THE REPUBLIC OF UGANDA

ARUA DISTRICT

Hazard, Risk, and Vulnerability Profile

MULTI-HAZARD, RISK AND VULNERABILITY PROFILE
AGAGO

A collaboration between the Office of the Prime Minister, Department of Disaster Preparedness and Management and Agago district, together with the United Nations Development Programme (UNDP) in Uganda.

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Authors:

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Submitted by:
Matua Mike Odravu Emmanuel
Individual Contractor
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Acronyms

GOU	Government of Uganda
OPM	Office of the Prime Minister
UNDP	United Nations Development Program
DRM	Disaster Risk Management
NGO	Non-Governmental Organization
DDMC	District Disaster Management Committee
GPS	Global Positioning System
GIS	Geographical Information System
FGD	Focus Group Discussion
SC	Sub-County
LC	Local Council
TC	Town Council

Acknowledgement

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

Executive Summary

This Arua 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, history, gender demographics and livelihoods.

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 risk show the areas where the hazard is significant, and also hotspots as points of incidence of the hazard.

Arua District as of now comprised of the Arua Municipality, Ayivu, Vurra, Terego and Madi-Okollo counties, is bordered by Maracha district in the north, Yumbe District in north north east, Moyo and Adjumani districts in the north east, Amuru district in the east, Nebbi District in the south, Zombo District in south west and Democratic Republic of Congo in the west.

Communities perceive that Arua district is vulnerable to fourteen hazards, in order of high to low risk: land conflicts, human epidemics, environmental degradation, crop and animal diseases, hailstorm and lightning, prolonged dry spell, floods, bush fires, vermin, refugee influx, pest infestation, invasive weed species, motor vehicle accidents, mines and unexploded ordinances.

Odupi, Olepi, Ogoko and Pawor sub-counties are the most vulnerable (red) while, Ofaka, Okollo, Arivu, Rigbo, Bileafe, Katrini, Aiivu, Omugo sub-counties, and River Oli division are moderately vulnerable (yellow). The rest of sub-counties are at the lower level (green) of the vulnerability scale. Ajia, Dadamu and Manibe sub counties had the least vulnerability to the mentioned hazards with a weighted vulnerability of only 2.

Timely installation of early warning systems and other DRR interventions would enhance the resilience of the people of Arua to the effects of climate change.

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

Introduction

Arua District Local Government and the Department of 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 Arua 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 inArua 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 embarked on a field mission to West Nile 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 West Nile sub-region) 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, 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.

Overview of the District

District Profile

Arua is one of the 111 districts of the Republic of Uganda and one of the 8 districts of the West Nile Sub Region. Arua District was curved out of the then West Nile and Madi District which was founded in 1912 during the colonial period. In 1953 Madi District comprising of the current Moyo and Adjumani districts was granted a district status leaving West Nile as a District. In 1973 West Nile was given a provincial status but reverted back to a District in 1979 with Nebbi being curved into a District of its own. Since 2001 the Districts of Yumbe, Koboko and Maracha were curved out of Arua District. Arua District as of now comprises of the counties of Arua Municipality, Ayivu, Vurra, Terego and Madi-Okollo.

Administrative arrangement

Table 1: Arua District Land Area by Administrative Unit

County	sub county	Parishes	Villages
Terego	Omugo	8	74
	Uriama	5	43
	Aiivu	9	63
	Odupi	7	96
	Bileafe	4	32
	Katrini	6	58
Ayivu	Dadamu	7	51
	Adumi	5	61
	Aroi	6	53
	Ayivuni	4	41
	Oluko	9	67
	Pajulu	9	79
	Manibe	8	67
Madi-Okollo	Ogoko	5	23
	Anyiribu	4	24
	Pawor	4	21
	Rhino Camp	6	50
	Okollo	4	34
	Offaka	4	36
	Rigbo	8	65
	Olepi	3	22
Vurra	Vurra	10	84
	Ajia	9	32
	Logiri	7	85
	Arivu	6	62
Arua Municipality	Arua Hill	3	25
	River Oli	3	28
Total		**163**	**1376**

Table 2: Arua District Projected Population (2013) by gender by Sub County

	Male	Female	Total

Arua	**386,600**	**415,500**	**802,100**
Arua Municipality	31,300	32,200	**63,500**
Arua Hill	10,600	11,100	**21,700**
Oli River	20,700	21,100	**41,800**
Ayivu	118,400	130,700	**249,100**
Adumi	27,900	31,500	**59,400**
Aroi	12,900	14,400	**27,300**
Dadamu	18,300	19,900	**38,200**
Manibe	15,800	17,500	**33,300**
Oluko	19,600	21,200	**40,800**
Pajulu	23,900	26,300	**50,200**
Madi-okollo	66,000	70,200	**136,200**
Offaka	12,300	13,600	**25,900**
Ogoko	9,500	10,400	**19,900**
Okollo	8,300	9,000	**17,300**
Rhino Camp	10,900	11,700	**22,600**
Rigbo	20,500	21,000	**41,500**
Uleppi	4,400	4,600	**9,000**
Vurra	63,200	69,500	**132,700**
Ajia	13,100	14,200	**27,300**
Arivu	11,700	13,000	**24,700**
Logiri	16,700	17,800	**34,500**
Vurra	21,600	24,400	**46,000**
Terego	107,700	112,900	**220,600**
Aii - Vu	20,300	21,400	**41,700**
Beleafe	9,400	10,100	**19,500**
Katrini	17,800	19,500	**37,300**
Odupi	27,100	27,000	**54,100**
Omugo	21,300	22,700	**44,000**
Uriama	11,700	12,100	**23,800**

Socio-economic situation

The People

The Lugbara, largely inhabit Arua District. They are the dominating settlers in all parts of the district. Other tribes are Kakwa, Madi, Alur and Lendu. The Madi live in the eastern parts while the Alur and Lendu are mostly found in the western parts of the District. The Lugbara and Madi are Sudanic origin while the Kakwa are Nilo-hamites. The Alur and Lendu are of Congo origin. All the ethinicities have similarities in culture.

The Economy

Like many Ugandan districts, the economy of Arua is dependent on agriculture and employs over 80% of the total population. Fertile soils and suitable climate combine to support the cultivation of a number of crops in most parts of the district. Agriculture is mainly subsistence (80%) and takes place on smallholdings of approximately two acres using mainly simple farming tools (hoes, pangas and harrowing sticks). Only 0.5% of the population is engaged in commercial agriculture. Family members constitute the single most important source of labour.

Both food and cash crops are grown. The major food crops include cassava, beans, groundnuts, simsim, millet and maize. Tobacco is the major cash crop and is the main source of livelihood for the majority of the population in the district. It is grown mainly in the fertile highlands. Cotton used to be grown in the lower and drier plains but due to marketing problems, it has been largely abandoned. There is also an insignificant growing of coffee, which is done mainly in the temperate areas along the borders of Arua and Nebbi district. There is renewed interest in the promotion of coffee production in many areas of the district now.

Other important economic activities in the district include formal employment, which employs about 9% of the population, petty and formal trade, which employs 3.8% and 0.7% respectively and cottage industry that employs 2.3%. The remaining proportion of the population depends on family support and other miscellaneous activities

The majority of the people of Arua District depend on the environment and natural resources for their livelihood. This means that the state of the environment has a huge implication for poverty eradication. For instance, about 90 percent (90%) of the population of the District lives in the rural areas and depend on the natural resources for their livelihood. About 80 percent of the population is employed in the Agricultural sector which is dependent on the climatic and soil conditions, with uncertainty in success due to climate change and unpredictable weather conditions. 99 percent of the households in the District depend on wood fuel (firewood and charcoal) for cooking. It therefore follows that the degradation of the environment and the natural resources leads to low productivity and consequently low income that contributes to poverty and low standards of living.

Sustainable economic and social development of Arua District largely depends on exploitation of its environmental and natural resources, including climate change. However, the increasing degradation of these resources coupled with increasing climate variability and climate change is beginning to have a serious negative impact on the District's social and economic development and the livelihoods of its people.

Soil degradation is one of the leading environmental problems affecting the District. The main degradation process is soil erosion, which is caused by poor land management and agricultural husbandry practices. As a result soils have over time lost their nutrients. Fallow periods have either been abandoned or reduced due to population pressure and lack of enough agricultural land. Overgrazing has also significantly contributed to soil degradation as this too exposes the soils to erosional forces. Grazing in the District is mainly communal and this has exacerbated the problem of soil erosion.

Arua District has twenty (20) gazetted Forest Reserves (both Local and Central Forest reserves) totaling to 14, 395 ha. Today, 40-60 % of the gazetted forest reserves have been depleted. Deforestation has also occurred on private and communal lands.

The wide spread deforestation in the District is a result of expansion of agricultural land, the rampant felling of the trees for wood-fuel, timber and tobacco curing. Trade in Forest products within and outside the District has worsened the situation of deforestation. Unfortunately, a forestation programs in the District do not equally correspond to the high rate of deforestation. It is important to manage sustainably the existing forests and encourage individual and community a forestation programs in the District.

Climate

Arua district has a bi-modal rainfall pattern with light rains between April and October. The wettest months are normally August and September which receive 120mm/month. The average total rainfall is 1250mm. The mean monthly evaporation ranges from 130mm - 180mm. In the dry season (December -March) temperatures remain high throughout.

The table below displays average monthly climate indicators in Arua based on 8 years of historical weather readings.

Temperature by: Centigrade

Arua district is 1211 meters above sea level.

Table 3: Average monthly climate indicators

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Avg. Temperature	25	25	25	25	24	22	22	22	23	23	23	24
Avg. Max Temperature	30	30	29	28	28	26	26	26	27	27	27	28
Avg. Min Temperature	16	18	18	18	18	17	16	17	17	17	17	17
Avg. Rain Days	0	0	0	0	1	2	1	2	1	2	1	0

Game reserves and tourism

Besides good climate and friendly people, Arua District is greatly endowed with natural attractions (Ajayi Game Reserve, Imvepi – Enyau Valley Forest, Waterfalls and beaches, Wild Life, mountains and water bodies), cultural attractions (A variety of foods, community festivals, traditional ceremonies and rituals, art and craft, music/song/instruments and traditional economic activities) and historic attractions (Indigenous sites, Monuments, burial places, religious centres, historic buildings and architecture and recreational activities).The area of tourism Industry is still virgin and therefore offers a wide range of potential Investment opportunities in the areas of conservation and development of heritage sites, restocking

or Ajayi Game Reserve especially with the white Rhino, specialised eco-tourism, art and craft, recreational activities, accommodation and operating tours and travel circuits and other products. The Ajai Wildlife reserve and the numerous historical sites in Luku, Wati and the River Nile offers a spectacular opportunities for development of tourism facilities that can be augmented with the rich culture of the people especially their food and entertainments

Livelihoods

Table 4: Arua District livelihoods, by sub-county

Agro Ecological Zone	Livelihood	Sub County
Agricultural zone	Crop cultivation	Adumi, Aroi, Pajulu, Dadamu, Oluko, Ayivuni, Manibe, Vurra, Ajia, Arivu, Logiri, Aiivu, Bileafe, Uriama, Omugo, Katrini, Odupi, Offaka, Anyiribu, Olepi, Okollo, Ogoko, Pawor, Rhino Camp, Rigbo
	Brick laying	Adumi, Aroi, Pajulu, Dadamu, Oluko, Ayivuni, Manibe, Vurra, Ajia, Arivu, Logiri, Aiivu, Bileafe, Uriama, Omugo, Katrini, Odupi, Offaka, Anyiribu, Olepi, Okollo,
	Petty trade	Adumi, Aroi, Pajulu, Dadamu, Oluko, Ayivuni, Manibe, Vurra, Ajia, Arivu, Logiri, Aiivu, Bileafe, Uriama, Omugo, Katrini, Odupi, Offaka, Anyiribu, Olepi, Okollo, Ogoko, Pawor, Rhino Camp, Rigbo, Arua Hill, River Oli
	Tourism	Vurra,Omugo, Ogoko, Pawor, Rhino Camp, Rigbo, Arua Hill
	Agricultural markets	Pajulu, Oluko, Ayivuni, Manibe, Vurra, Ajia, Arivu, Logiri, Aiivu, Bileafe, Uriama, Omugo, Katrini, Odupi, Offaka, Olepi, Okollo, Ogoko, Pawor, Rhino Camp, Rigbo, Arua Hill, River Oli
	Apiculture	Vurra, Ajia, Arivu, Logiri, Odupi,
	Livestock rearing	Oluko,Ajia, Arivu, Logiri, Odupi, Offaka, Okollo, Anyiribu, Olepi
	Charcoal burning	Olepi, Okollo, Ogoko, Pawor, Rhino Camp, Rigbo
	Cattle markets	Pajulu, Arivu, Uriama, Omugo, Katrini, Odupi, Offaka
	Sand scooping	Adumi, Aroi, Pajulu, Dadamu, Oluko, Manibe, Vurra, Ajia, Arivu, Logiri, Aiivu, Bileafe, Uriama, Omugo, Katrini, Odupi
	Stone quarry	Adumi, Aroi, Pajulu, Dadamu, Oluko, Manibe, Vurra, Aiivu, Bileafe, Uriama, Omugo, Katrini, Odupi, Offaka, Anyiribu, Olepi, Okollo, Ogoko, Pawor, Rhino Camp, Rigbo, Arua Hill, River Oli
Agro forestry zone	Trade	
	Agricultural markets	

Women's livelihoods

Women provide approximately 50% of the labour force from opening of the fields to harvesting. They also trade but with consent of their husbands. They deal in sale of food items mainly.

Ethnicity

The lugbara are the predominant ethenic group of people living in Arua. However other Bantu and Luo ethinic groups are also found in the district. The Congolese and Sudanese community also live in the district especially in the town areas.

Hazard

Table 5: Hazard status and ranking

Hazard category	Status	Sub County	Rank
Land conflicts	Cases of internal and inter-territorial boarder conflicts are usually reported due to unclear land demarcations by the land owners and authorities.	Arua Hill, River Oli, Adumi, Aroi, Manibe, Oluko, Ayivuni, Aiivu, Bileafe, Katrini, Omugo, Odupi, Uriama, Offaka, Anyiribu, Olepi, Okollo, Ogoko, Pawor, Rhino Camp, Rigbo, Arivu, Logiri, Vurra	1
Human disease/epidemics	Yellow fever in Lower Madi due to the water source consumed by these communities, AIDS mostly in the fishing communities, malnutrition cases and outbreaks of cholera majorly in Arua Hill and River Oli.	Arua Hill, River Oli, Adumi, Aroi, Manibe, Dadamu, Oluko, Pajulu, Ayivuni, Aiivu, Bileafe, Katrini, Omugo, Odupi, Uriama, Offaka, Olepi, Ogoko, Pawor, Rhino Camp, Rigbo, Arivu, Logiri, Vurra	2
Environmental degradation	The poverty situation and demand for charcoal and fire wood in the district have been reported.	Arua Hill, River Oli, Aroi, Manibe, Oluko, Ayivuni, Aiivu, Bileafe, Katrini, Omugo, Odupi, Uriama, Offaka, Anyiribu, Olepi, Okollo, Ogoko, Pawor, Rhino camp, Rigbo, Arivu, Ajia, Logiri, Vurra	3
Crop & animal disease	Maize streak, groundnut rosette, cassava mosaic in crops while foot and mouth, swine fever and anthrax are commonly reported to affect animals.	Adumi, Aroi, Manibe, Dadamu, Oluko, Pajulu, Ayivuni, Aiivu, Bileafe, Katrini, Omugo, Odupi, Uriama, Offaka, Anyiribu, Olepi, Ogoko, Pawor, Rhino, camp, Rigbo, Arivu, Logiri, Vurra	**4**
Hailstorm & lightening	Destructive cases are usually reported with lives of humans and animals as well as properties lost during the heavy rains in the listed sub counties.	Arua Hill, Adumi, Aroi, Manibe, Ayivuni, Aiivu, Bileafe, Katrini, Omugo, Odupi, Uriama, Offaka, Anyiribu, Olepi, Okollo, Ogoko, Pawor, Rhino camp, Rigbo, Arivu, Ajia, Logiri, Vurra	5
Prolonged dry spell and food insecurity	The reported cases of food insecurity have been due to the crop destruction by the heavy rains, pest infestations, few granaries and none at all in some places.	Adumi, Aroi, Manibe, Pajulu, Ayivuni, Aiivu, Bileafe, Katrini, Odupi, Offaka, Anyiribu, Olepi, Okollo, Ogoko, Pawor, Rhino camp Rigbo, Arivu, Ajia, Logiri, Vurra	5

Hazard category	Status	Sub County	Rank
Floods	Events reported are based on the heavy rains that mostly occur in March, April, June and August to October.	Arua Hill, River Oli, Manibe, Pajulu, Aiivu, Bileafe, Katrini, Omugo, Odupi, Uriama, Offaka, Anyiribu, Olepi, Ogoko, Pawor, Rigbo, Arivu	**7**
Fires (bush and house burning)	Incidences of bush fires are reported majorly in December and early January when farmers are preparing their gardens for the sawing seasons of March. In other cases of fires, houses are burnt as a result of community misunderstandings and conflicts.	Aroi, Dadamu, Oluko, Pajulu, Aiivu Katrini, Odupi, Uriama, Offaka, Anyiribu, Olepi, Okollo, Ogoko, Pawor, Rhino camp, Rigbo	8
Vermin	Reported cases are due to the presence of monkeys in areas like Logiri, Okollo among others and the edible rats in some parts of Terego county such as Katrini.	Katrini, Odupi, Uriama, Offaka, Anyiribu, Olepi, Okollo, Ogoko, Pawor, Rigbo, Arivu, Ajia, Logiri, Vurra	9
Refugee influx	Influxes of migrants from the neighboring South Sudan and the D.R.C into Arua for settlement have so far been reported.	River Oli, Odupi, Olepi, Rigbo	10
Pest infestation	This is mostly in the cropping or farming seasons and the grasshopper (*nsenene)* seasons. There are also cases of termites especially in rainy seasons.	Katrini, Uriama, Anyiribu, Ogoko, Pawor, Arivu	11
Invasive weeds	Water lily and water hyacinth while the land weeds that majorly comprise creepers and striger have as well been reported.	Dadamu, Oluko, Bileafe, Odupi	12
Motor accidents	Reports are majorly on the escalating number of boda-boda riders and the ever crowded population within these areas.	Arua Hill, River Oli	13
Mines & Unexploded ordinances	The former existence of rebel activities that left behind such hazards and thus a threat to the community.	Odupi, Arivu	14

Table 6: Summary of hazards by sub-county

Sub Counties	Hazards														Total Vulnerability (based on Hazard and not frequency or magnitude of loss suffered)
	Floods	Crop & Animal Disease	Hailstorm & Lightening	Prolonged dry spell & Food insecurity	Fires (Bush & house burning)	Mines & Unexploded ordinances	Refugee influx	Invasive weeds	Environmental degradation	Vermin	Human disease/Epidemics	Land Conflicts	Pest infestation	Motor accidents	
Arua Hill	✓	0	✓	0	0	0	0	0	✓	0	✓	✓	0	✓	**06**
River Oli	✓	0	0	0	0	0	✓	0	✓	0	✓	✓	0	✓	**06**
Adumi	0	✓	✓	✓	0	0	0	0	✓	0	✓	✓	0	0	**06**
Aroi	0	✓	✓	✓	✓	0	0	0	✓	0	✓	✓	0	0	**07**
Manibe	✓	✓	✓	✓	0	0	0	0	0	0	✓	✓	0	0	**06**
Dadamu	0	✓	0	0	✓	0	0	✓	0	0	✓	0	0	0	**04**
Oluko	0	✓	0	0	✓	0	0	✓	✓	0	✓	✓	0	0	**06**
Pajulu	✓	✓	0	✓	✓	0	0	0	0	0	✓	0	0	0	**05**
Ayivuni	0	✓	✓	✓	0	0	0	0	✓	0	✓	✓	0	0	**06**
Aiivu	✓	✓	✓	✓	✓	0	0	0	✓	0	✓	✓	0	0	**08**
Bileafe	✓	✓	✓	0	0	0	0	✓	✓	0	✓	✓	0	0	**07**
Katrini	✓	✓	✓	✓	✓	0	0	0	✓	✓	✓	✓		0	**10**
Omugo	✓	✓	✓	✓	0	0	0	0		0	✓	✓	0	0	**07**
Odupi	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	0	0	**12**
Uriama	✓	✓	✓	0	✓	0	0	0	✓	✓	✓	✓	✓	0	**09**
Offaka	✓	✓	✓	✓	✓	0	0	0	✓	✓	✓	✓	0	0	**09**
Anyiribu	✓	✓	✓	✓	✓	0	0	0	✓	✓	0	✓	✓	0	**09**

Olepi	✓	✓	✓	✓	✓	0	✓	0	✓	✓	✓	✓	0	0	**10**
Okollo	0	0	✓	✓	✓	0	0	0	✓	✓	0	✓	0	0	**06**
Ogoko	✓	✓	✓	✓	✓	0	0	0	✓	✓	✓	✓	✓	0	**10**
Pawor	✓	✓	✓	✓	✓	0	0	0	✓	✓	✓	✓	✓	0	**10**
Rhino Camp	0	✓	✓	✓	✓	0	✓	0	✓	0	✓	✓	0	0	**08**
Rigbo	✓	✓	✓	✓	✓	0	0	0	✓	✓	✓	✓	0	0	**09**
Arivu	✓	✓	✓	✓	0	✓	0	0	✓	✓	✓	✓	✓	0	**10**
Ajia	0	0	✓	✓	0	0	0	0	✓	✓	0	0	0	0	**04**
Logiri	0	✓	✓	✓	0	0	0	0	✓	✓	✓	✓	0	0	**07**
Vurra	0	✓	✓	✓	0	0	0	0	✓	✓	✓	✓	0	0	**07**
Total	17	23	23	21	16	02	04	04	24	14	24	24	06	02	**198**

Hazard Risk

The sub-county communities judged the likelihood of hazard events and their severity, to assess the risk of each hazard, shown as not-reported (none), low, medium and high in table 7 below. Each of the columns in table 7 are translated into risk corresponding risk maps in the following section and the respective colour codes per Sub County are maintained in the maps.

Table 7: Hazard risk assessment

Sub County	Hazards													
	Floods	Crop & Animal Disease	Hailstorm & Lightening	Prolonged dry spell & Food insecurity	Fires (Bush & house burning)	Mines & Unexploded ordinances	Refugee influx	Invasive weeds	Environmental degradation	Vermin	Human disease/Epidemics	Land Conflicts	Pest infestation	Motor accidents
Arua Hill	L	N	L	N	N	N	N	N	M	N	H	M	N	H
River Oli	L	N	N	N	N	N	H	N	H	N	H	H	N	H
Adumi	N	M	L	L	N	N	N	N	M	N	L	L	N	N
Aroi	N	M	L	M	M	N	N	N	L	N	L	L	N	N
Manibe	M	L	L	L	N	N	N	N	N	N	L	L	N	N
Dadamu	N	M	N	N	L	N	N	M	N	N	M	N	N	N
Oluko	N	M	N	N	L	N	N	L	M	N	L	M	N	N
Pajulu	L	L	N	M	M	N	N	N	N	N	H	N	N	N
Ayivuni	N	L	L	M	N	N	N	N	L	N	L	M	N	N
Aiivu	H	H	H	H	H	N	N	N	M	N	H	M	N	N
Bileafe	H	M	M	N	N	N	N	L	H	N	M	M	N	N
Katrini	H	M	H	H	M	N	N	N	M	L	L	M	M	N
Omugo	H	M	H	M	N	N	N	N	H	N	H	M	N	N
Odupi	H	M	H	H	M	L	H	H	M	M	H	M	N	N
Uriama	L	L	M	N	L	N	N	N	L	L	L	H	L	N
Offaka	H	M	L	M	M	N	N	N	L	M	L	L	N	N
Anyiribu	M	M	L	M	M	N	N	N	L	L	N	L	L	N
Olepi	H	H	H	H	M	N	H	N	H	M	L	L	N	N
Okollo	N	N	H	H	H	N	N	N	H	M	N	M	N	N
Ogoko	H	H	H	H	H	N	N	N	H	H	M	H	M	N
Pawor	H	M	H	M	M	N	N	N	L	H	H	H	H	N
Rhino Camp	N	M	L	M	M	N	H	N	L	N	L	L	N	N
Rigbo	M	M	L	H	M	N	N	N	M	H	M	H	N	N
Arivu	M	M	M	L	N	M	N	N	L	L	M	M	L	N
Ajia	N	N	L	L	N	N	N	N	M	M	N	N	N	N
Logiri	N	L	L	L	N	N	N	N	M	M	M	M	N	N
Vurra	N	L	H	L	N	N	N	N	L	L	H	H	N	N

Risks

Flood risks

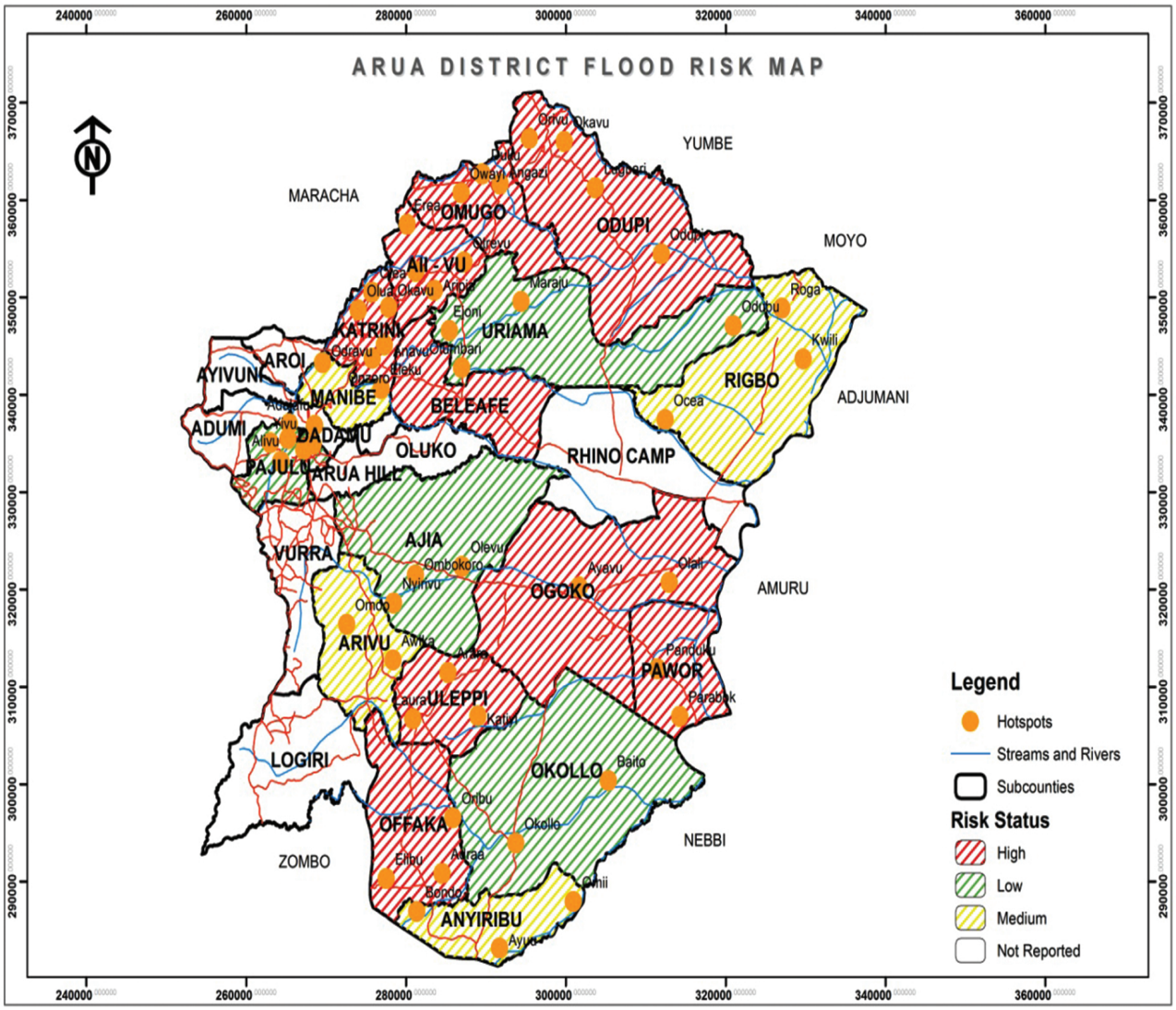

Figure 1: Flood Risk Map

Arua district experiences floods in most of the sub counties though at varied levels of magnitude. The most severe cases are in Aiivu, Bileafe, Katrini, Omugo, Odupi, Offaka, Olepi, Ogoko and Pawor Sub Counties, where the risk is high. These regions are generally flat making it hard for the rain water to run into streams or nearby rivers. In some other case, Sub Counties near rivers such as Rigbo flood due to the over flow from river Nile. Areas such as Manibe, Anyiribu, Rigbo and Arivu are prone to moderate risk of floods while Uriama, Ajia, Okollo and Pajulu are prone to low risk of the hazard. The rest of the sub counties and divisions are not prone to floods.

The effects of the hazard include destruction of crop fields and social/engineering infrastructure especially the community access and feeder roads. This further affects service delivery and food insecurity in the entire district as these areas act as the district's food basket. The flood incidence as well poses the risks of school children failing to turn up to their respective schools due to impassable roads.

Crop and animal disease risk

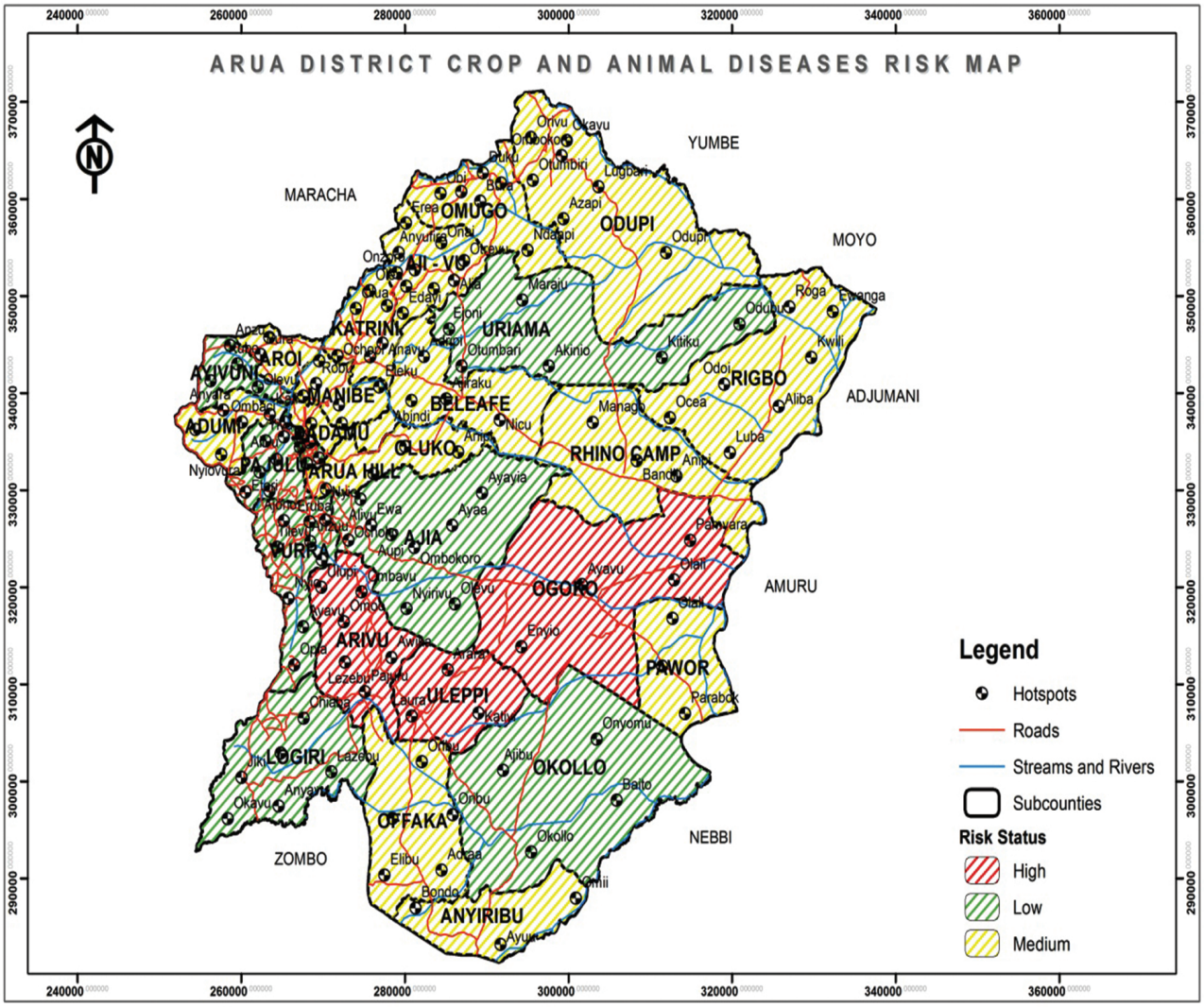

Figure 2: Crop and animal disease risk map

Arua district reported crop and animal diseases in all the sub counties with risk levels varying from high to low. The sub counties that reported high risk of crop and animal diseases Arivu, Olepi and Ogoko; those prone to moderate/medium risk are the Sub Counties Manibe, Ofaka, Anyiribu, Pawor, Rhino Camp, Rigbo, Odupi, Omugo, Aiivu, Katrini, Bileafe, Oluko, Dadamu, Aroi and Adumi; while Pajulu, Ayivuni, Uriama, Logiri, Ajia, Okollo and Vurra sub counties are prone to the least/low risk crop and animal disease.

The major crop diseases reported are maize streak, cassava mosaic/brown streak, ground nuts rosette, citrus cankers and animal diseases include foot and mouth disease, tick borne diseases, foot rot among others.

If not controlled, these diseases can cause food shortage for the entire west Nile region, which depends on food supply from Arua district.

Hailstorm and lightening risk

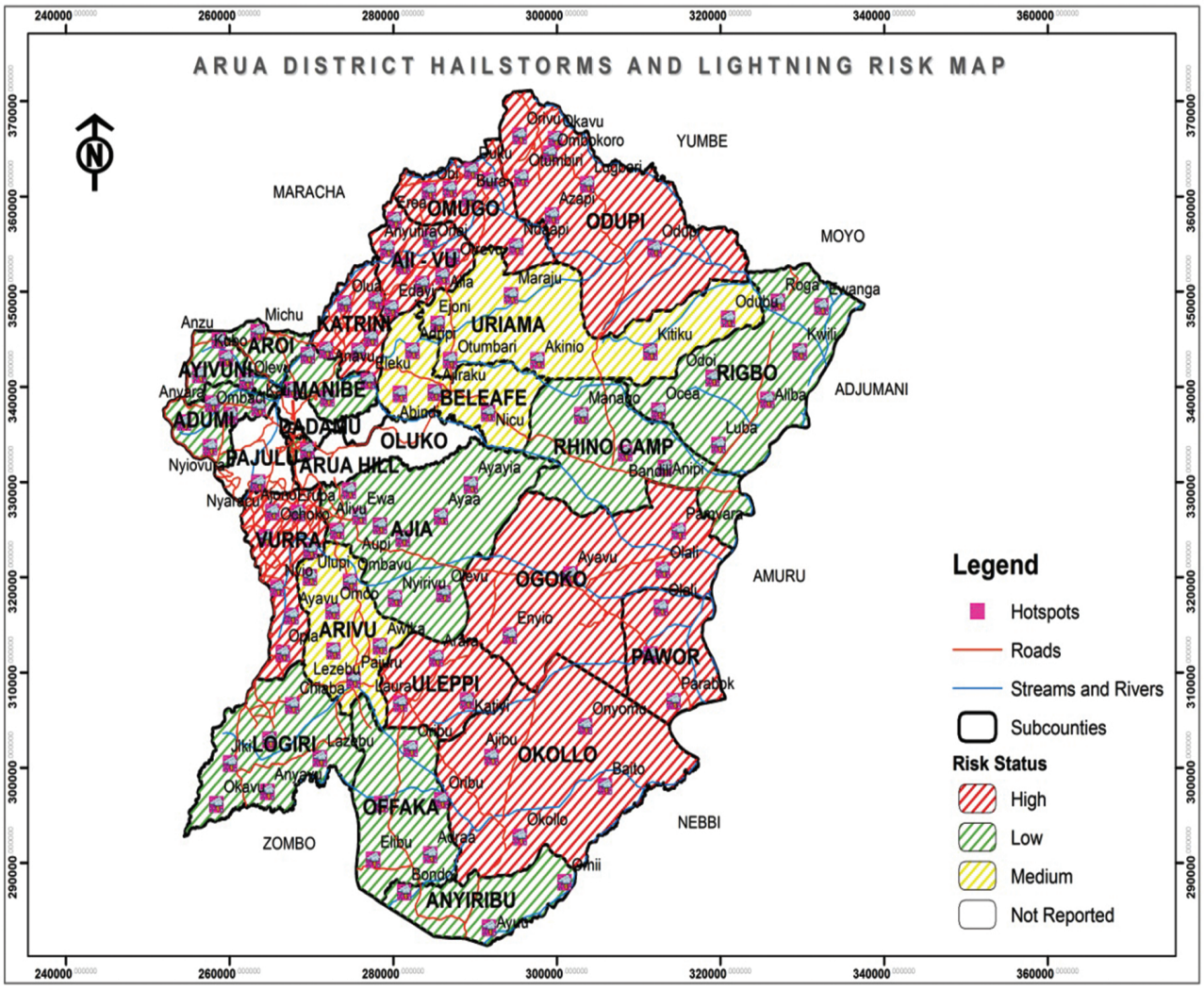

Figure 3: Hailstorm and lightening risk map

These are usually linked to the heavy rains in the rainy seasons of the district. The lightening incidences in the district arise from convectional currents from the Atlantic Ocean influenced by topography and local conditions and is made worse by the lack of lightning arresters on the buildings thus exposing the communities to the risk.

Reported cases include the death of school going pupils and students especially those in areas with more trees. Hailstorms destroy crops especially in their vegetative stage leading to 100% loss. In some other cases, some individuals have lost their livestock to either hailstorms or lightening in places like Okollo, Ulepi, Pawor among others.

The communities of Aiivu, Katrini, Odupi, Omugo, Ulepi, Okollo, Ogoko, Pawor sub counties and Arua Hill Division are prone to high risk hailstorms and lightning. Those in Bileafe, Uriama and Arivu Sub Counties are prone to moderate risk of the hazard while OLuko, Dadamu, Pajulu sub counties and River Oli Division are not prone to any risk. The rest of the sub counties are prone to low risk of hailstorm and lightning.

Prolonged dry spell and food insecurity risk

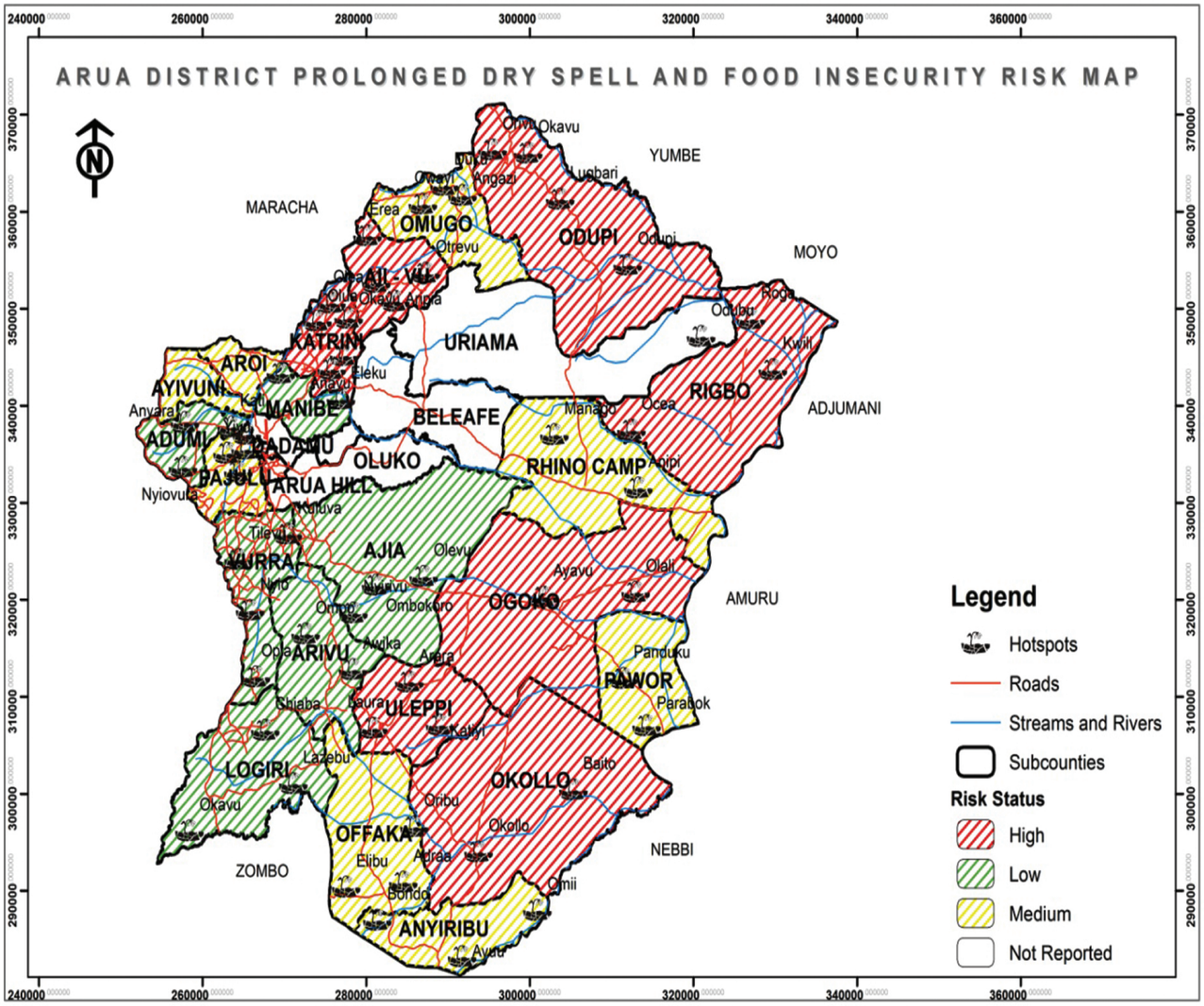

Figure 4: Prolonged dry spell and food insecurity risk map

The prolonged dry spell and food insecurity has been reported in all the crop growing Sub Counties of the district except Arua Hill and River Oli divisions of Arua Municipality, Oluko, Bileafe and Uriama sub counties, which never reported any cases.

The Sub Counties that are prone to high risk of prolonged dry spell and food insecurity include Aiivu, Katrini, Odupi, Olepi, Okollo, Ogoko and Rigbo. Those prone to moderate risk include Ofaka, Anyiribu, Pawor, Rhino Camp, Pajulu, Ayivuni, Aroi and Omugo sub counties, while Manibe, Adumi, Ajia, Arivu and Logiri are prone to low risk of prolonged dry spell. The extended dry spells normally culminate into food shortages in the region or district.

Fires (bush and house burning) risk

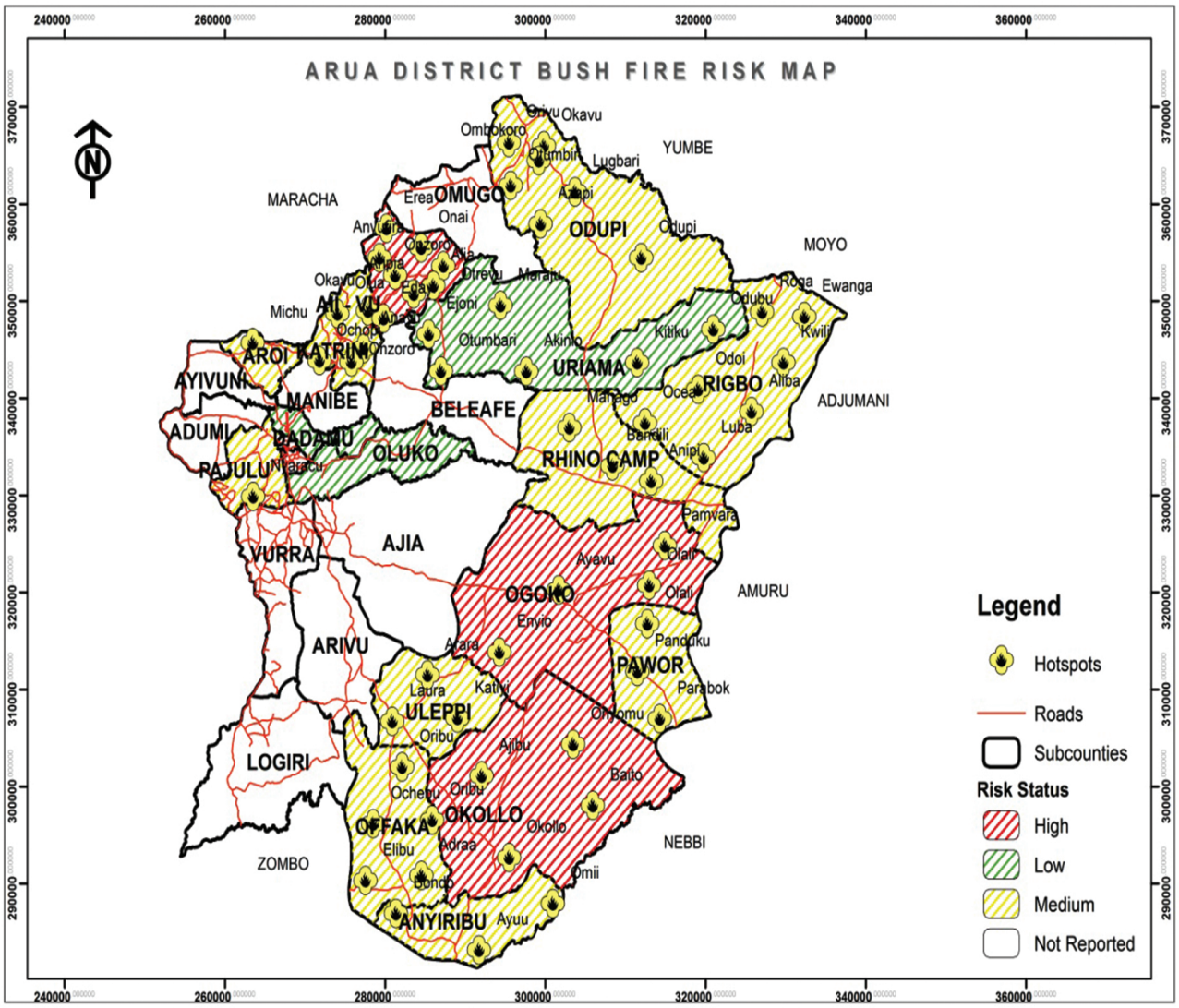

Figure 5: Fires (bush and house burning) risk map

The bush fires are usually common between December and March (the dry season) when farmers burn the grass especially first for fresh pasture for livestock, control of ticks and later for preparing gardens for the new rainy season.

The communities prone to high risk of bush fires are in Aiivu, Okollo and Ogoko sub counties. The majority of bush fire incidences are reported to be of moderate risk covering Aroi, Katrini, Odupi, Offaka, Anyiribu, Olepi, Pawor, Rhino Camp, Anyiribu, Pajulu and Rigbo. The risk is reported to be low in Dadamu, Oluko and Uriama.

The house burning cases are attributed to bush fires and internal community conflicts leading to arson, mob action and sometimes loss of lives.

Mines and Unexploded ordinances risk

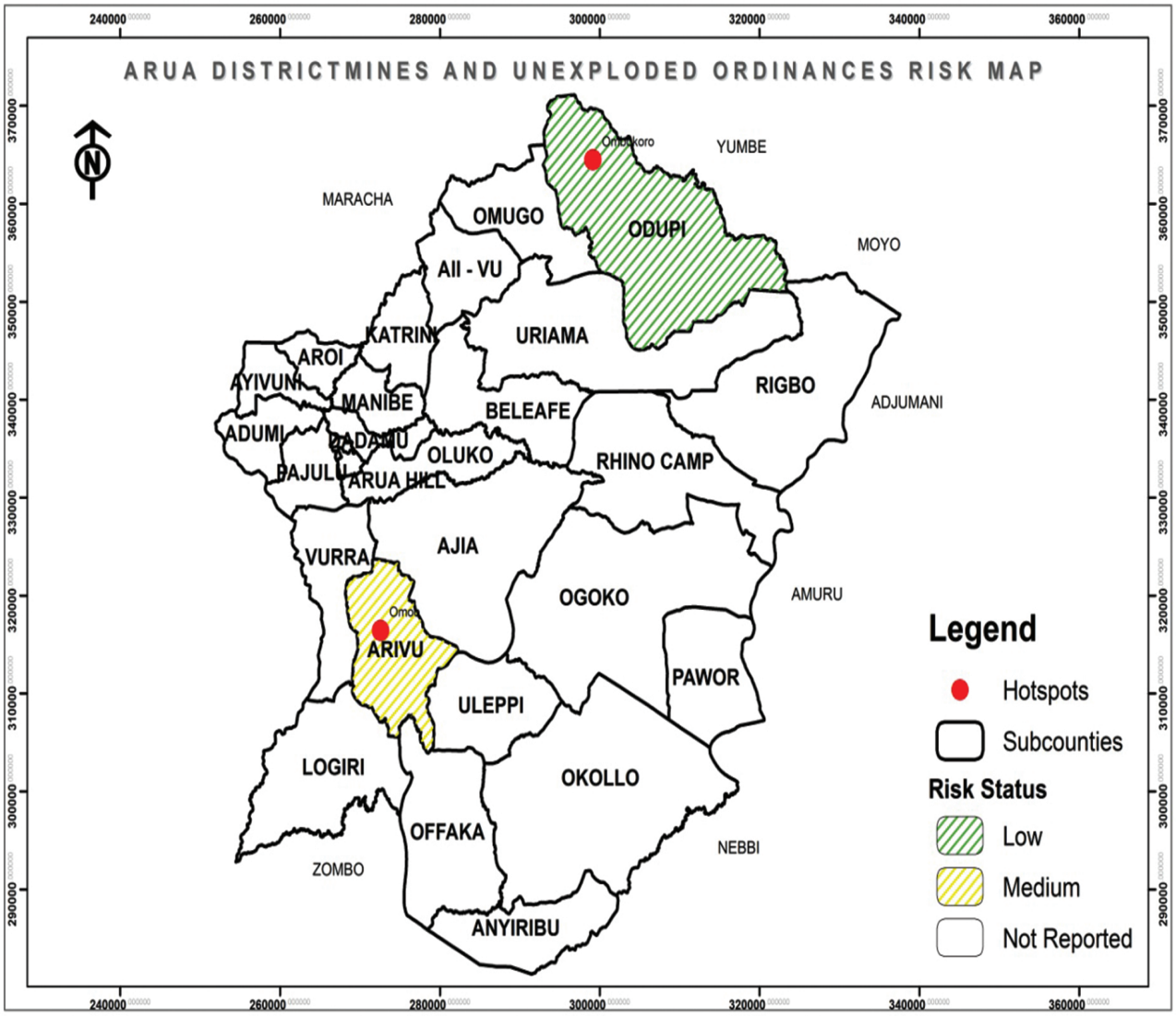

Figure 6: Mines and Unexploded ordinances risk map

The remnants of the unexploded devices that were planted during the armed conflicts in the post liberation war era are still active and threatening the lives of the locals. The most severe cases were reported in Arivu Sub County though at a moderate risk and a low risk is assessed in Odupi Sub County. The fear of such risk has to an extent limited farmers from opening virgin land for crop farming.

Refugee influx risk

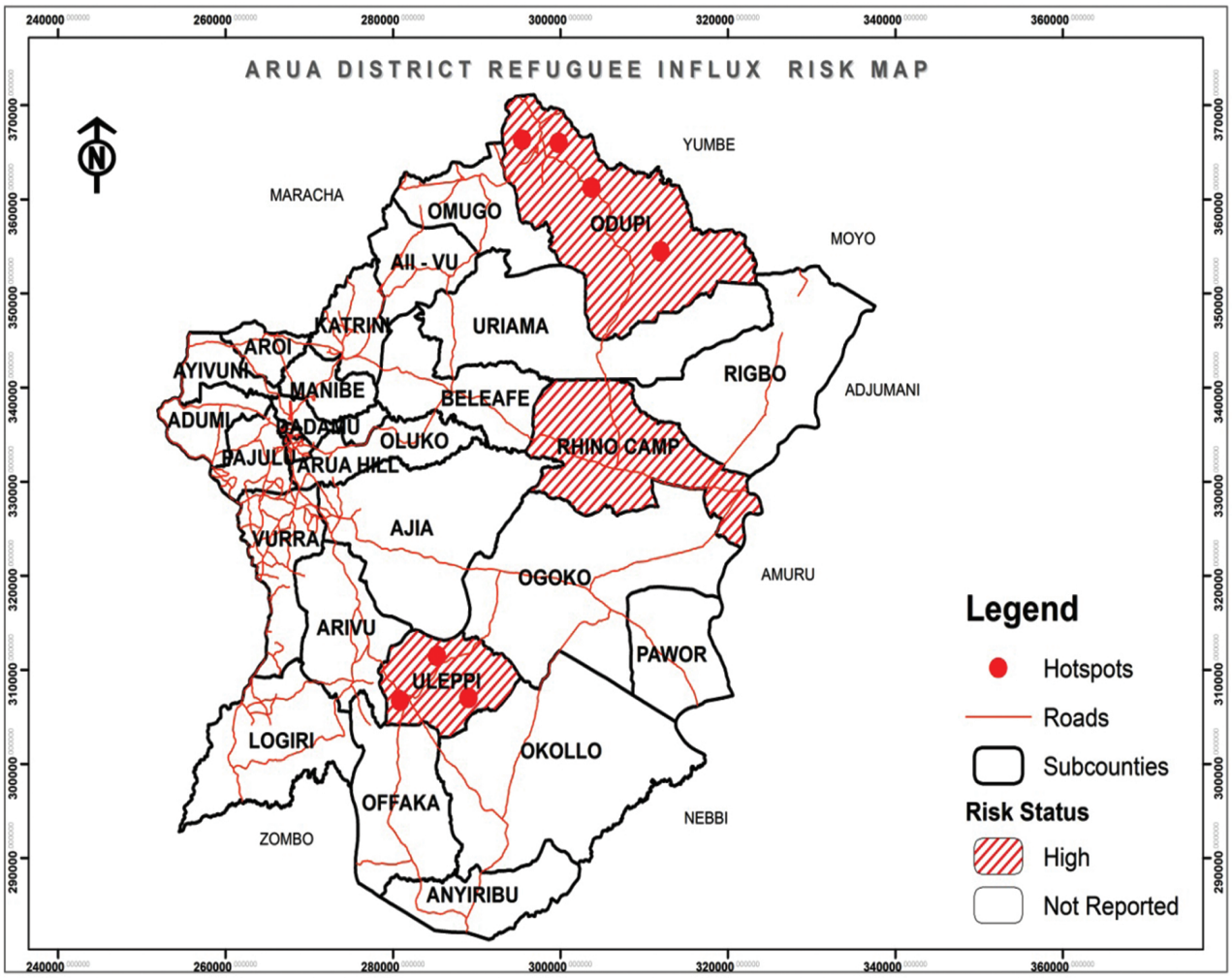

Figure 7: Refugee influx risk map

The reported cases and risks are high in River Oli division, Odupi, Olepi and Rigbo sub counties. The rest of the district is not prone to any risk of risk of the refugee influx. The refugee influx has exposed the host communities to contagion of human epidemics like meningitis and cholera due to poor hygiene and sanitation. The locally planned and provided social services like health and education are also over stretched to accommodate the increased population.

Invasive weeds risk

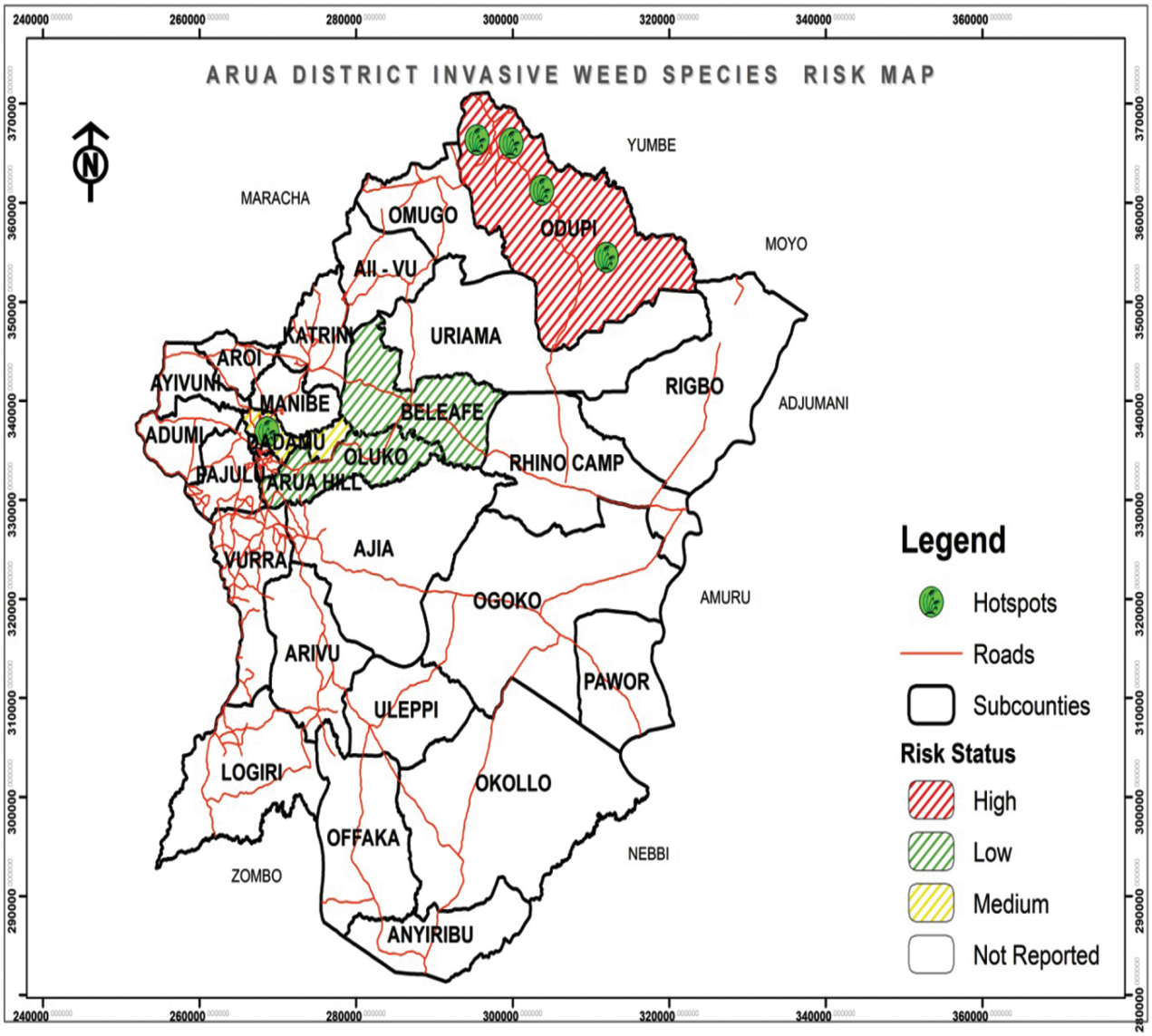

Figure 8: Invasive weeds risk map

The invasive weed species are not common in Arua district, although the risk of the hazard is reported to be high in Odupi Sub County; there is moderate risk in Dadamu and low in Oluko and Bileafe Sub Counties. The common weeds include Lanatana Camara, Striga weed and Congress weed. These weeds have generally affected crop farming in these communities leading to considerable reduction in harvests. Cattle keepers have also reported reduction in grazing land as the lantana camara and congress weeds conquer more land.

Environmental degradation risk

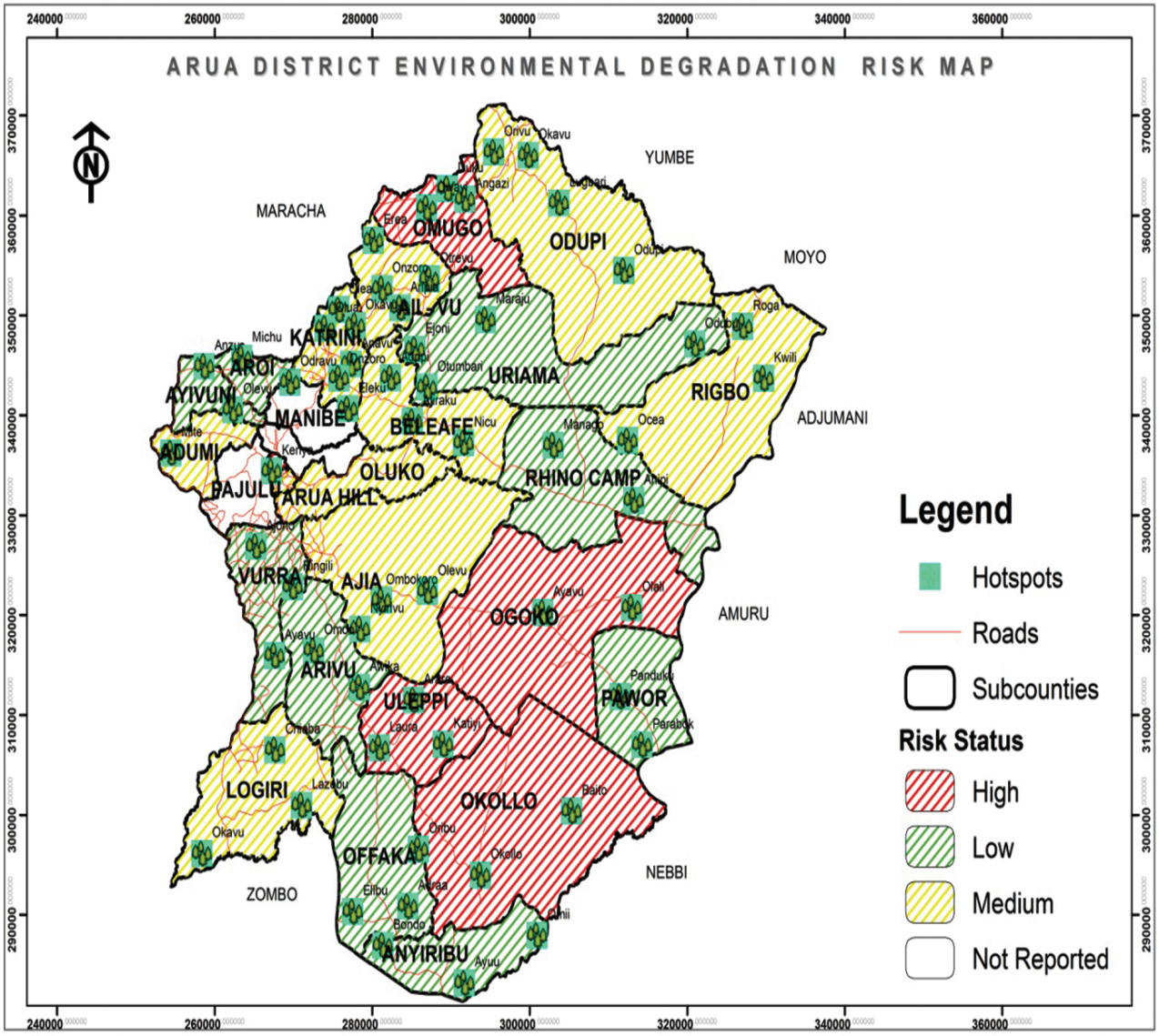

Figure 9: Environmental degradation risk map

Most of the Sub Counties of Arua district are engaged in charcoal burning activities and collection of firewood that are usually consumed by the locals and other individuals within and outside Arua district. The growing demand for these wood fuels has prompted commercial charcoal burning thus greatly affecting the district's ecosystem through activities of deforestation.

The highest risks of environmental degradation are posed to River Oli due to the demand for settlement areas; Omugo, Olepi, Okollo, and Ogoko due to massive deforestation. Cases of moderate risk were from Arua Hill division, Adumi, Oluko, Aiivu, Katrini, Odupi, Rigbo, Bileafe and Logiri. No such risks were recorded from Manibe, Dadamau and Pajulu whereas the other Sub Counties reported low risks possible.

Vermin risk

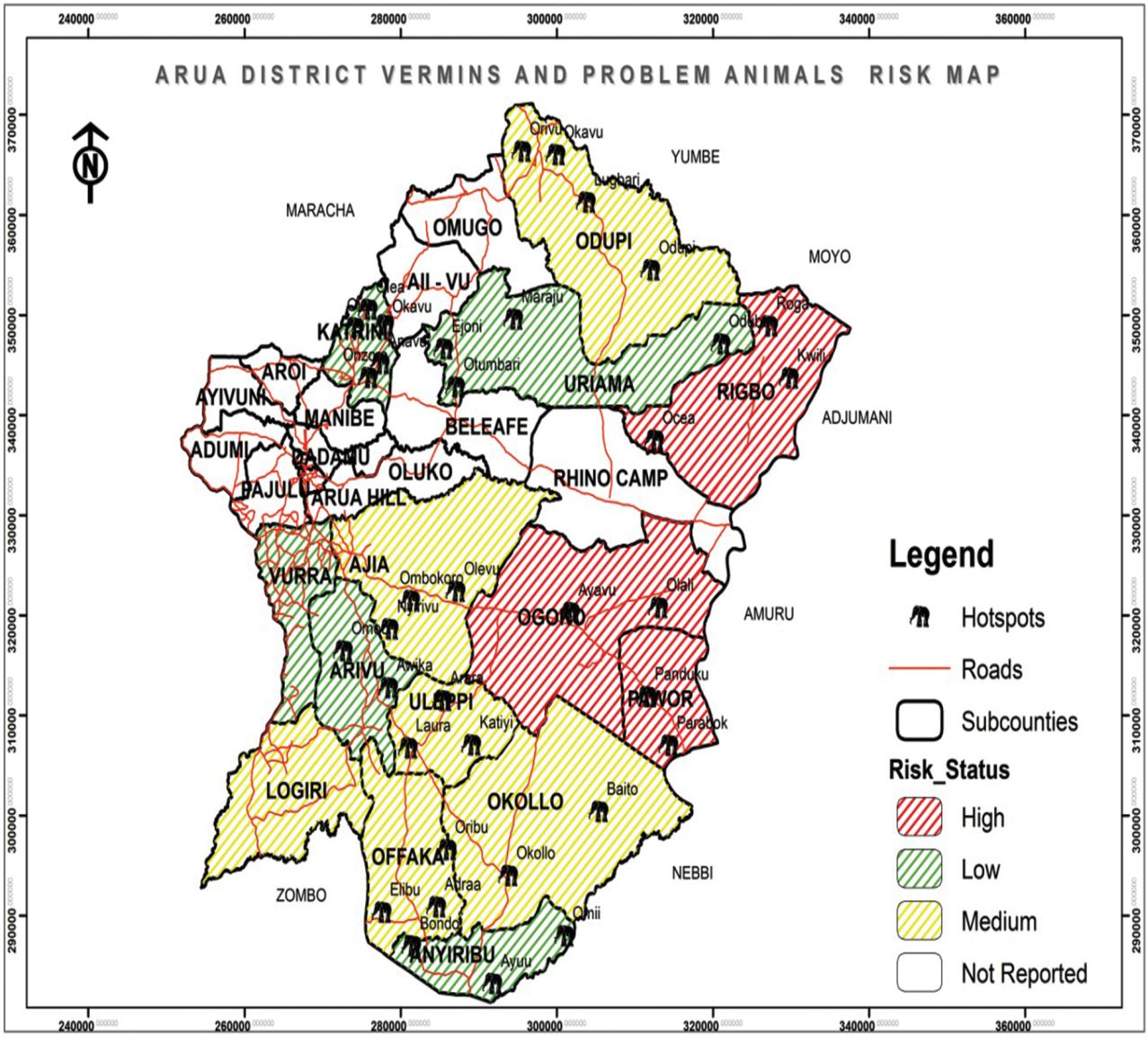

Figure 10: Vermin risk map

The vermin risks are high in Ogoko, Pawor and Rigbo; moderate/medium risks are in Odupi, Offaka, Olepi, Okollo, Ajia and Logiri in which destruction of majorly field crops are being experienced. The Sub Counties of Katrini, Uriama, Anyiribu, Arivu and Vurra reported a low risk posed by these vermin and no reports were made by the other reaming Sub Counties. These vermin generally invade and destroy crops and contribute to food insecurity.

Human epidemics risk

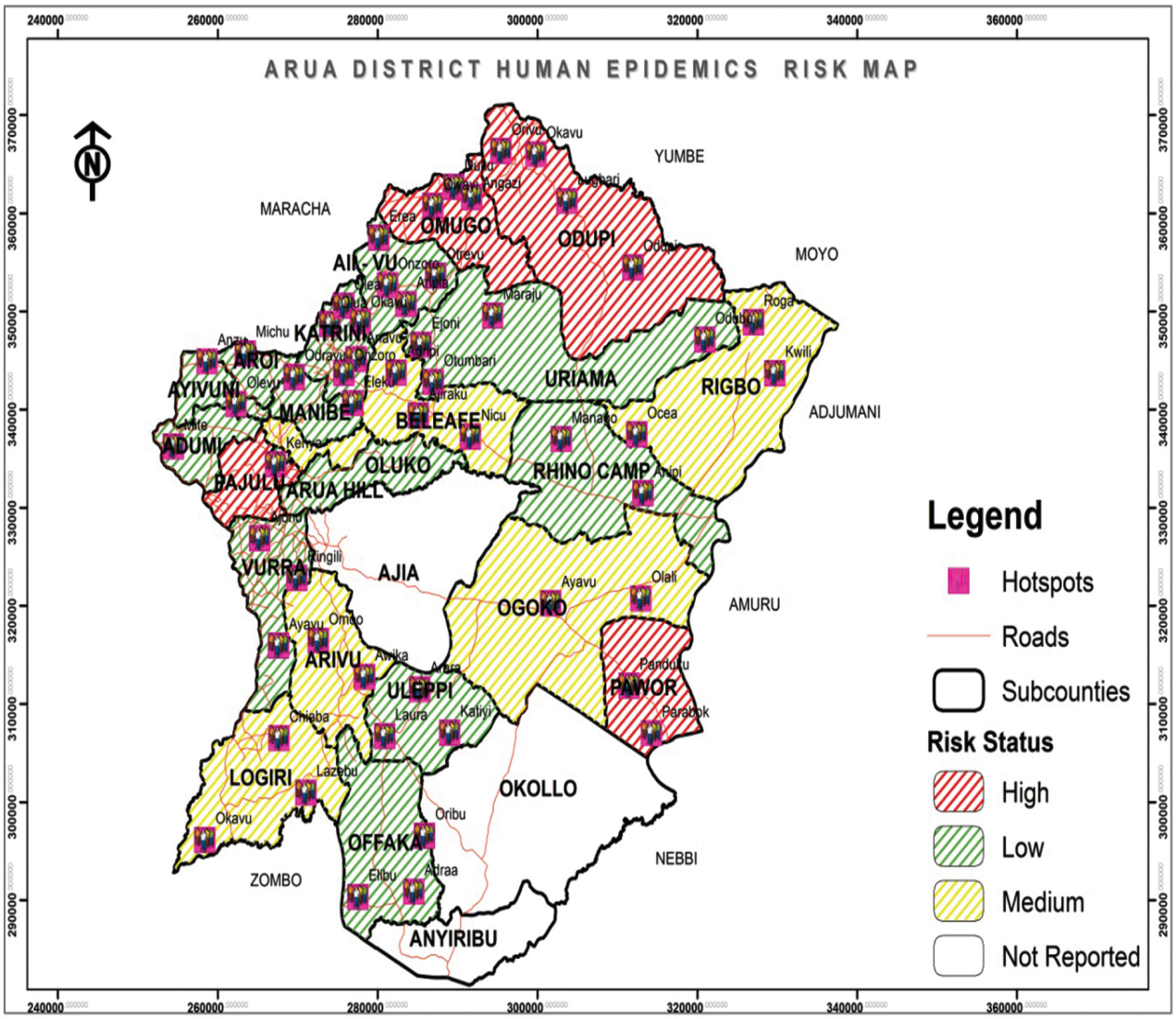

Figure 11: Human epidemics risk map

Arua district is reported to have been affected by poor sanitation and in hygienic conditions. This exposes the communities to diseases such as cholera, hepatitis, meningitis among others. These are coupled with the growing population and stress on the environment in most affected areas of the district. High risks of human epidemics have been reported from Pajulu, Odupi, Omugo and Pawor sub counties while Anyiribu, Okollo and Ajia reported no such cases. Dadamu, Bileafe, Ogoko, Rigbo, Arivu and Logiri sub counties are prone to moderate/medium risk while a low risk was reported by the other remaining Sub Counties of the district.

Land conflicts risk

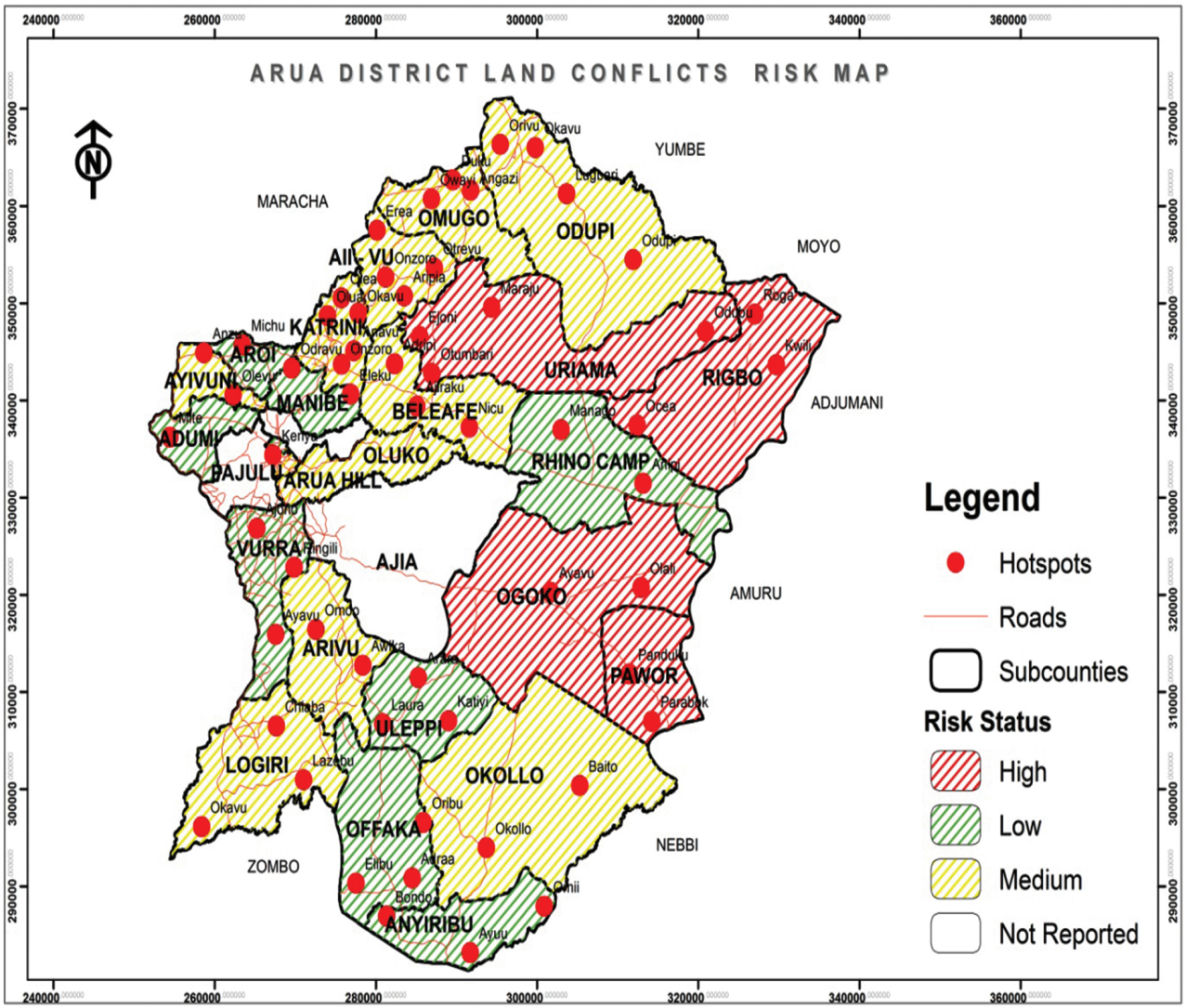

Figure 12: Land conflicts risk map

Land conflicts were reported from the entire district except Dadamu, Pajulu and Ajia sub counties. This risk is as well attributed to the growing population, unclear land boundaries, un registered lands and poverty. The reported conflicts involve households, clans, Sub Counties, government installations, communities as well as individuals.

The most severe cases were however reported from River Oli, Uriama, Ogoko, Pawor and Rigbo where the risk of land conflicts is high. For instance, the reported cases from River Oli were inter family conflicts and in Vurra Sub County were inter clan. The reported risks of this hazard were low in Adumi, Aroi, Manibe, Offaka, Anyiribu, Olepi and Rhino Camp. The risks are however medium in the other Sub Counties.

Pest infestation risk

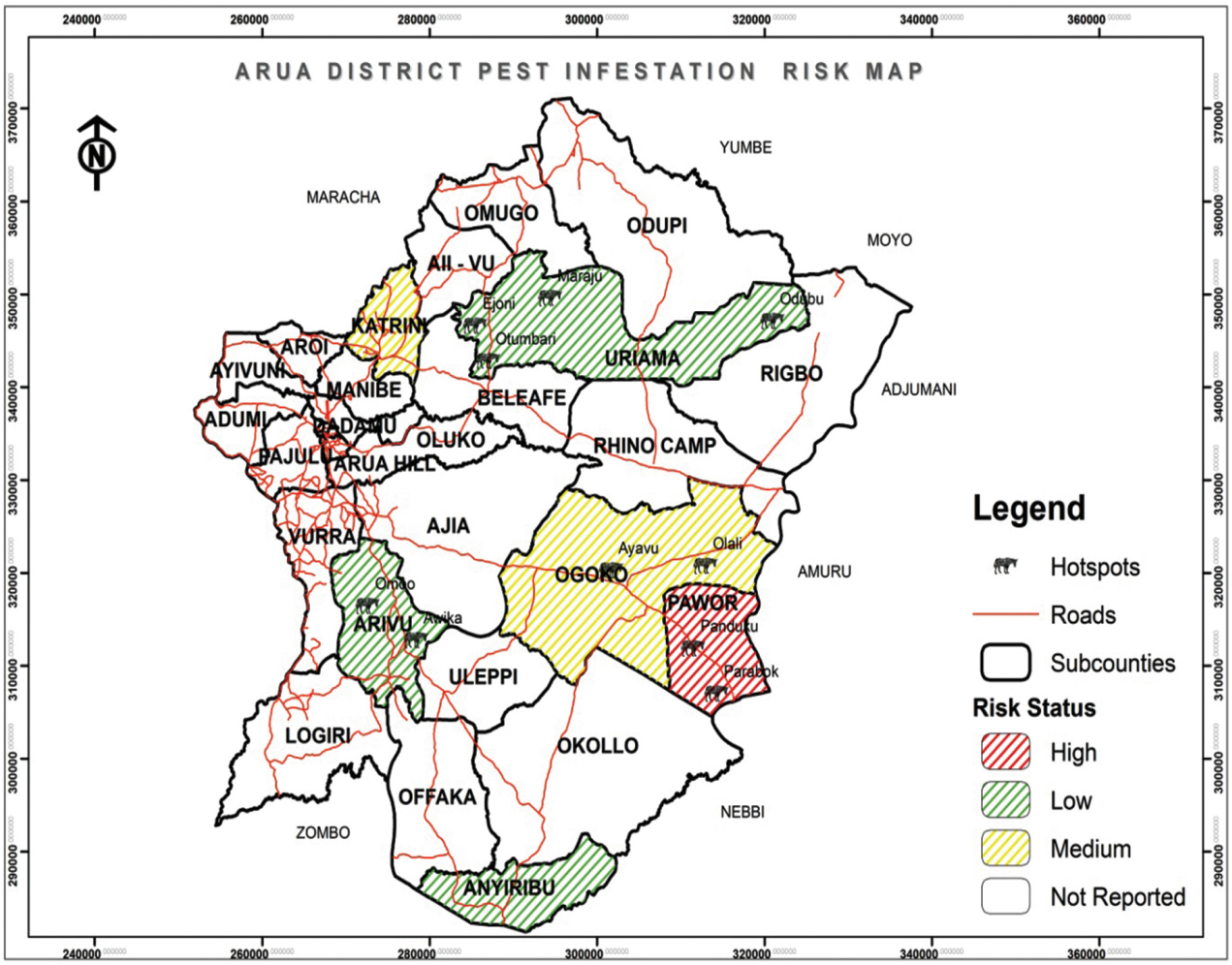

Figure 13: Pest infestation risk map

A few of the Sub Counties reported cases of pest infestation from which the highest threat was recorded in Pawor. Katrini and Ogoko reported a moderate risk, Uriama, Anyiribu and Ajia recorded the lowest risks of pest infestation. No cases were recorded by the rest of the Sub Counties.

Motor accidents risk

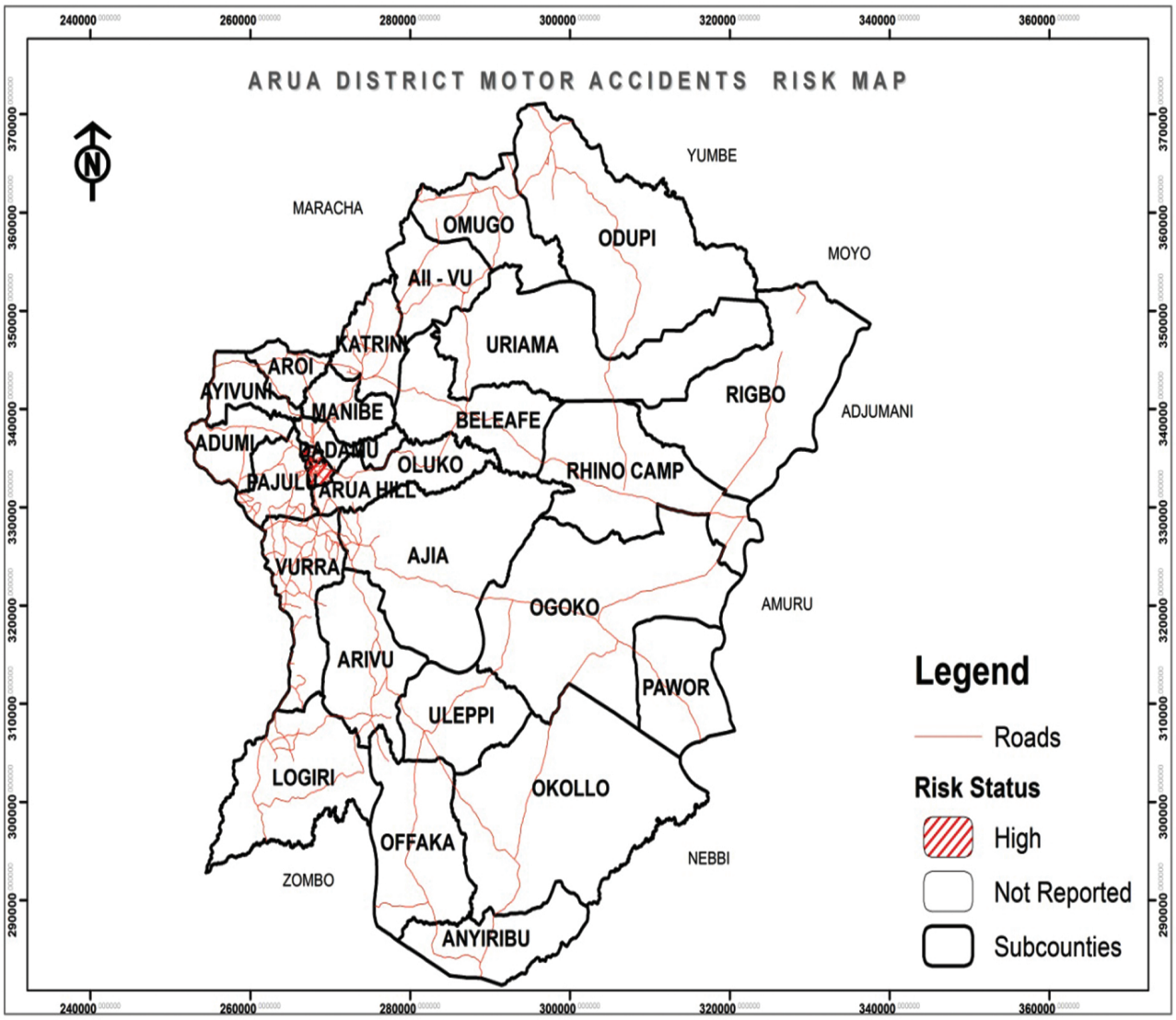

Figure 14: Motor accidents risk map

Motor accidents were majorly recorded from Arua Hill and River Oli that have a large population and are located along the Vurra customs-Arua-Koboko-Oraba highway. The other contributing factor to the high risk of motor accidents the recklessness of the road users, the nonexistence of road furniture and humps that would possibly regulate speed of driving and riding.

Vulnerability

Risk and Vulnerability Assessment

Table quantifies the high/med/low risk assessments in **Error! Reference source not found.** and sums their values. Horizontally, the totals rank the risk associated with each hazard throughout the district. Vertically, the totals rank the sub-counties in aggregate risk.

Table 8: Risk and vulnerability assessment

Sub County	Hazards															
	Floods	Crop & Animal Disease	Hailstorm & Lightening	Prolonged dry spell & Food insecurity	Fires (Bush & house burning)	Mines & Unexploded ordinances	Refugee influx	Invasive weeds	Environmental degradation	Vermin	Human disease/Epidemics	Land Conflicts	Pest infestation	Motor accidents		
Arua Hill	1	0	1	0	0	0	0	0	2	0	3	2	0	3	12	4
River Oli	1	0	0	0	0	0	3	0	3	0	3	3	0	3	16	5
Adumi	0	2	1	1	0	0	0	0	2	0	1	1	0	0	8	3
Aroi	0	2	1	2	2	0	0	0	1	0	1	1	0	0	10	3
Manibe	2	1	1	1	0	0	0	0	0	0	1	1	0	0	7	2
Dadamu	0	2	0	0	1	0	0	2	0	0	2	0	0	0	7	2
Oluko	0	2	0	0	1	0	0	1	2	0	1	2	0	0	9	3
Pajulu	1	1	0	2	2	0	0	0	0	0	3	0	0	0	9	3
Ayivuni	0	1	1	2	0	0	0	0	1	0	1	2	0	0	8	3
Aiivu	3	3	3	3	3	0	0	0	2	0	3	2	0	0	22	7
Bileafe	3	2	2	0	0	0	0	1	3	0	2	2	0	0	15	5
Katrini	3	2	2	2	2	0	0	0	2	1	1	2	2	0	19	6
Omugo	3	2	2	2	0	0	0	0	3	0	3	2	0	0	17	6
Odupi	3	2	2	2	2	1	3	3	2	2	3	2	0	0	27	9
Uriama	1	1	2	0	1	0	0	0	1	1	1	3	1	0	12	4
Offaka	3	2	1	2	2	0	0	0	1	2	1	1	0	0	15	5
Anyiribu	2	2	1	2	2	0	0	0	1	1	0	1	1	0	13	4
Olepi	3	3	3	3	2	0	3	0	3	2	1	1	0	0	24	8
Okollo	0	0	3	3	3	0	0	0	3	2	0	2	0	0	16	5
Ogoko	3	3	3	3	3	0	0	0	3	3	2	3	2	0	28	9
Pawor	3	2	3	2	2	0	0	0	1	3	3	3	3	0	25	8

Rhino Camp	0	2	1	2	2	0	3	0	1	0	1	1	0	0	13	4
Rigbo	2	2	1	3	2	0	0	0	2	3	2	3	0	0	20	7
Arivu	2	2	2	1	0	2	0	0	1	1	2	2	1	0	16	5
Ajia	0	0	1	1	0	0	0	0	2	2	0	0	0	0	6	2
Logiri	0	1	1	1	0	0	0	0	2	2	2	2	0	0	11	4
Vurra	0	1	3	1	0	0	0	0	1	1	3	3	0	0	13	4
Total Risk	39	43	41	41	32	3	12	7	45	26	46	47	10	6	398	

KEY

Risk: **H**= High, **M**= Medium, **L**= Low, **N**= Not reported

Weighted Vulnerability: High = 8+, Moderate = 5 – 7, Low = 0 - 4

Risk Vulnerability

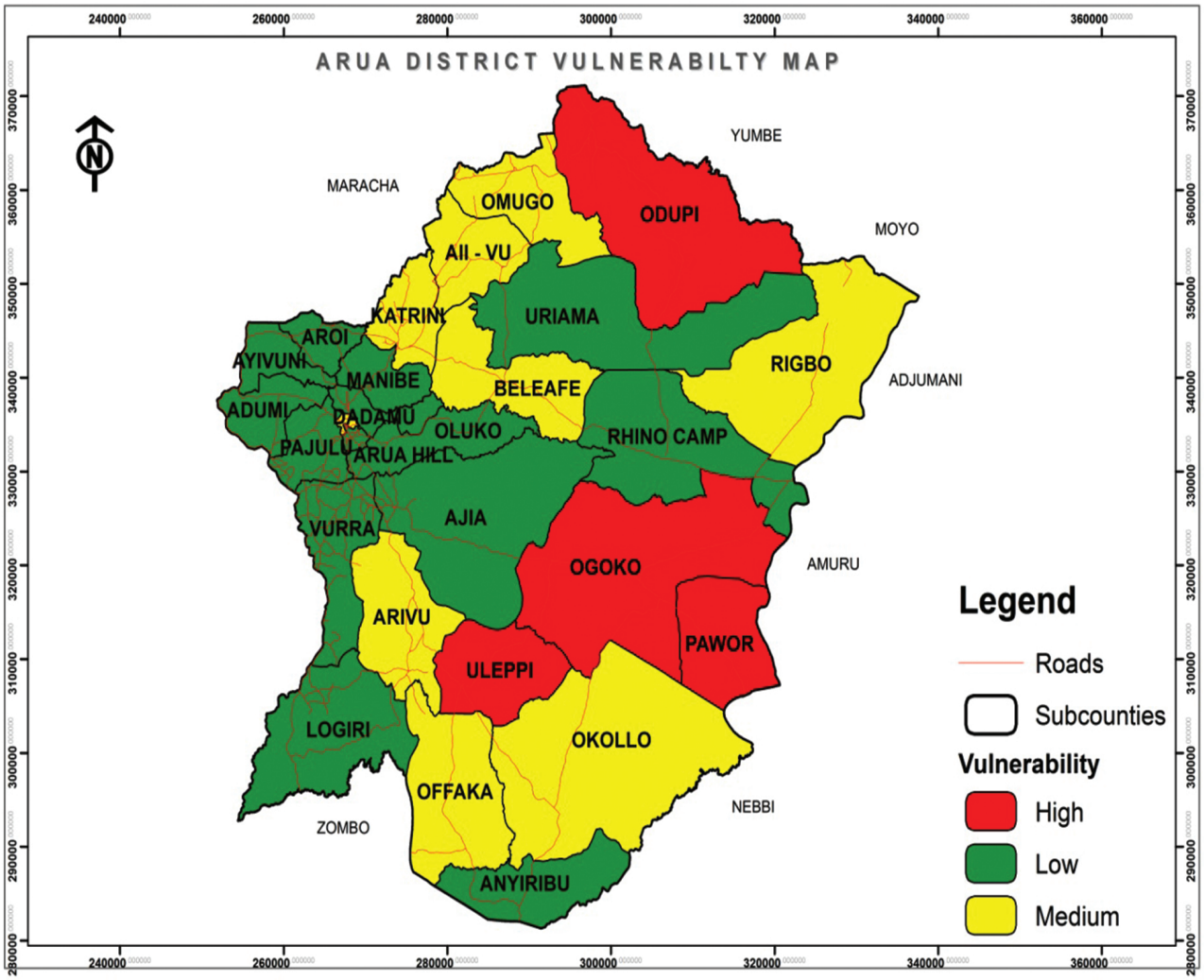

Figure 15: Risk Vulnerability Map

Vulnerability

The vulnerability map in Figure 15 shows the areas of low, medium and high vulnerability according to the risk and vulnerability table (Table 8) above. In this analysis, the cumulative vulnerability of each sub-county is calculated and then weighted to provide weighted vulnerabilities for individual sub-counties. Therefore sub-counties with weighted vulnerability values less than 4 are coded “low”, termed low vulnerability areas and are assigned colour green, those from 5 to 7 are coded “medium”, termed medium vulnerability areas and are assigned colour yellow while those whose weighted vulnerabilities are 8 or more are coded “high”, termed high vulnerability areas and are represented by colour red.

Arua district is exposed to 14 hazards namely drought, land conflicts, human epidemics, environmental degradation, crop and animal diseases, hailstorm and lightning, prolonged dry spell, floods, bush fires, vermin, refugee influx, pest infestation, invasive weed species, motorvehicle accidents, mines and unexploded ordinances arranged in their order of risk from highest to lowest.

The district assessed Odupi, Olepi, Ogoko and Pawor sub-counties to be highly vulnerable (red) while, Ofaka, Okollo, Arivu, Rigbo, Bileafe, Katrini, Aiivu, Omugo sub-counties, and River Oli division are fast keeping pace at the vulnerability scale indicating a medium (yellow) level of vulnerability. The rest of sub-counties are at the lower level (green) of the vulnerability scale. Ajia, Dadamu and Manibe sub counties had the least vulnerability to the mentioned hazards with a weighted vulnerability of only 2.

Though all the elements of the community are vulnerable to the fore mentioned hazards, the burden lies heaviest on the elderly, the children and the women. The school children and the farmers are especially vulnerable to floods than any other groups. The poor members of these communities too feel the pinch of the hazards more than their wealthy counterparts therefore are more vulnerable.

Conclusions

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

Communities perceive that Arua District is vulnerable to 14 hazards, in order of high to low risk: land conflicts, human epidemics, environmental degradation, crop and animal diseases, hailstorm and lightning, prolonged dry spell, floods, bush fires, vermin, refugee influx, pest infestation, invasive weed species, motor vehicle accidents, mines and unexploded ordinances.

Odupi, Olepi, Ogoko and Pawor sub-counties are the most vulnerable (red) while, Ofaka, Okollo, Arivu, Rigbo, Bileafe, Katrini, Aiivu, Omugo sub-counties, and River Oli division are moderately vulnerable (yellow). The rest of sub-counties are at the lower level (green) of the vulnerability scale. Ajia, Dadamu and Manibe sub counties had the least vulnerability to the mentioned hazards with a weighted vulnerability of only 2.

Timely installation of early warning systems and other DRR interventions would enhance the resilience of the people of Arua to the effects of climate change.

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

Definition of Terms

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

UNITED NATIONS DEVELOPMENT PROGRAMME (UNDP)
Plot 11 Yusuf Lule, Road, Nakasero
P. O. Box 7184, Kampala, Uganda
Tel: (+256) 417 112 100
Fax: (+256) 414 344 801
WWW.Undp.Org