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 atlas of disaster risk. It will support planning and decision-making processes to manage disaster risk in the District

## **The methodology provided for four phases of work:**

Phase I	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 sub-counties provides a qualitative assessment of the situations that the communities face. Maps corresponding to each hazard show the areas where the hazard is significant, and also hotspots as points of incidence of the hazard.

Soroti District lies between latitudes 1° 15'N and 2° 00' N; and longitudes 33° 00'E and 33° 45' E in Eastern Uganda. Soroti borders Kamuli, Lake Kyoga, Kumi and Pallisa in the South, Kabermaido in the west and Katakwi in the Northeast.

Nine hazards are reported in Soroti District, caused by natural and human induced processes: floods, winds, hailstorms and lightning, pest infestation, crop and animal diseases, drought, land conflict, environmental degradation, vermin, and mines and unexploded ordinance.

Flooding is the biggest risk with vulnerability in all sub-counties in the district. Gweri (Awoja), Kamuda and Tubur experience the highest flood threat.

All of the sub-counties aggregate vulnerability to several hazards. In this sense, Asuret, Gweri and Soroti are the most vulnerable to multi-hazard disaster, with eight hazards each. The Eastern, Western and Northern Divisions are the least vulnerable, with at most five hazards each.



# INTRODUCTION

Soroti district is located in Eastern Uganda. Formerly, it was part of the Teso district which included Kumi, Bukedea, Soroti, Kabermaido, Katakwi and Amuria. Like other districts in the sub-region, Soroti is prone to a variety of hazards including floods, crop and animal epidemics, severe storms, land conflict, pest infestation, environmental degradation, pest infestation, drought and food insecurity. Disasters experienced in Teso sub-region have been increasing in frequency and severity in recent years, particularly flooding, which damages infrastructure and livelihoods.

This multi-hazard mapping was implemented in Soroti District to reduce the population's vulnerability to disaster and also to prepare district hazard, risk and vulnerability profiles which support fact-based decision making and planning. Hazards in Soroti pose risks to life, property and livelihoods and are compounded by physical exposure and proximity to hazard-prone areas, socio-economic, and cultural and behavioural conditions.

Thus multi hazard mapping exercise is a critical guide in optimizing development gains and minimizing potential loss of economic resources, infrastructure, physical assets, human resources, and environmental capital.

## Objectives

The objective of the hazard, risk, and vulnerability mapping exercise is to produce a District Profile that will aid planning and decision making processes to address disaster risks in Soroti 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 analysed 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, screen 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.

#### **Phase IV: Dissemination workshop**

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

### **Brief Overview of the District**

#### **Historical background**

The growth of Soroti dates from 1904 when the then District Commissioner of Mbale sent Kakungulu to open up an administrative post in Serere, Gweri and Soroti areas. Part of Kakungulu's team camped near the rock at Soroti and settled there. The choice of this site as a camping station was probably influenced by the availability of good drinking water from the nearby streams and the fact that the rock had defensive advantages for the settlers from the local inhabitants around. Under the organised and able rule of Kakungulu's men,



local inhabitants were forced to clear the forest and within a few years a large area had been cleared and considerable amount of settlement had taken place.

Where the present Lukiiiko Hall stands they constructed Thatched houses for Soroti County administrative purposes and also a dispensary in temporary materials which stood at the site of the present hospital. Asian traders built four small shops in semi-permanent materials, providing clothes, salt, sugar, hoes, beads, etc., transacted through bartering manufactured goods and cotton for skins, beans, chicken and groundnuts.

In 1912 Soroti attained the status of the permanent headquarters of Teso region, as a result of a recommendation by Sir Fredrick Jackson, after his appointment as the new Governor of Uganda. Later a District Commissioner was posted to Soroti and then permanent buildings were erected commencing with the District Office. The First World War (1914-1918) retarded development somewhat, but in 1919 it picked up again. Considerable challenges remained to administer a large district with only skeletal staff on the ground, until 1962 when augmented administrative resources improved governance capacity.

### **Location and neighbours**

Soroti District lies between latitudes 1° 15'N and 2.00 N; and longitudes 33° 00 and 33° 45 E in Eastern Uganda. Formerly, it was part of Teso district covering Soroti, Kumi, Katakwi, Kaberamaido, Amuria, Bukedea, Ngora and Serere. Soroti borders Kamuli, Lake Kyoga, Kumi and Pallisa in the South, Kaberamaido in the west and Katakwi in the Northeast. The district covers approximately a total land area of 2,662.5 km<sup>2</sup> of which 2,256.5 km<sup>2</sup> is land and 406 km<sup>2</sup> is water.

### **Administrative arrangements**

Soroti, like all other districts, was administered centrally from Kampala until 1994. The present decentralized arrangement facilitates more effective and efficient service delivery to the population. Currently the district comprises three rural counties of Kasilo, Serere and Soroti, and Soroti Municipality. There are 17 sub-counties, including 3 Divisions of the Municipality, 92 parishes (80 rural parishes and 12 wards) and 517 villages. The district has established political and administrative structures down to the village level. The Local Councils make up the political structures, i.e., LC V at the district level to LC 1 at the village level. The key decision-making councils are the LC V, LC IV (Urban), LC III and LC I. Local Councils IV and II are administrative unit councils. LCV, LC IV (Urban) and LCIII are independent local governments. All these councils are policy-making bodies who monitor all developmental programmes in the district. The District Chairperson is the District Political Head and heads the local council at district level.

The administrative structure spans from the district to the parish level. The Chief Administrative Officer (CAO) heads the civil servants at the district, coordinates the government departments and is therefore the Chief Executive of the Local administration.

The district has nine Departments according to the new structure of Local Governments: Administration, Production, Works and Technical services, Education, Health, Finance and Planning, Community Based Services, Natural Resources, Council, and Statutory Bodies. The total district approved traditional staff establishment is 2,826 staff. The District has also the Office of the Resident District Commissioner (RDC) who represents H.E. the President and the Central Government in the District. The Assistant Chief Administrative Officers head the counties and coordinate government business at county level, supported by extension officers of some of the technical departments, e.g., Agriculture, Community Development Assistants, Veterinary, Fisheries, Trade, Health and Water and Sanitation. Sub-county Chiefs head and coordinate government business at sub-county level. Parish Chiefs head the lowest administrative units, the parishes, to coordinate and ensure effective implementation of government programs at the parish and village level.

## **Climate**

### **Rain**

A large wetland surrounding the district modifies the climate. The rainy season is March to November, with a marked minimum in June, and marked peaks in April to May and August to October, and total annual rainfall of 1000 – 1500 mm. December and January are the driest months. In recent years rainfall has been unreliable and unpredictable, affecting agricultural and livestock activities, etc. Areas adjacent to the northeast border and by the lakeshore experience earlier dry seasons and sometimes experience very sharp spells of drought.

### **Temperature, humidity, wind and evapotranspiration**

Soroti district has a mean annual maximum temperature of around 31.3°C and a mean minimum of around 18°C. Its extreme highest temperatures are in the month of February when it records approximately 35°C. The highest ever recorded was in February 1949 where temperatures reached 40°C. Relative humidity ranges from 66% to 83% at 0600GMT. However, it falls in the afternoon to 35%-57% at 1200GMT thereby reducing chances of rainfall. During the N.E monsoon the area is swept by a wind that has traversed Somalia, passed between the Abyssinian massif, the Kenya highlands and the hills of Karamoja. The water vapour content of this wind is consequently low. The southwards passage of the inter-tropical convergence zone in October brings just sufficient rain to produce a gradual falling off from the July peak. There are relatively high rates of evaporation, particularly high in the dry seasons, in Soroti District, as it lies near the equator.

### **Geology and soils**

Most of the areas in Soroti district are underlain by rocks of the basement complex Precambrian age that include granites, migmatites, gneiss, schists and quartzites. The soils fall mainly under four major units; Serere and Amuria catena; Metu complex and Usuk type series. These are mainly of the ferralitic type (sandy sediments and sandy loams). They are well drained and friable. Bottomlands contain widespread deposits of alluvium.



## Vegetation

Soroti has wooded savannah, grass savannah, forests and riparian vegetation. The wooded savannah comprises mostly moist Acacia savanna associated with hyparrhenia spp and combretum savanna associated with hyparrhenia spp. These are mainly found in southwestern part of the district, i.e., Kasilo County. The riparian category comprises certain scattered tree grasslands associated with Setaria incrassate Hyparrheria rufa, Accacia sayel Accacia fistula, Balanities aegyptica and Terminalia spp. Further to the northeast vegetation is characteristic of a semi-arid climate with thorny shrubs predominating.

## Population characteristics

Soroti has a total projected population of 322,000 (2002 UBOS census results) of which 159,800 are male and 162,200 are female. It has a population density of over 217 persons per km<sup>2</sup>. The population is young with the 0-4 age group (infants) forming 26%, 5-14 age group constituting 26% (children) 15-64 age group (economically active) forming 46.2 % and 65+ (the aged) constituting 1.7% giving a dependency ratio of 92/100 working population. Females in the reproductive age group (15-49) constitute 24%. The urban population is projected to 69,400 persons (2010). Table 1 shows the population by county and sub-county disaggregated by sex.

**Table 1 Population by sex, sub-county and county, Soroti district**

County	Sub-county	No. of Households	Male	Female	Total	Average Household Size
Serere	Atiira	2,925	6,664	6,933	13,597	4.6
	Kateta	6,046	16,895	18,038	34,933	5.8
	Kyere	5,755	15,019	16,110	31,129	5.4
	Olio	4,670	12,103	12,636	24,739	5.3
	Sub- Total	19,396	50,681	53,717	104,398	5.4
Kasilo	Bugondo	4,178	10,897	11,654	22,551	5.4
	Pingire	6,046	15,999	16,406	32,405	5.3
	Kadungulu	3,305	8,348	8,777	17,125	5.2
	Sub- Total	13,529	35,244	36,837	72,081	5.3
Soroti	Arapai	4,662	12,442	12,872	25,314	5.4
	Asuret	4,487	11,852	12,875	24,727	5.5
	Gweri	5,537	15,210	16,689	31,899	5.8
	Kamuda	4,327	11,316	11,586	22,902	5.3
	Katine	3,750	9,968	10,682	20,650	5.5
	Soroti	2,054	5,764	5,933	11,697	5.6
	Tubur	2,945	6,946	7,464	14,410	4.9
	Sub- Total	27,762	73,498	78,101	151,599	5.4



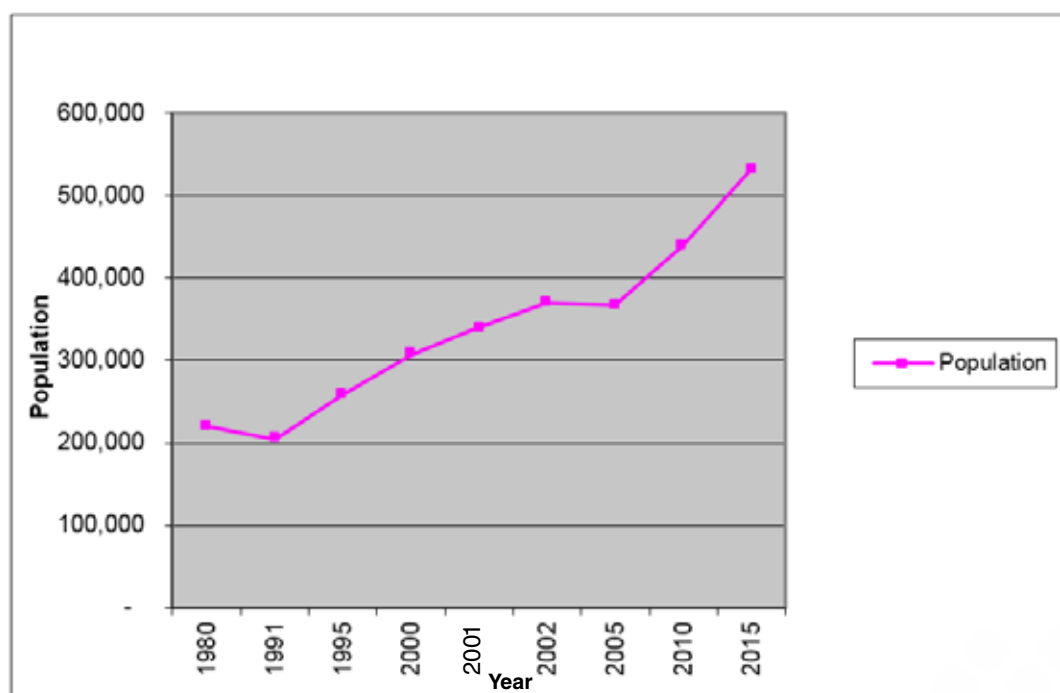
County	Sub-county	No. of Households	Male	Female	Total	Average Household Size
Municipality	Western Div	2,436	4,908	4,940	9,848	4.0
	Eastern Div	3,878	7,736	8,030	15,766	4.0
	Northern Div	3,454	8,080	8,017	16,097	4.2
	Sub-Total	9,768	20,724	20,987	41,711	4.1
Grand Totals		70,455	180,147	189,642	369,789	5.2

**Source:** Population and Housing census 2002, Final results

### Population growth rate

Over the period 1980 – 1991, the population of Soroti District diminished by -0.09 %. The 2002 Population and Housing Census results shown in Figure 1 reveal a remarkably high annual population growth rate of 5.1 % (1980 –1991). This is one and a half times higher than the National average of 3.3%.

**Figure 1 Population growth 1980-2015**



**Figure 1 Population growth 1980-2015**

### Population density.

Soroti District has a population density of 151 persons per km<sup>2</sup>, higher than the national average of 124 persons per km<sup>2</sup> and is the third most densely populated among the districts of the Teso Sub-region, after Pallisa (328) and Kumi (160) (2002 final census results). Much of this population (89%) is rural, of which 51% are women, characteristic of the agricultural

nature of the district's economy. The data also reveal a high dependency ratio because 56% of the population are children of whom the greater proportion (46.5%) is under 5 years of age. Women and children form 75% of the population, a consideration reflected in planning and provision of requisite resources.

### **Migration**

Soroti District experienced significant emigration to neighbouring districts during the insurgency in 1987 – 1991. However, seasonal migrations continue to occur when the Karamojong nomads cross into the relatively wetter parts of the district in search of water and pasture, normally in the November to March season.

### **Ethnicity and language**

Soroti district mainly comprises Iteso, Kumam and Bakenyi who speak Ateso, Kuman and Lukenyi respectively and are Nile-Hamites by race. Traditionally, Bantu speaker tribes co-existed with the Iteso, Baganda, Bakenyi and the Bahima / Tutsi cattle keepers but conflict affected this pattern. The return of peace will hopefully facilitate the reinstatement of the original settlement pattern and distribution.

### **Religious affiliation**

The dominant religious affiliations in Soroti are Catholic, Protestant and Islam.





# HAZARDS

**Table 2 Hazard summary**

Sub-counties	Floods	Crop and Animal Disease	Pest Infestation	Land Conflict	Heavy Storms and Lightning	Mines and Unexploded Ordinance	Environmental Degradation	Drought and Food Insecurity	Vermin	Total
Gweri	✓	✓	✓	✓	✓	✓	✓	✓		8
Asuret	✓	✓	✓	✓	✓		✓	✓	✓	8
Kamuda	✓	✓	✓	✓	✓		✓	✓		7
Soroti	✓	✓	✓	✓	✓		✓	✓		7
Katine	✓	✓		✓	✓		✓	✓		6
Tubur	✓	✓	✓	✓	✓		✓	✓		7
Arapai	✓	✓	✓	✓	✓		✓	✓		7
Northern Div	✓			✓	✓		✓			4
Western Div				✓	✓		✓			3
Eastern Div.	✓			✓	✓		✓			4
Total	9	7	6	10	10	1	10	7	1	61



**Table 3 Hazard status**

Hazard	Status	Sub-County	Rank
Floods See Figure 2	Low-lying lands flood extensively in Gweri, Katine and Kamuda sub-counties, inundating roads and farmlands.	Generally district wide with the most severe being Gweri, Asuret, Kamuda, Soroti, Katine, Tubur, Arapai, Northern Div and Eastern Div.	1
Hailstorms and Lightning See Figure 5	Instances reported district wide	District wide	2
Environmental Degradation See Figure 7	Instances reported in the district mainly resulting from land use activities like cultivation, charcoal burning and brick making.	District wide	4
Drought and food insecurity See Figure 8	Drought is reported in the district and has had some effect on crop yields recently	District wide by reported severely in; Gweri, Asuret, Kamuda Soroti, Katine, Tubur and Arapai sub-counties	5
Crop and animal disease See Figure 9	Crop and animal disease risk is reported throughout the district.	Severe incidences reported in; Gweri, Asuret, Kamuda, Soroti Tubur, Katine and Arapai Sub-counties	6
Pest Infestation	The crops most affected by pests are citrus, groundnuts, cassava and sorghum. For citrus the major pests is citrus fruit fly, mites, aphids and scales. Aphids and leaf miners attack groundnuts. Cassava pests are cassava mealy bugs, scales and mites. Sorghum suffers from central shoot fly and stem borers	Gweri Asuret Kamuda Soroti Tubur and Arapai Sub-counties most affected	7
Vermin See Figure 10	Vermin in the district are mainly monkeys and baboons which attack farmland especially in Asuret Sub-County. The crops most eaten are maize, groundnuts sweet potatoes, cow pease, cassava and bananas. There are isolated cases of bush rats which eat the same crops as well as sism sim and millet.	Severe incidences reported in Asuret Sub-county.	8

Hazard	Status	Sub-County	Rank
Mines and unexploded ordinance See Figure 11	The main cause of this hazard in the district was the LRA insurgency of 2003 - 2005. Instances of excavation of bullet and grenades have been reported in Gweri Sub-county.	The main areas that where worst affected Omugenya, Awali-Wali Dokolo, Aukot, Gweri and Awoja Parishes.	9
Land Conflict See Figure 12	Instances reported in all sub-counties	District wide	10



# RISKS

Table 4 shows the communities' perception of the magnitude of risk of each hazard. Blank cell indicate that the hazard was not reported in that sub-county.

**Table 4 Hazard risk assessment**

Hazard	Asuret	Gweri	Kamuda	Tubur	Katine	Arapai	West Div	North Div	Soroti
Floods	M	H	H	M	H	M	L	L	L
Drought	M	M	M	M	M	M			L
Crop and Animal disease	M	M	M	M	M	M			M
Pest infestations	M	M	M	M		M			M
Vermin	L								
Heavy Storms	M	M	M	M	M	M	M	M	M
Unexploded Appliances (Grenades, bullets)		L							
Land Conflict	L	L	L	L	L	L	H	L	L
Environmental degradation	L	L	L	L	L	L	L	L	L
<b>Key:</b> High = H, Medium = M, Low = L, Blank = Not reported									





Cases of floods are reported in the extensive wetlands and low lying areas of the district that are characterised by poor farming practices. Floods are highest in the sub-counties of Kamuda, Gweri and Katine and lowest in Soroti Sub-County and the municipal council. Several impacts of floods are reported including: destruction or inundation of road networks, farmlands destruction and household devastation. Some of the notable roads affected include: Olwelai-Kangai road (bridge affected); Kaberamaido - Ocheri road and bridge destroyed (seriously damaged with no significant repair to date); Ochwake swamp makes the road completely impassable during the rainy season. Communities (5 households affected) in Abule village in Aparisa and Tubur were most affected by flooding in 2012.

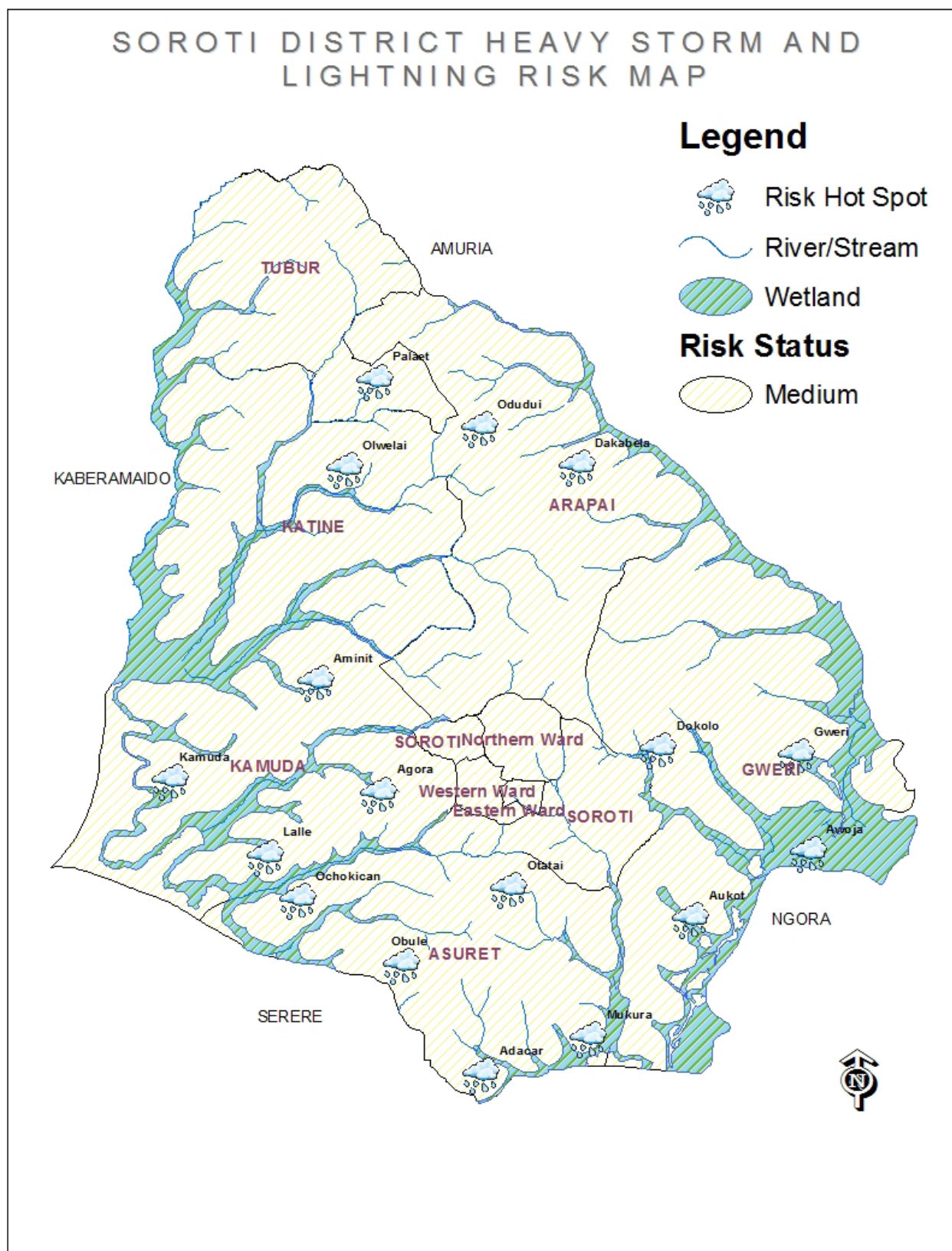


**Figure 3 Section of road prone to flood**



**Figure 4 Road section after flood**

## Heavy storm and lightning risk



**Figure 5 Heavy storm and lightning risk map**

Overall, the district has medium risk of hailstorms and windstorms. Heavy rains normally occur during the onset of both the first and second wet seasons. Mostly sporadic in occurrence, these can be severe, sometimes causing damage to property and infrastructure. Cases are recorded of schools with roofs destroyed by wind.



**Figure 6 Light primary school affected by heavy storms**



## **Environmental degradation.**

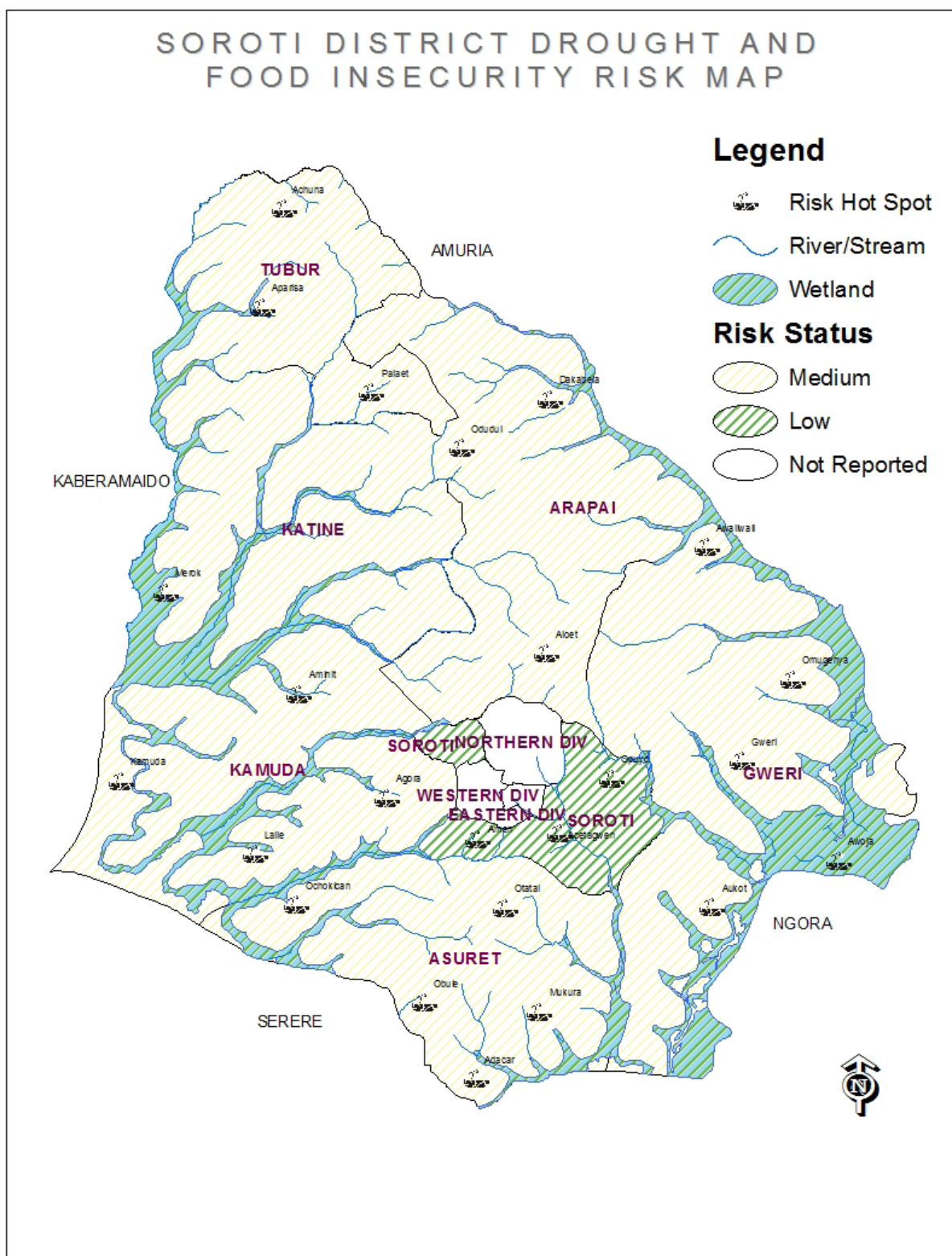
Environmental degradation is mainly caused by wetland reclamation for rice cultivation. Incidences of quarrying of sand, rock, brick making, charcoal burning and bush burning are also reported. There is excessive cutting of vegetation for cultivation responding to the high demand for land due increasing population. The situation is worsened by land fragmentation.



**Figure 7 Environmental degradation**



## Drought and food insecurity risk



**Figure 8 Drought and food insecurity risk map**

Instances reported in all sub-counties, mostly as a result of climatic changes that have affected the amount of rainfall for crop growth and development resulting to poor yields. Yields appear also to be reduced by emerging crop pests and diseases.

## Crop and animal disease risk

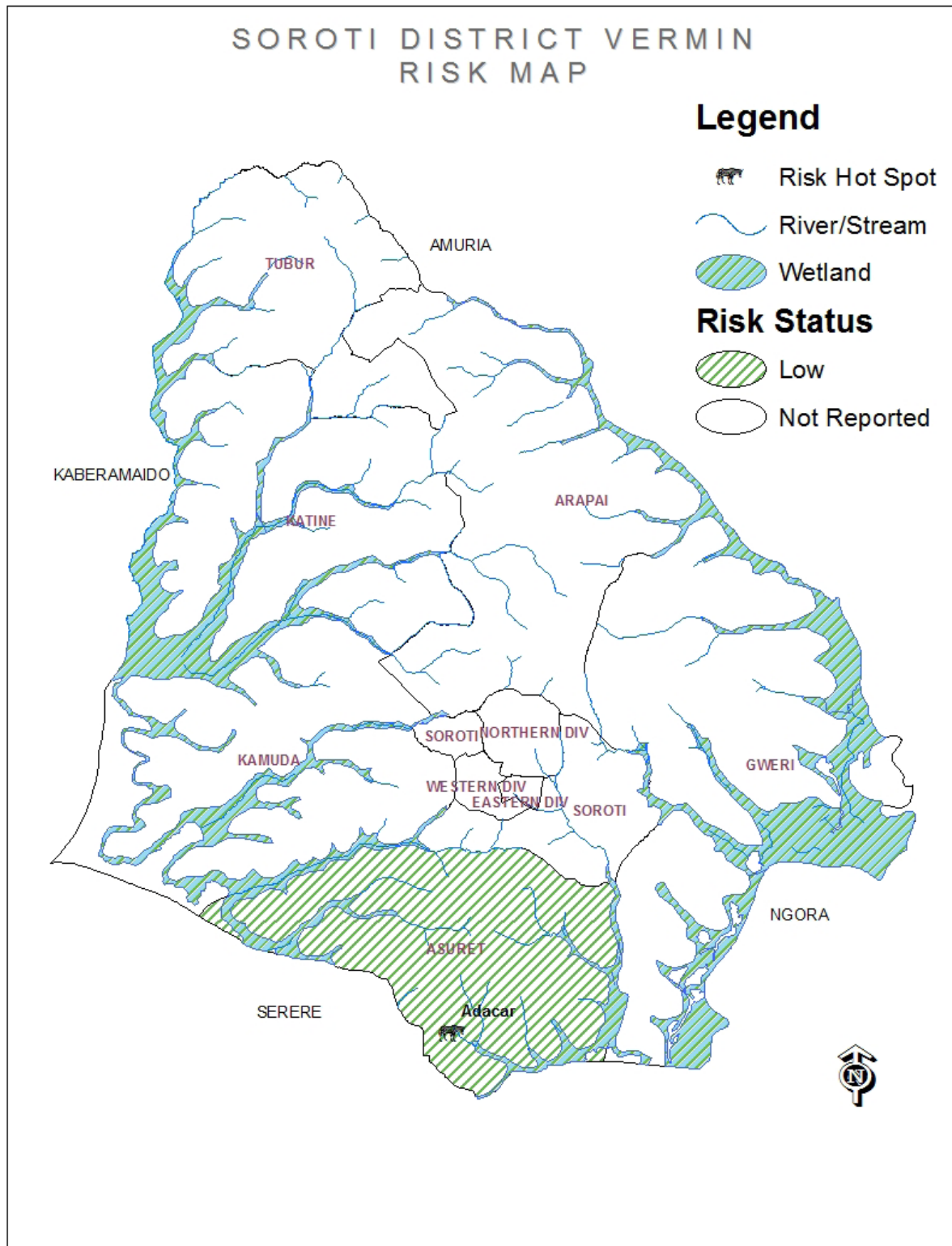


**Figure 9 Crop and animal disease risk map**

Crop diseases in the district are reported to attack cassava, sorghum, citrus, groundnuts and rice. Some of the diseases reported are potato weevils, potato horn worm infestation in Otatai Parish (Asuret Sub-County), Rabbis-Crops (brown wilt), liver fluke caused by stagnant water in which snails breed, and black army worms affecting tomatoes in Aleot, Arapai Sub-County. Livestock suffers from tick borne diseases, as well as worms and external parasites. Polythene bags (Buveras) are a hazard to livestock and a problem to farmers.



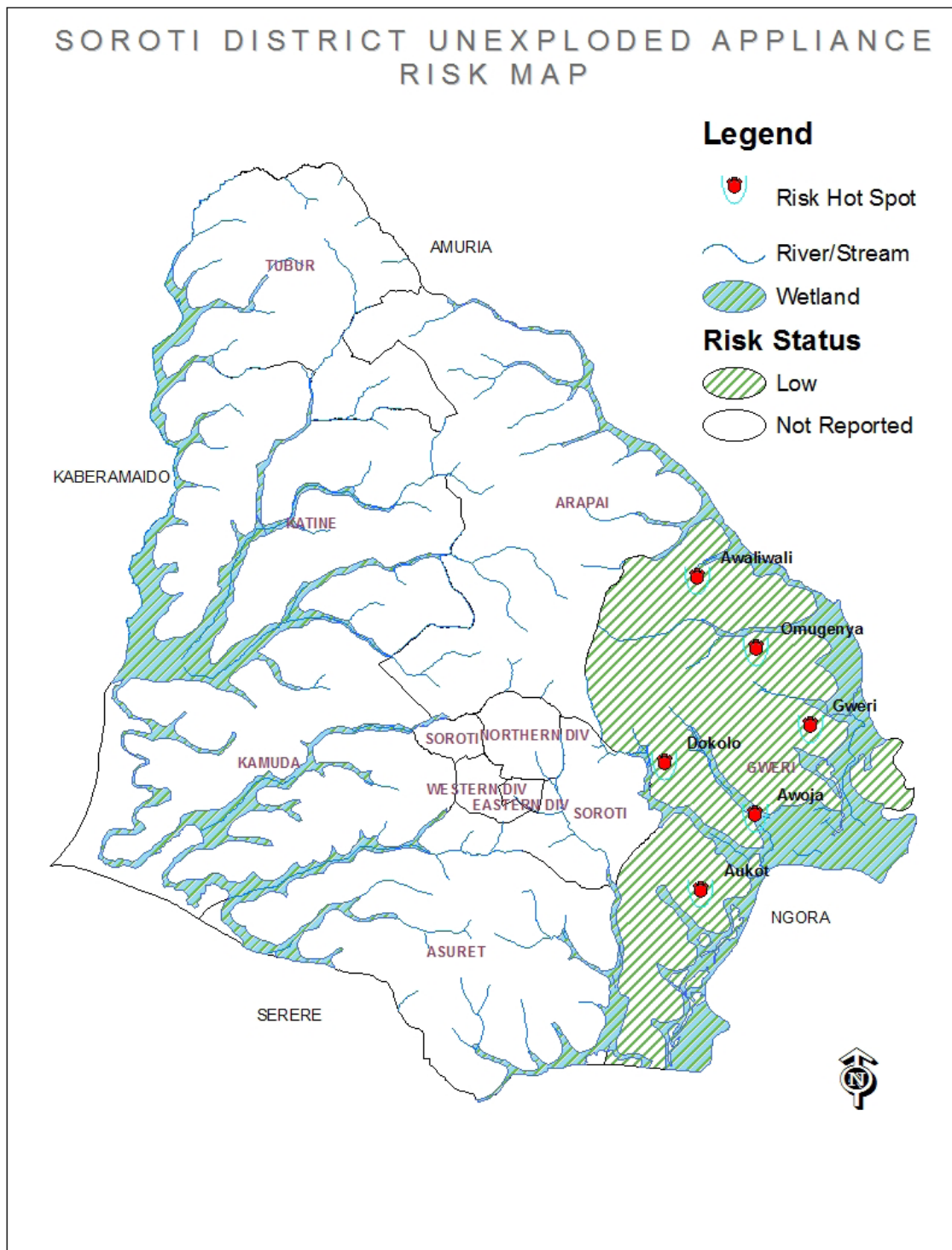
## Vermin risk



**Figure 10 Vermin risk map**

Some crop raiding by monkeys and baboons has been reported in Asuret Sub-County, but the risk is low there, and not felt at all throughout the rest of the district.

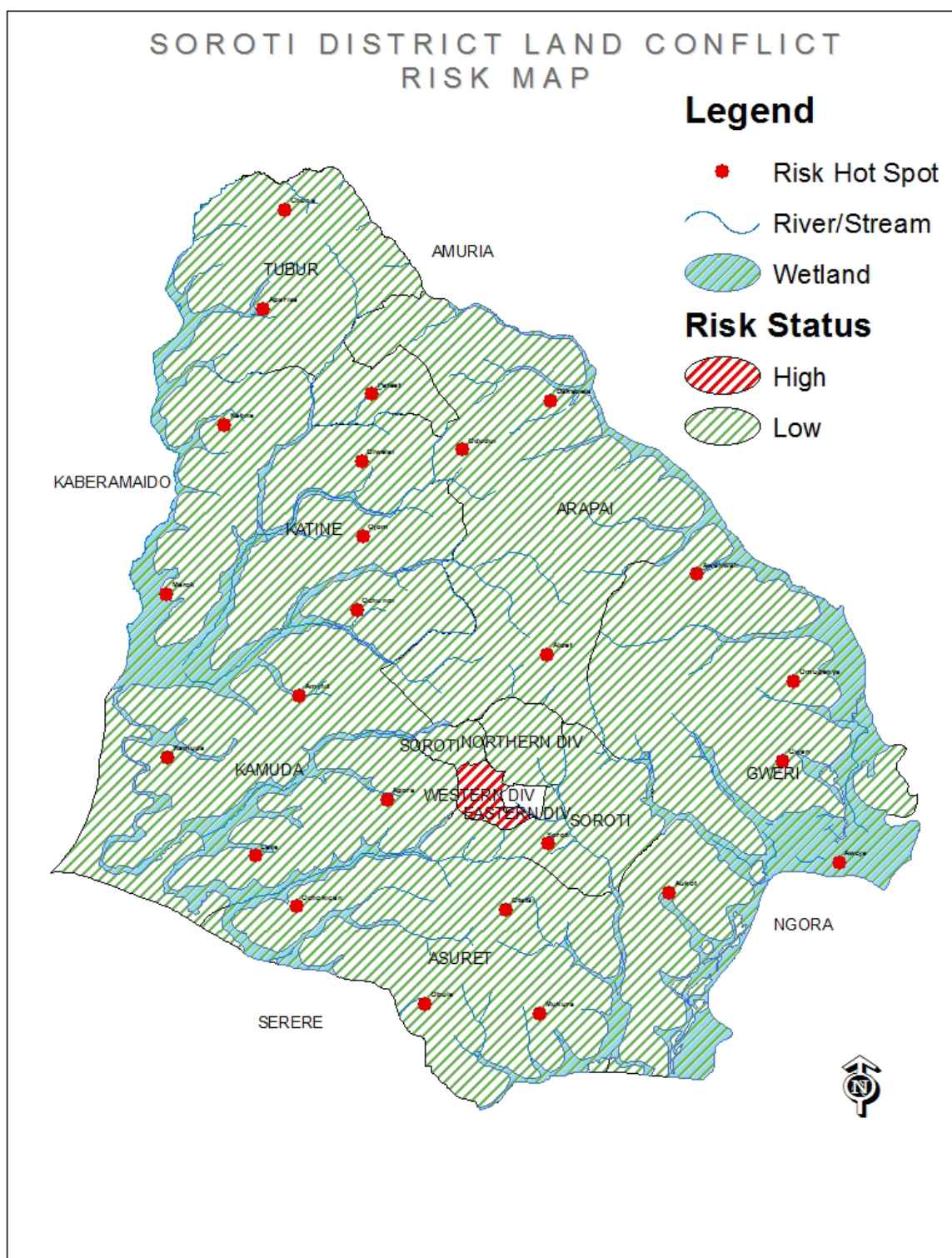
## Unexploded ordinance risk



**Figure 11 Mines and unexploded ordinance risk map**

Bullets and grenades have been excavated in Gweri Sub-County, mainly in Omugenya, Awali-Walim, Dokolo, Aukot, Gweri and Awoja Parishes.

## Land conflict risk



**Figure 12 Land conflict risk map**

Land conflict cases are reported in all sub-counties but highest in the municipal council, mainly caused by increasing population pressure on land and greed for more land. In the municipality, land conflicts are fuelled by the growing pressure for land and increasing urbanization rates. Other causes are lack of permanent landmarks used for demarcating boundaries and insufficient capacity of local land courts in arbitrating land issues.

# VULNERABILITY

**Table 5 Risk vulnerability**

Hazard	Asuret	Gweri	Kamuda	Tubur	Katine	Arapai	East Div.	West Div.	North Div.	Soroti
Floods	2	3	3	2	3	2	1	1	1	1
Drought and Food Insecurity	2	2	2	2	2	2				1
Crop and Animal Disease	2	2	2	2	2	2				2
Pest Infestations	2	2	2	2		2	2			2
Vermin	1									
Hail, Wind, Electric Storms	2	2	2	2	2	2	2	2	2	2
Grenades, Bullets		1								
Disputes About Public Land	1	1	1	1	1	1	1	3	1	1
Land Disputes Between Households	1	1	1	1	1	1	1	1	1	1
Land Disputes Between Institutions	1	1	1	1	1	1	1	1	1	1
Environmental Degradation	1	1	1	1	1	1	3	1	1	1
<b>Score:</b> High = 3, Medium = 2, Low = 1, Not reported = Blank										





Risk vulnerability

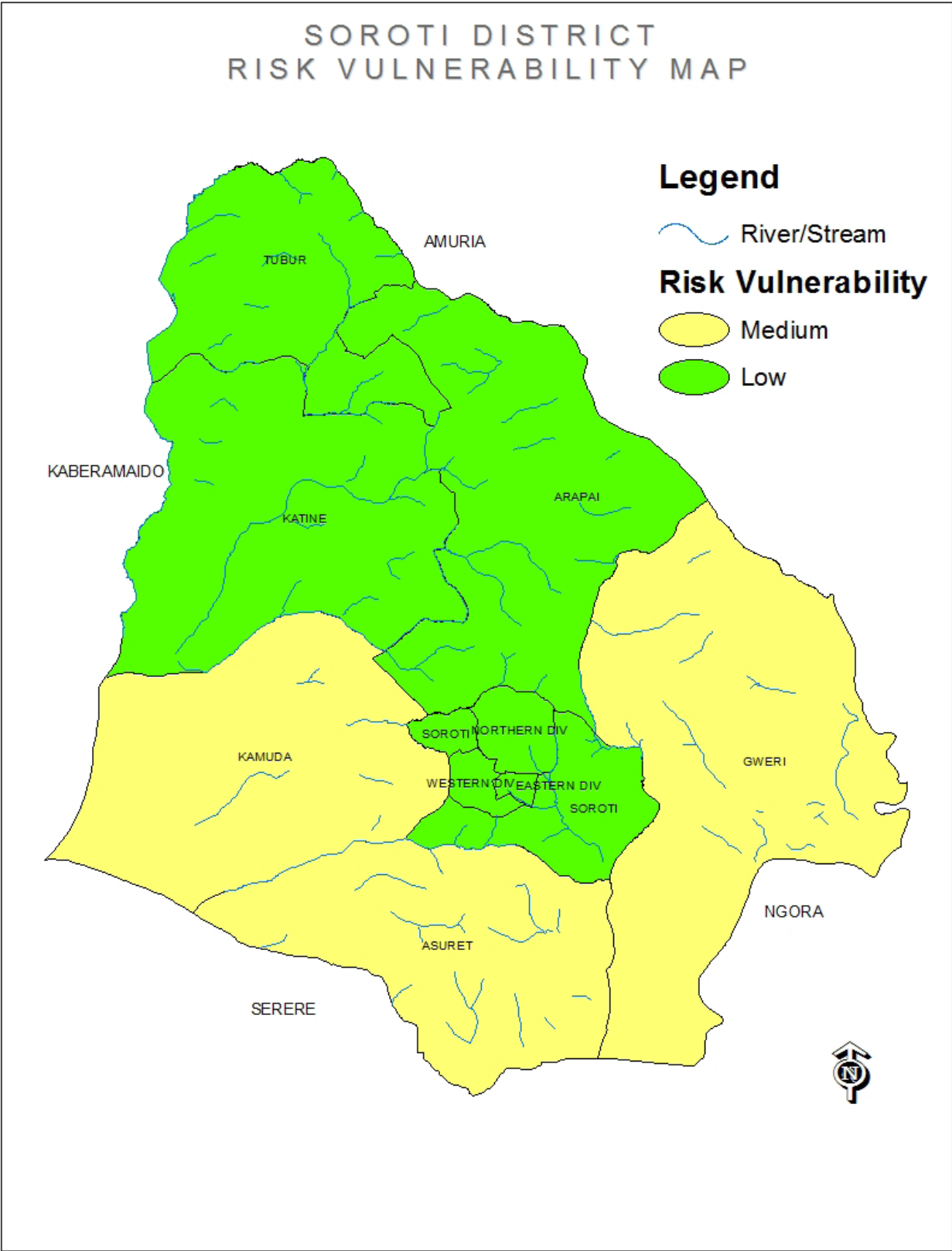


Figure 13 Vulnerability risk map



Table 5 estimates the relative vulnerability of communities in the sub-counties with respect to the hazards endemic there. The incidence of hazards across the district is not homogeneous, and consequently aggregate vulnerability conditions in Soroti District vary from one sub-county to another, as is evident in Figure 13.

Based on the frequency of hazard events and the magnitude of loss suffered, Kamuda, Gweri and Asuret Sub-Counties are assessed at medium risk and vulnerability levels, and the remaining sub-counties have low vulnerability.

The risk vulnerability is generally low across the district. However, the major hazards that have affected the sub-counties are floods, drought and food insecurity, crop and animal disease, pest infestations, hail, wind and electric storms among others. These are mainly attributed to the low lying nature of the area making it highly susceptible to floods.

Serious floods are reported in the sub-counties of Gweri, Katine and Kamuda. Awoja swamp has for years remained a risk hot spot for flood, while land conflict is a serious problem mainly in the municipal council western division.



# CONCLUSIONS

The multi-hazard vulnerability profile output from this mapping exercise is a combination of physical data and information captured from sub-county communities using participatory methods in Soroti District. The information focuses on how communities perceive each hazard based on its likelihood of occurrence and impact on the communities. The level of vulnerability varies from one sub-county to another.

Nine hazards are reported in Soroti District, caused by natural and human induced processes: floods, winds, hailstorms and lightning, pest infestation, crop and animal diseases, drought, land conflict, environmental degradation, vermin, and mines and unexploded ordinance.

Flooding is the biggest risk with vulnerability in all sub-counties in the district. Gweri (Awoja), Kamuda and Tubur experience the highest flood threat.

All of the sub-counties aggregate vulnerability to several hazards. In this sense, Asuret, Gweri and Soroti are the most vulnerable to multi-hazard disaster, with eight hazards each. The Eastern, Western and Northern Divisions are the least vulnerable, with at most five hazards each.

The mapping exercise shows the importance of spatial information in the understanding of hazards in Soroti District. This information should be integrated with the disaster mitigation plans developed by the Soroti district local government to plan and minimize the impacts of hazards.



# DEFINITION 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 loose 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.



**With support from:**

United Nations Development Programme

Plot 11, Yusuf Lule Road

P.O. Box 7184

Kampala, Uganda

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