



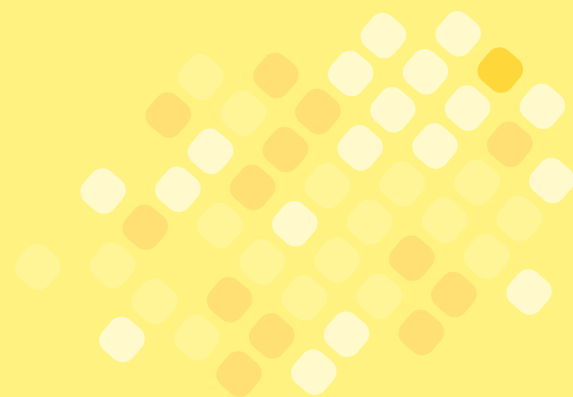
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KARAMOJA

KOTIDO District

HAZARD, RISK AND VULNERABILITY PROFILE

August 2014





With support from:

United Nations Development Programme
Plot 11, Yusuf Lule Road
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Kampala, Uganda
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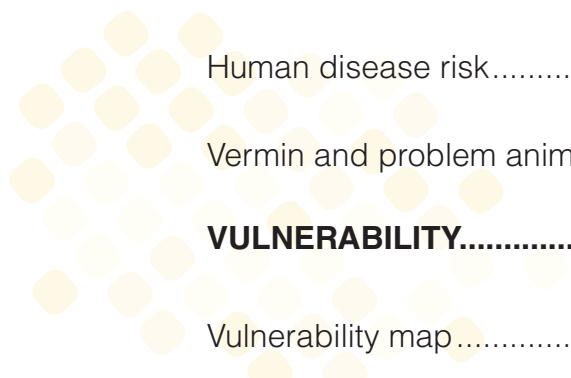


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Acronyms

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
CCPP	Contiguous Caprine Pleuro Pneumonia
CBPP	Contagious Bovine Pleuro Pneumonia
PPR	Peste de Petit Ruminarh



Acknowledgement

On behalf of the Office of the Prime Minister, I wish to express sincere gratitude to all of the key stakeholders who provided their valuable inputs and support to this hazard, risk and vulnerability mapping exercise that led to the production of comprehensive district hazard, risk and vulnerability profiles for the Karamoja sub-region.

I especially extend my appreciation to the Department of Disaster Preparedness and Management in the Office of the Prime Minister, under the leadership of the Acting Commissioner, Ms. Rose Nakabugo and the Assistant Commissioner, Mr. Gerald Menyha, for the oversight and management of the entire exercise. My appreciation also goes to the District Disaster Management Committees and the entire body of stakeholders who in one way or another yielded valuable ideas, resources and time to support the completion of this exercise.

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Finally, the field team led by Mr. Solomon Elungat, Senior Disaster Management Officer and supported by Mr. Moses Banduga, GIS Expert, and Mr. Samuel Lwetutte and Ms. Pamella Drate, GIS Specialists, who painstakingly traversed the sub-region gathering local knowledge, mapping hazards and compiling these documents, deserves our thanks.

Hon. Hilary O. Onek

Minister for Relief, Disaster Preparedness and Management



EXECUTIVE SUMMARY

This Kotido 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 Refining and final map production/reporting

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

It identifies endemic hazards in twelve (12) classes, in order of high to low risk: Floods, Environmental degradation, Industrial accidents, Drought and food insecurity, Crop and animal disease, Land conflicts, Vermin's/Problem animals, Human diseases, Pest/parasite infestation, Cattle theft, Bush/Wild fires, Hailstorms/Lightning and strong winds.

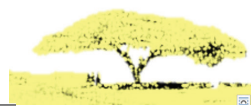
The discussion of the nature of each hazard and its geographic extent in terms of sub-counties provides a qualitative assessment of the situations that the communities face. Maps corresponding to each hazard show the areas where the hazard is significant, and also hotspots as points of incidence of the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

Kotido District lies between latitude 2°41'N and 3°15'N, longitude 33°49'E and 34°35'E in northeastern Uganda and bordered on the north and northeast by Kaabong District, on the west by Abim District, and on the south and southeast by Moroto District.

The findings identify twelve hazards predominant in the district, in order of decreasing risk: drought and food insecurity, environmental degradation, human disease, flooding, pest infestations, crop and animal disease, land conflicts, strong winds, bushfires, cattle theft, hail storm and lightning, and vermin and problem animals.

Drought, environmental degradation, human disease ranked closely as the most dangerous and high-risk hazards for people throughout Kotido District.

All of the sub-counties have significant vulnerability to disaster, accumulating risk from these hazards. Kacheri and Kotido sub-counties have the highest risks, and Rengen is distinguished by manifesting all twelve hazards. This aggregated vulnerability to several hazards at once compounds the exposure to disaster risk and the complexity of managing it. Kotido Town Council has the lowest risk but still aggregates significant vulnerability to most of the hazards.



INTRODUCTION

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

Objectives

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

Methodology

The multi-hazard, risk and vulnerability mapping approach employed a people-centred, 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 Karamoja 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 in Karamoja Sub-Region districts studied) and data from other organizations 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 Refining 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: Dissemination Workshop

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

Overview of the District

Brief district history

Kotido is one of the 120 districts of the Republic of Uganda, and one of the 7 districts of Karamoja Region. Kotido District was subdivided from the Karamoja district administration in 1971.

Location and administrative structure

Kotido District lies between latitude 2°41'N and 3°15'N, longitude 33°49'E and 34°35'E in northeastern Uganda and bordered on the north and northeast by Kaabong District, on the west by Abim District, and on the south and southeast by Moroto District. Kotido is basically what used to be Jie County. Kotido District has an area of 3,618km² and comprises 5 rural sub-counties, 25 parishes (LCIIs) and 168 villages (LCIs). The district has one Urban Council namely, Kotido Council.

Ethnicity

The major ethnic group in Kotido District is the Jie from the Ngijie speaking group of the Karamojongs. They are mainly pastoralists and live in clustered settlements known as mayattas. There are also traces of Luo speaking people among other tribes in the District, mainly in areas of Kacheri Sub County and Kotido TC.

Topography

Kotido District lies at the heart of Karamoja's largest inland plateau, a pedepain that extends from Kidepo Valley through Bokora to the foot of Mt. Elgon. Karamoja region was formed during the later pre-Cambrian system of the Mesozoic and Cenozoic groups associated with volcanic eruptions from the eastern parts Uganda, represented by Elgon, Kadam, Moroto, Napak and Toror Mountains with Maaru and Kacheri hills found in Jie County/ Kotido District.

The altitude of Kotido ranges between 100m to 2500m (Mt. Toror) above sea level. It is part of Central Karamoja which forms part of the plateau with several stages of transition of the ancient basement rock.

Climate and Rainfall

Kotido has savannah vegetation to the west and a semi-arid climate with thorny bushes and shrubs to the east and northeast, characterized by an intensely hot season from November to March with strong winds and dust storms. Rainfall is mainly orographic, i.e., precipitated from air forced upward by terrain.

The rainy season is from April to August, contributing to a sparse average 519 mm per annum, unevenly distributed and dependent on the local factors. There are a distinct minimum in June and a



maximum in May and July. The rain is erratic timing and volume. Distinct wet and dry seasons are a prominent feature. The most common forms of precipitation are day-time showers, early morning dews and occasional mists. Rainfall is frequently accompanied by electrical storms. Hailstones and fog occur once or twice a year.

Rainfall is inadequate, unevenly distributed and sparse, disadvantaging agricultural production and economic growth in the district. There is one long dry season from October to February with dry spells in June to August. The daily temperatures range from 20°C to 35°C. Relative humidity can reach 60% between June and July.

Overall, Kotido slopes westwards from the border of Karamoja Region with Kenya, formed by the western escarpment of the Great East African Rift Valley. The district is mainly drained by Kapetha/Lolelia, Dopeth, Longiro, and Lokwakieal Rivers flowing westwards and Nangoolapolon River flowing south-westwards.

Soils

Jie County/Kotido District is mainly composed of three types of soils. Principally, vertisols cover all the south and east, and luvisols are found at the western and northern margins of Abim and Kaabong Districts respectively. Gleysols extend from the north-western border with Pader District. Vertisols is a type of tropical soils formed during the pre-Cambrian system from sedimentary metamorphosed rock formation/strata. Jie County/Kotido District is in a fold structure, called Aruan-Central Karamoja Gneiss with narrow shear belts occurring.

Generally, the soils in Kotido District are affected by many factors such as climate, elevation, type of parent rock, vegetation cover, topography, aggravation, farming, land fragmentation and erosion processes.

All the soils of Kotido are low to medium productivity with mono-cropping currently being practiced. Much of the soil has lost its fertility because of frequent droughts and desertification. Sheet erosion occurs due to torrential rain and strong winds that carry away top soil cover. The soil cover is also changing due to the large herds of cattle of the Jie which numbered two million head during the last national livestock census. Subsequent overgrazing destroys the ground cover and exposes soil to agents of erosion, persistent drought, desertification and climate change stresses.

Vegetation

The vegetation pattern is typically semi-arid with agro-pastoral zones in the east of the district and typical savannah tree and grass species to the west and northwest along the borders with Abim, Pader and Kaabong Districts.



Population and Demographics

Table 1 Projected 2012 Population of Kotido District by Sub-county

Sub County	Male	Female	Total
Kacheri S/C	12,600	14,900	27,500
Kotido S/C	20,900	27,100	48,000
Kotido TC	11,700	12,700	24,400
Nakapelimoru S/C	12,400	15,200	27,600
Panyangara S/C	32,800	38,100	70,900
Rengen S/C	16,200	18,700	34,900
Total	106,600	126,700	233,300

Table 2 The Major Tribes and Languages Spoken in Kotido District

Sub County	Tribe	Language
Kacheri	Jie, Bagishu and Acholi	Ngajie, Lugishu and Luo
Kotido SC	Jie	Ngajie
Kotido TC	Jie , Acholi and Bagishu	Ngajie , Luo and Lugishu
Nakapelimoru	Jie and Turkana	Ngajie and Ngaturkana
Panyangara	Jie	Ngajie
Rengen	Jie	Ngajie



Livelihoods

Table 3 Kotido District Main Livelihoods, by Sub-County and Town Council

Agro-Ecological Zones	Livelihood	Sub-Counties
West Agricultural Zone	Crop farming (Simsim, Ground nuts, Sorghum, Bulrush millet)	Kacheri
	Fishing in dams	Kacheri
	Apiary	Kacheri
	Crafting	Kacheri
	Charcoal burning and firewood collection	Kacheri
	Casual labor	Kacheri
	Local brewing "Abutia"	Kacheri
Agro-pastoral Zone	Crop farming (Simsim, Ground nuts, Sorghum)	Kotido SC, Kotido TC, Nakapelimoru, Panyangara and Rengen
	Fishing in the Dams	Kotido SC
	Crafting	Kotido SC, Kotido TC, Nakapelimoru, Panyangara and Rengen
	Sand mining	Kotido SC, Kotido TC, Nakapelimoru, Panyangara and Rengen
	Stone quarrying	Kotido SC, Kotido TC and Rengen
	Casual labor	Kotido SC, Kotido TC, Nakapelimoru, Panyangara and Rengen
Agro-pastoral Zone	Local brewing "Abutia"	Kotido SC, Kotido TC, Nakapelimoru, Panyangara and Rengen
	Rearing of animals	Kotido SC, Kotido TC, Nakapelimoru, Panyangara and Rengen
	Brick making	Kotido SC, Kotido TC, Nakapelimoru, Panyangara and Rengen
	Charcoal burning and firewood collection	Kotido SC, Kotido TC, Nakapelimoru, Panyangara and Rengen
	Petty trading	Kotido SC and Kotido TC
Pastoral Zone	Rearing of animals	Nakapelimoru and Panyangara
	Crafting	Nakapelimoru and Panyangara
	Casual labor	Nakapelimoru and Panyangara
	Local brewing "Abutia"	Nakapelimoru and Panyangara
	firewood collection	Nakapelimoru and Panyangara

Women's livelihoods

The women of Kotido are the main breadwinners, engaging in various activities including farming, charcoal burning, firewood collection, bee-keeping, casual labour, local brewing, stone quarrying. Some are in the formal business sector.



HAZARDS

Table 4 Hazard Summary

Hazard	Status	Sub County	Rank
Drought and Food Insecurity	Incidences of prolonged dry spells associated with food shortages reported	Nakapelimoru, Panyangara, Kotido TC, Kotido SC, Kacheri and Rengen	1
Environmental Degradation	Incidences of Charcoal burning, brick making, fencing (Manyata style), overgrazing, poor waste disposal, bush burning present	Nakapelimoru, Panyangara, Kotido TC, Kotido SC, Kacheri and Rengen	2
Human disease	Cases of Cholera, Meningitis, Malaria, Yellow Fever, Hepatitis, Jiggers, Pneumonia, Brucellosis, and Typhoid reported	Nakapelimoru, Panyangara, Kotido TC, Kotido SC, Kacheri and Rengen	3
Flooding	Incidences reported	Nakapelimoru, Panyangara, Kotido TC, Kotido SC, Kacheri and Rengen	4
Pest Infestations	Incidences of Sorghum borers / Stalk borer, Tsetse flies, Ticks, Central shoot fly, Sorghum midge, Mily burg, Soil roaming termites, Tree locusts, Sacking grasshoppers, Aphids, Boll worms, Pod borers, Bean fly, Quala-quala birds Weeds (stiga) were reported.	Nakapelimoru, Panyangara, Kotido TC, Kotido SC, Kacheri and Rengen	5
Crop and Animal disease	Incidences of Sorghum smut, Leaf rust, Maize streak, Honey dew and Rosette Tick borne diseases (East Coast Fever and Anaplasmosis), Contagious Bovine Pleuropneumonia (CBPP), Peste de Petit Ruminante (PPR) and Contagious Caprine Pleuropneumonia (CCPP), New Castle and Coccidiosis were reported	Nakapelimoru, Panyangara, Kotido TC, Kotido SC, Kacheri and Rengen	6
Land Conflicts	Cases related with land conflict reported	Nakapelimoru, Panyangara, Kotido TC, Kotido SC, Kacheri and Rengen	7
Strong Winds	Incidences reported	Nakapelimoru, Panyangara, Kotido TC, Kotido SC and Rengen	8
Bush/Wild Fires	Instances of Bush/Wild bush fires reported	Nakapelimoru, Panyangara, Kotido SC, Kacheri and Rengen	9
Cattle Theft	Incidences of theft reported	Nakapelimoru, Panyangara, Kotido SC, Kacheri and Rengen	10
Hail storm and Lightning	Incidences of lightning were reported	Nakapelimoru, Kotido TC, Kotido SC, Kacheri and Rengen	11
Vermin and Problem Animal	Incidences of Elephants, Buffaloes, warthogs were reported	Kacheri and Rengen	12



Table 5 Summary of Hazards by Sub-county

Sub County	Floods	Crop and animal disease	Drought	Hail and lightning	Strong winds	Land conflicts	Bush/Wild Fires	Pest/Parasite Infestation	Cattle Theft	Environmental Degradation	Human Disease	Vermin , Problem Animal	Total
Nakapelimoru	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		11
Panyangara	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		10
Kotido TC	✓	✓	✓	✓	✓	✓		✓		✓	✓		9
Kacheri	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	11
Kotido SC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		11
Rengen	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Total	6	6	6	5	5	6	5	6	5	6	6	2	64

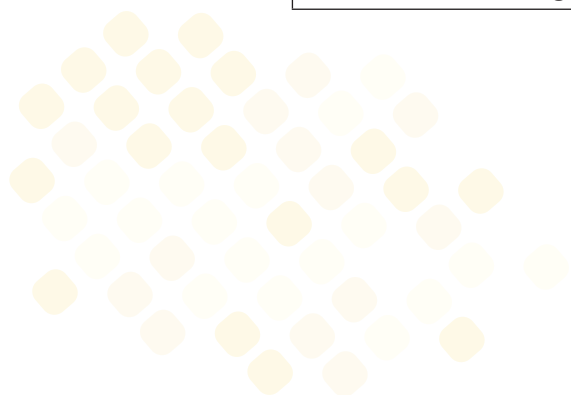
(shows which and how many hazards exist in each district)



Risk Assessment

Table 6 Hazard risk

Hazard Category	Nakapelimoru	Panyangara	Kotido TC	Kacheri	Kotido SC	Rengen
Floods	M	M	M	H	H	H
Crop and animal disease	H	M	L	H	H	L
Drought	H	H	H	M	H	H
Hailstorm and lightning	M	N	L	L	L	M
Strong winds	H	H	H	N	M	M
Land conflicts	M	M	H	M	M	M
Bush fires	Low	M	N	M	M	L
Pest, parasite infestations	M	L	L	H	H	M
Cattle theft	Low	L	N	M	M	M
Environmental degradation	H	High	M	H	H	M
Human disease	H	M	H	H	M	H
Vermin, problem animals	N	N	N	H	N	M
Risk: H = high, M = medium, L = low, blank = no risk reported						



RISKS

Flood Risk

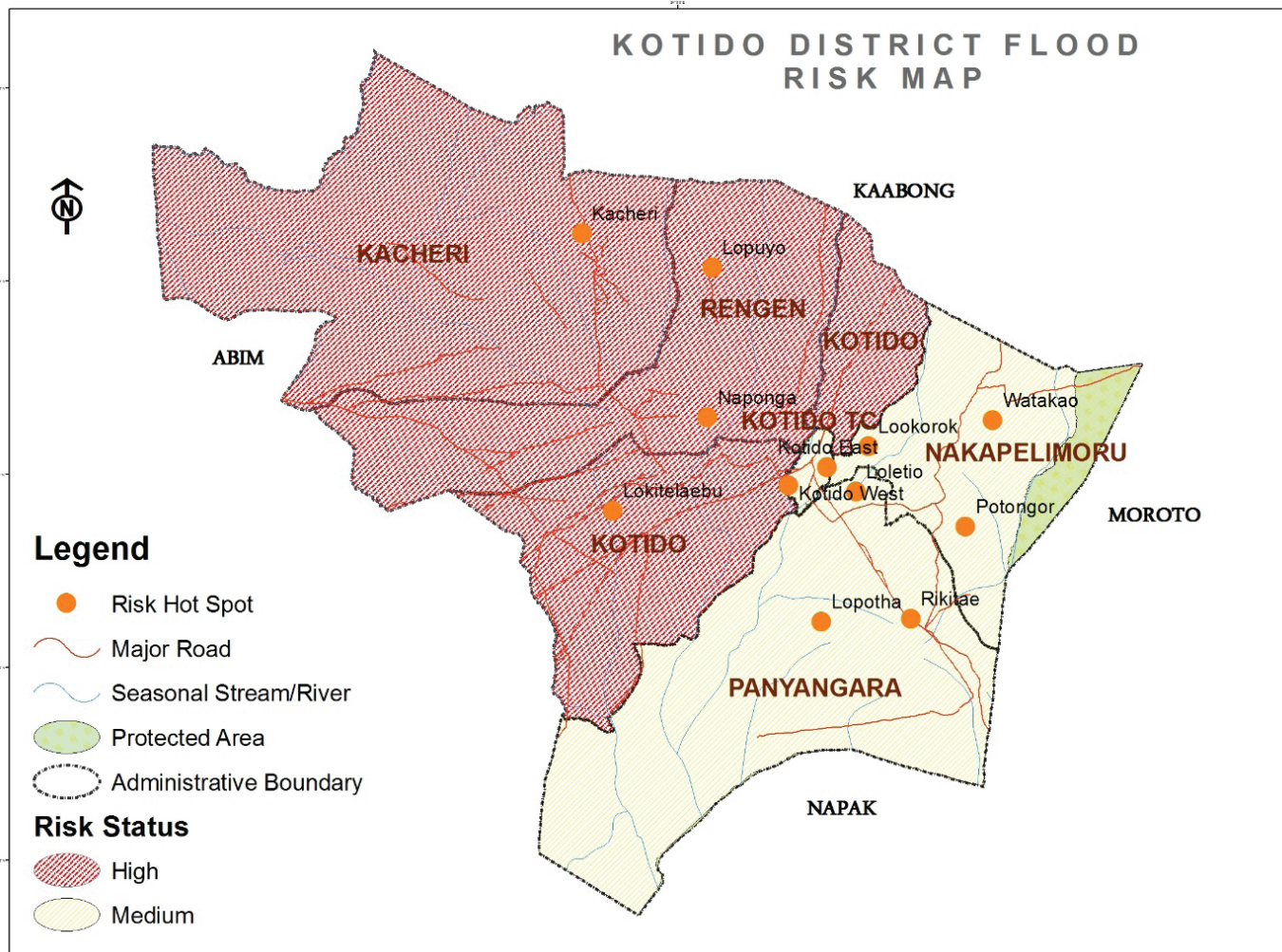


Figure 1 Flood risk

Flooding occurs mainly during the rainy season, usually in July – August, caused by heavy rains lasting 2 – 3 days. Waters flow from Kaabong (Zulia and Morungole hills) causing rivers to overflow their banks. Lopotha, Lotelio and Rikitae parishes flood mainly due to the Lopworokocha River that runs through these parishes. Floods cut off most road networks within these parishes. The Dopeth and Longiro Rivers flood Rengan (Nakwalet, Napeet and Um Um) and Kotido (Naokot, Kaidila and Kabalo) Sub-Counties inundating roads and bridges, destroying and homesteads, silting dammed water reservoirs and ponds, among other damage. For instance annually in Nakapelimoru sub county, floods destroy Kathileu Bridge and inundate the Lookorok-Nakapelimoru road. Specific damages reported include inundation of the Panyangara-Napumpum and Rikitie-Napumpum roads; and the Napumpum Irish Bridge destroyed and the river bed silted there; and the Napeikunyon Bridge in Loposa Parish at Loputuk village destroyed.



Drought and Food Insecurity Risk

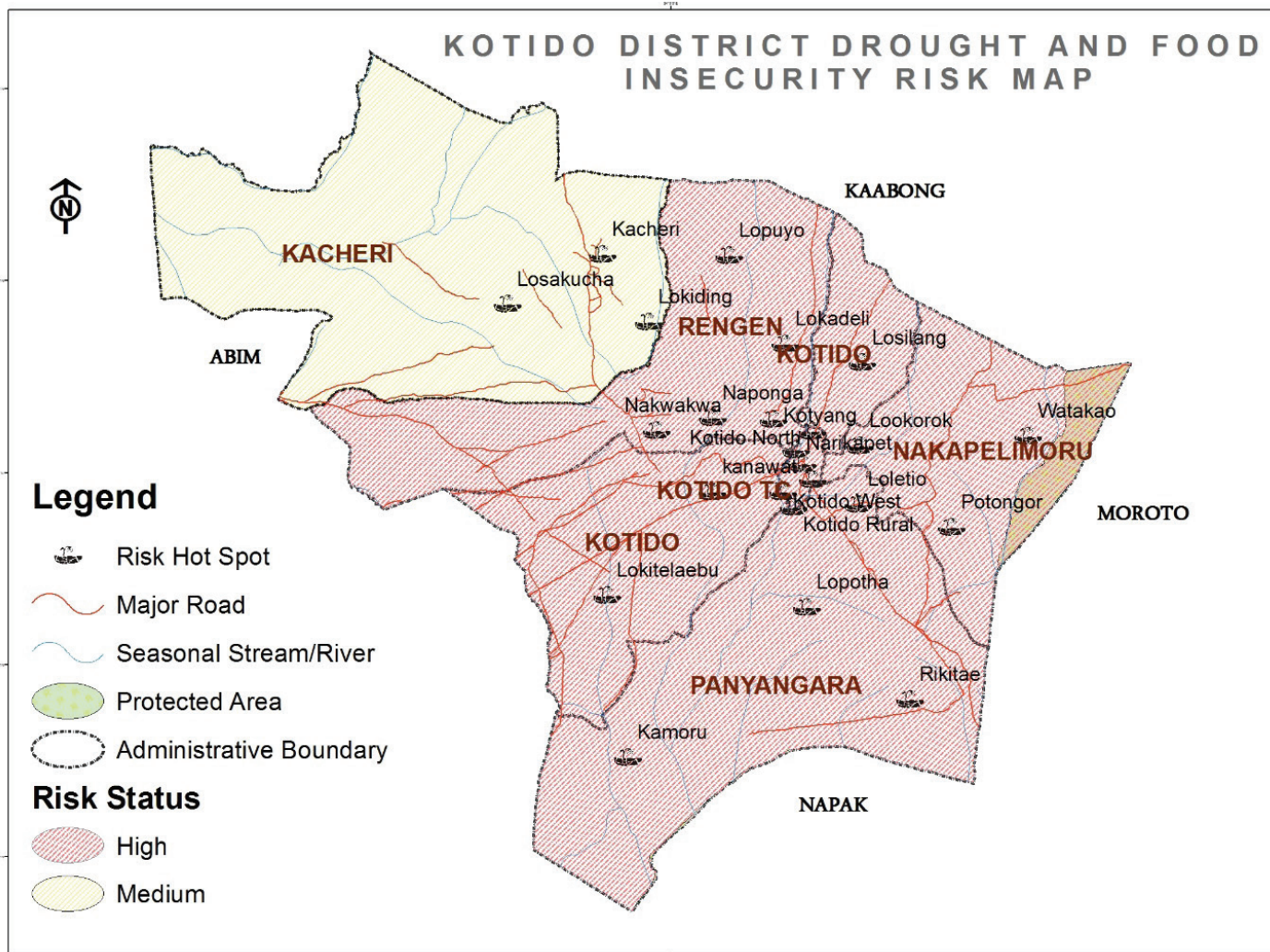


Figure 2 Drought and food insecurity risk

Kotido has relatively severe drought conditions from November to March characterized by high temperatures (27°C – 32°C), high evapo-transpiration rates, low or no humidity, unevenly distributed rains, clear sky, poor harvests, low livestock productivity, trans-boundary migration, drought related disease outbreaks, severe mortality of livestock due to infections, and inadequate water and pasture. Access to water for cattle can exceed 20km from settlements. During a drought in Kotido in 1980 almost 90% of the livestock died. Panyagara, Kitido, Nakapelimoru and Rengen have record high levels of drought and food insecurity risk. All sub-counties experience drought with severe food shortage and low productivity especially during the dry season.

The major constraints to livestock production are livestock theft, parasites and diseases and lack of money for veterinary services and drugs. Communities rely on the support of government and other partners for veterinary drugs and do not buy drugs even for treatable diseases. These conditions are linked with increased movement of people to reserved areas in the west of Kotido, such as Lobanya in Kacheri and Kangrok in Panyangara and the neighbouring District of Abim, Agago and Pader, to seek livelihood options.

Child casual labour includes wild fruit gathering (More than 60% of the population) and eating of seed.



Crop and Animal Disease Risk

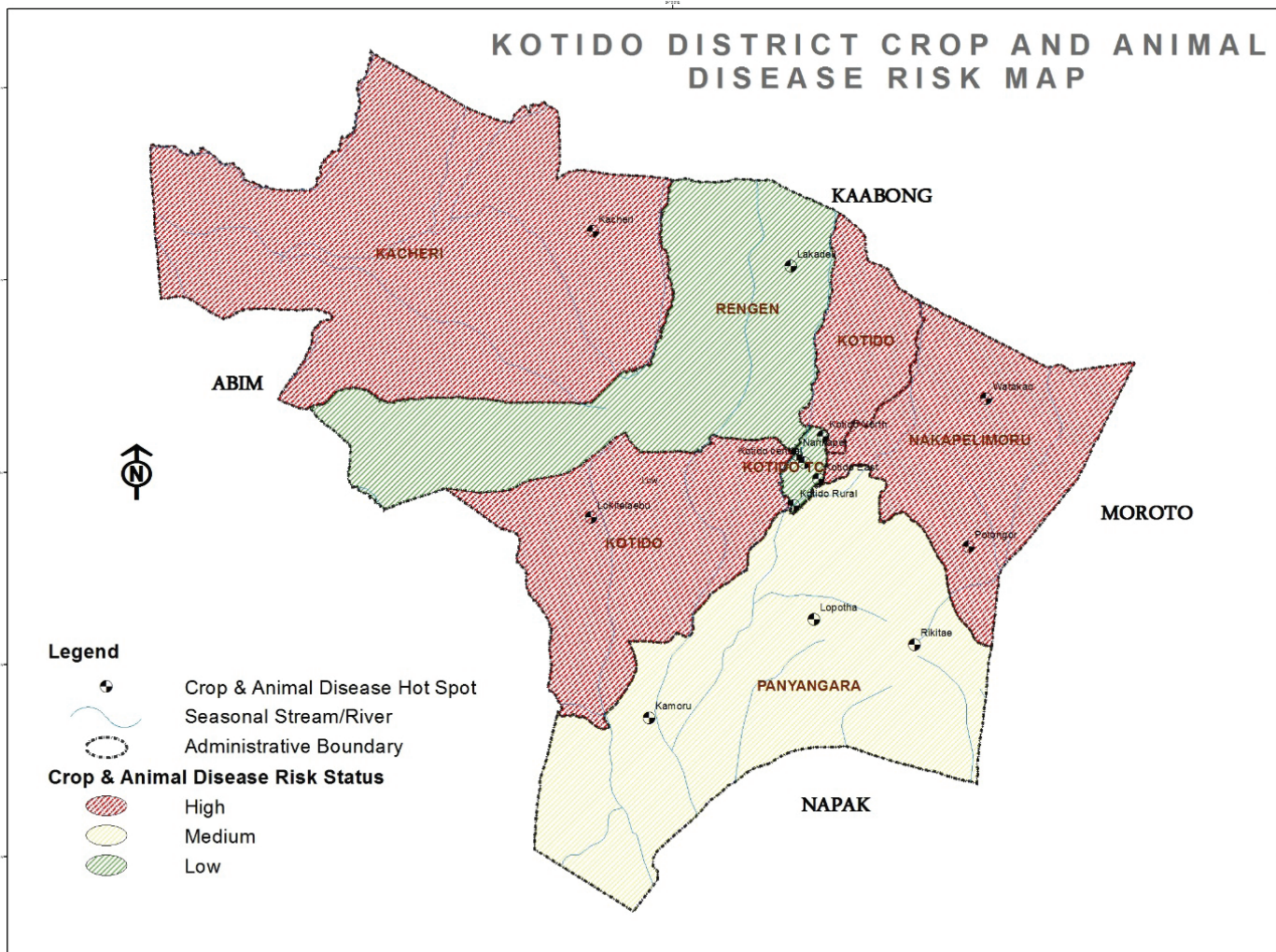


Figure 3 Crop and animal disease risk

Although the low densities of livestock in the district have considerably reduced incidence of infestation associated with large herds in communal grazing and watering points, the district still experiences crop and animal epidemics in all the sub-counties, mainly during the dry season. There is foot and mouth disease, Contagious Bovine Pleuropneumonia (CBPP), Peste de Petit Ruminante (PPR) and Contagious Caprine Pleuropneumonia (CCPP) in Nakapelimoru, Panyangara, Kacheri and Kotido TC while there is brucellosis and rabies in Kotido TC and Kotido SC, Honey due in Kacheri. Other cattle diseases reported include ECF, trypanosomiasis, FMD, and tick borne diseases; foot-rot in goats and New Castle Disease and coccidiosis in poultry. One of the major causes of infections is migration of livestock between Kotido to Abim and Pader. The most severe disease incidents are recorded in Kacheri, Nakapelimoru and Kotido Sub-Counties; Panyangara and Rengen record medium and low risk levels respectively.



Hailstorm and Lightning Risk

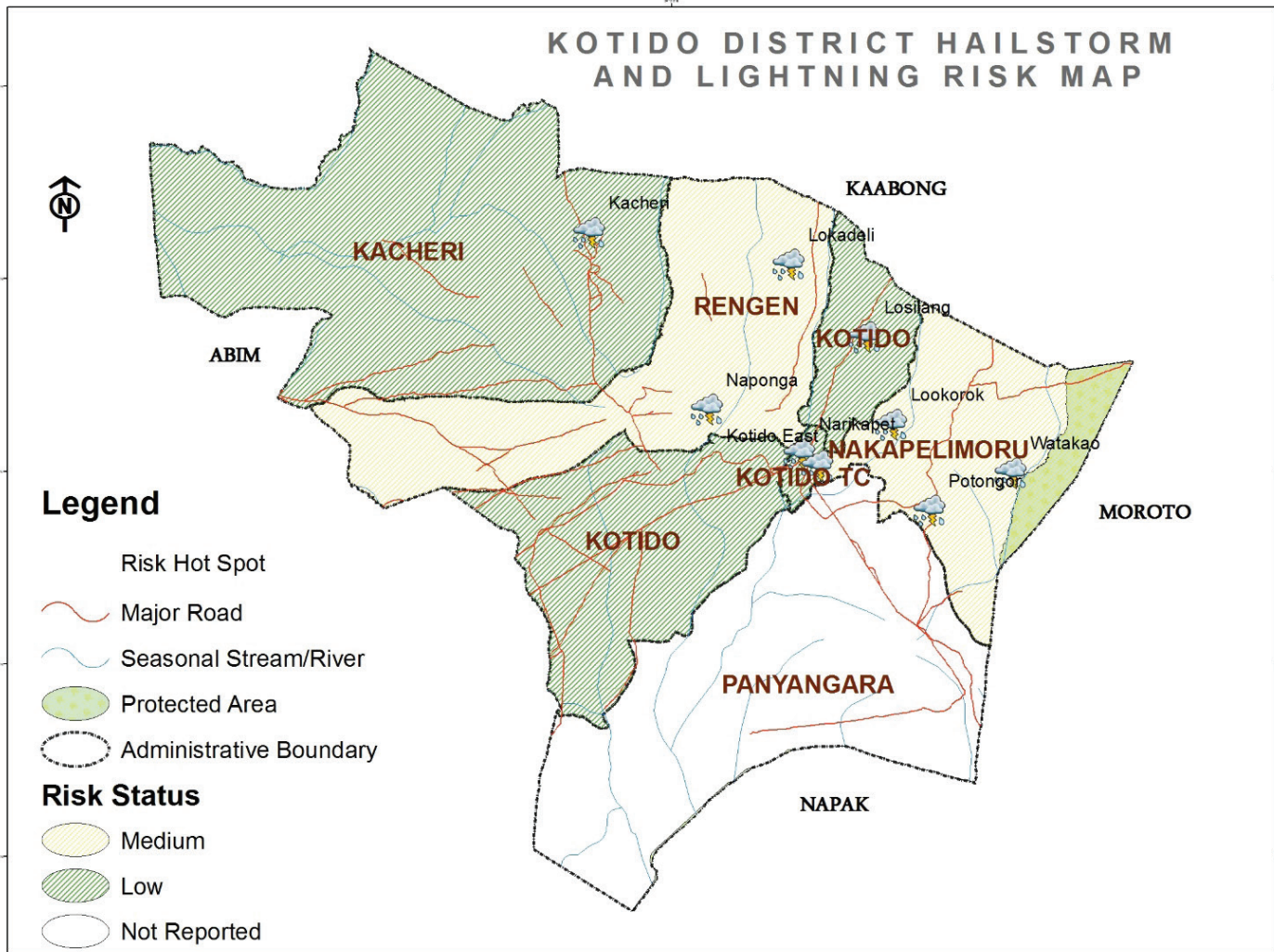


Figure 4 Hailstorm and lightning risk

Kotido experiences incidents of heavy rains and lightning annually across the district that are sometimes associated with fatalities and destruction of property. Risk hot spots recorded are Naponga and Lokadell Parishes in Rengen Sub-County, Kotido Town Council, and Patongo, Watakao and Lookorok in Nakapelimoru Sub-County.

Lightening hit a big tree in Nakapelimoru Primary School; in Kotido Town Council in 2012, lightning struck Kotido Health Centre and the NUSAF I building. Similar cases were also reported in Kotido Sub County. One student was killed in Kotido PTC in 2013 and another in Kotido Army Primary School. In Rengen Sub County, one boy was killed near the sub-county offices in 2013.

Strong winds risk

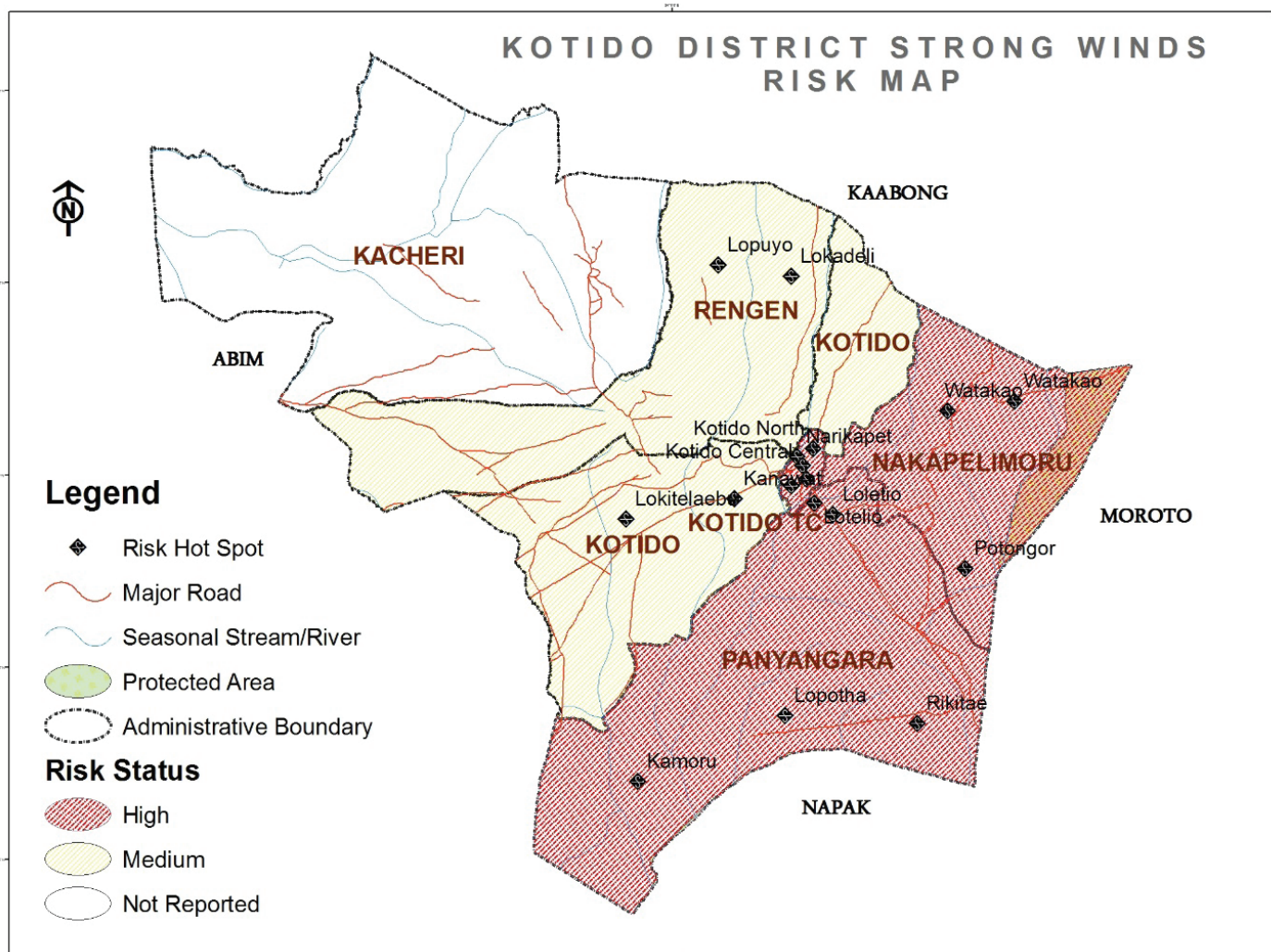


Figure 5 Strong winds risk

Strong winds with heavy dust storms in Kotido occur during the dry season, and especially between November and March. Then between December and April of each year, north-easterly winds blow strongly in areas which are relatively flat and bare leading to property destruction across the district, except in Kacheri Sub-County. Panyangara and Nakapelimoru Sub-Counties rank high in risk compared to Rengen and Kotido which rate medium. Strong wind events include the loss of classroom roofs of Kanair Primary School in Nakapelimoru Sub County and Kadokin Primary School in Panyangara Sub County. In Kotido Town Council, a number of houses lost roofs to strong winds in Narikapet and Entebbe area.



Land Conflicts Risk

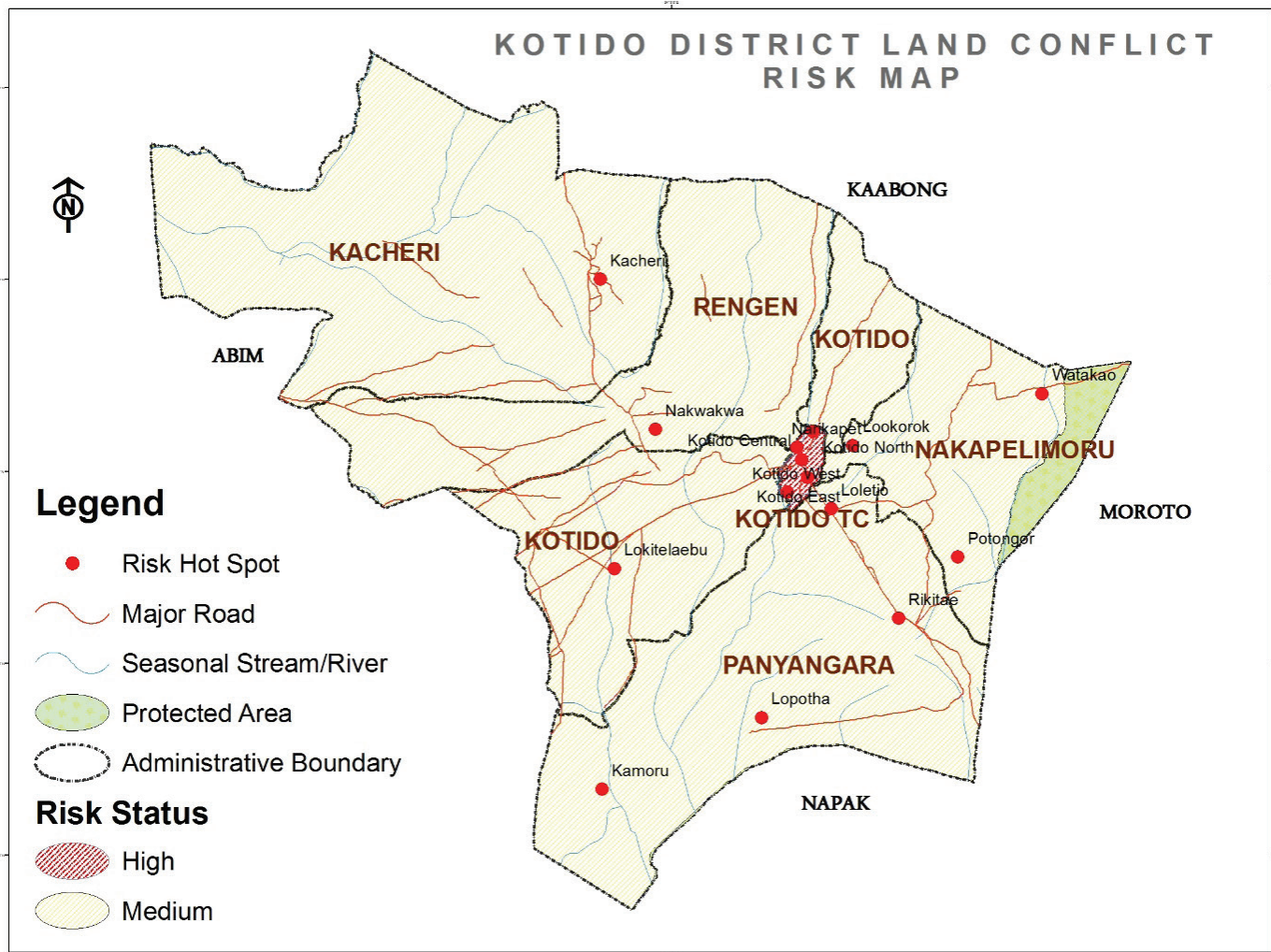


Figure 6 Land conflict risk

Land conflicts are becoming more common with improved security in Kotido. Kotido Town Council records the highest risk of land conflict, attributed to the growing value of urban land fueled by urbanization and population growth.

Other causes of land conflict in the district include unplanned settlements, an inadequate land title system, breakdown of traditional communal land ownership agreement, ignorance about existing land policies and laws and political interference. In severe cases, this has led to injuries, loss of lives, land grabbing, destruction of property and crops. For instance, in Panyangara, a person was killed in a land dispute, and in another incident, two lives were lost and others left their homes in a conflict between the local communities and Uganda Wild life Authority.

In a Nakapelimoru risk hot spot, the community is in conflict with the Nakapelimoru Health Centre III about the location of the facility. Conflict between the Jie of Kotido and the Dodoth of Kaabong over Loyoro is another ongoing hot spot.

Bush fire risk

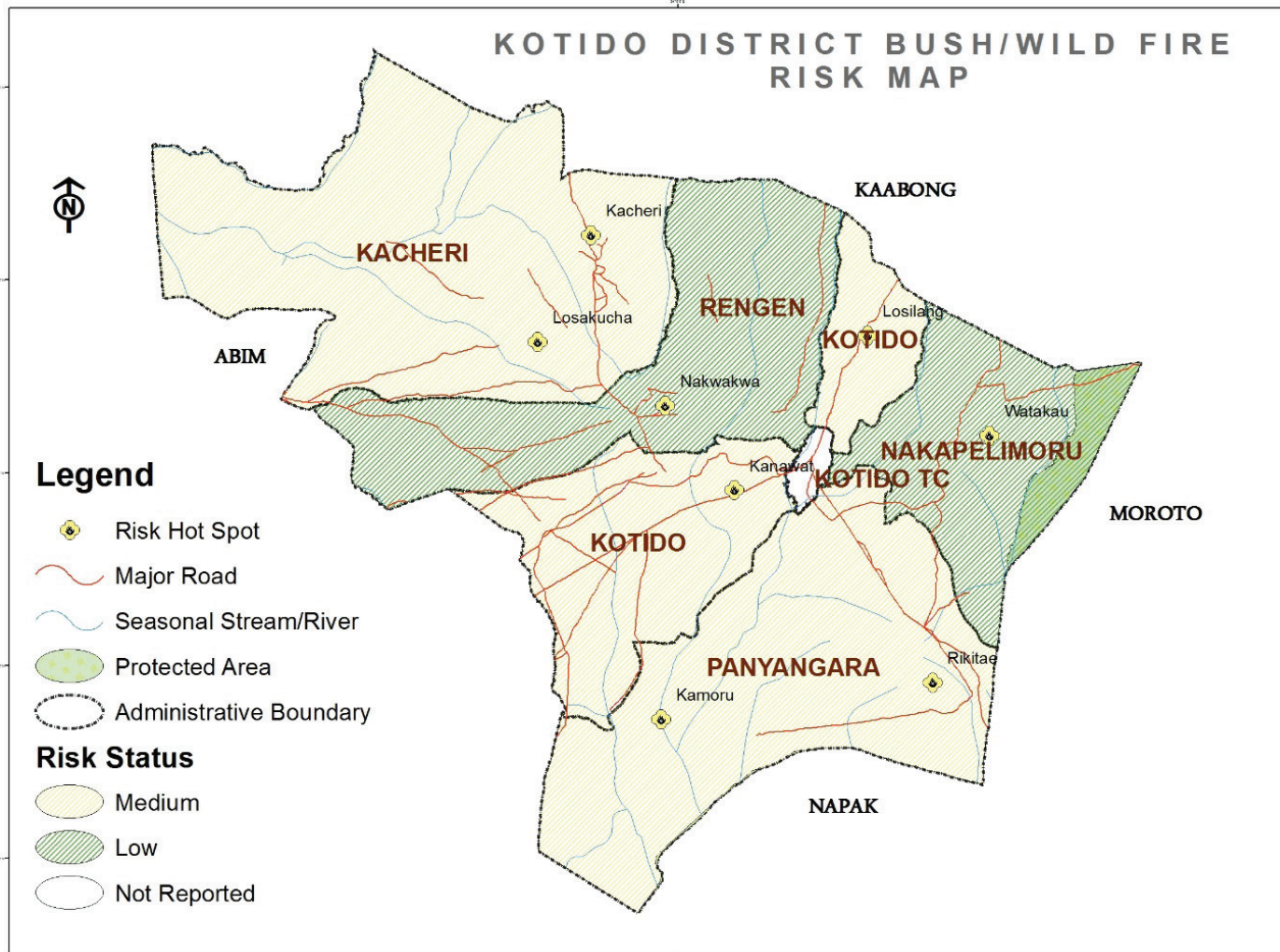


Figure 7 Bush fire risk

Fire outbreaks in Kotido District normally occur in homesteads and grasslands due to a number of factors that include clearing of land for agriculture and new pastures, burning grass for pest control, charcoal burning, using fire to flush out hunted animals and negligence in homesteads. Strong winds spread the fire leading to destruction of property and loss of life. A number of risk hot spots are reported including Kamoru and Rikitae in panyangara Sub County, and Losakucha and Kacheri in Kacheri Sub County. Fires are also common in Losilang and Rom Rom (Kotido Sub County). In Nakapelimoru Sub County, homesteads burned in Watakau. In Panyangara sub county, 6 villages burned in Rikitae in 2012 (Nadome, Nadou, Lolito, Kangorok, Moruadang and Lorwang). In Kacheri, large farmlands were burnt in 2014.



Pest and parasitic infestations risk

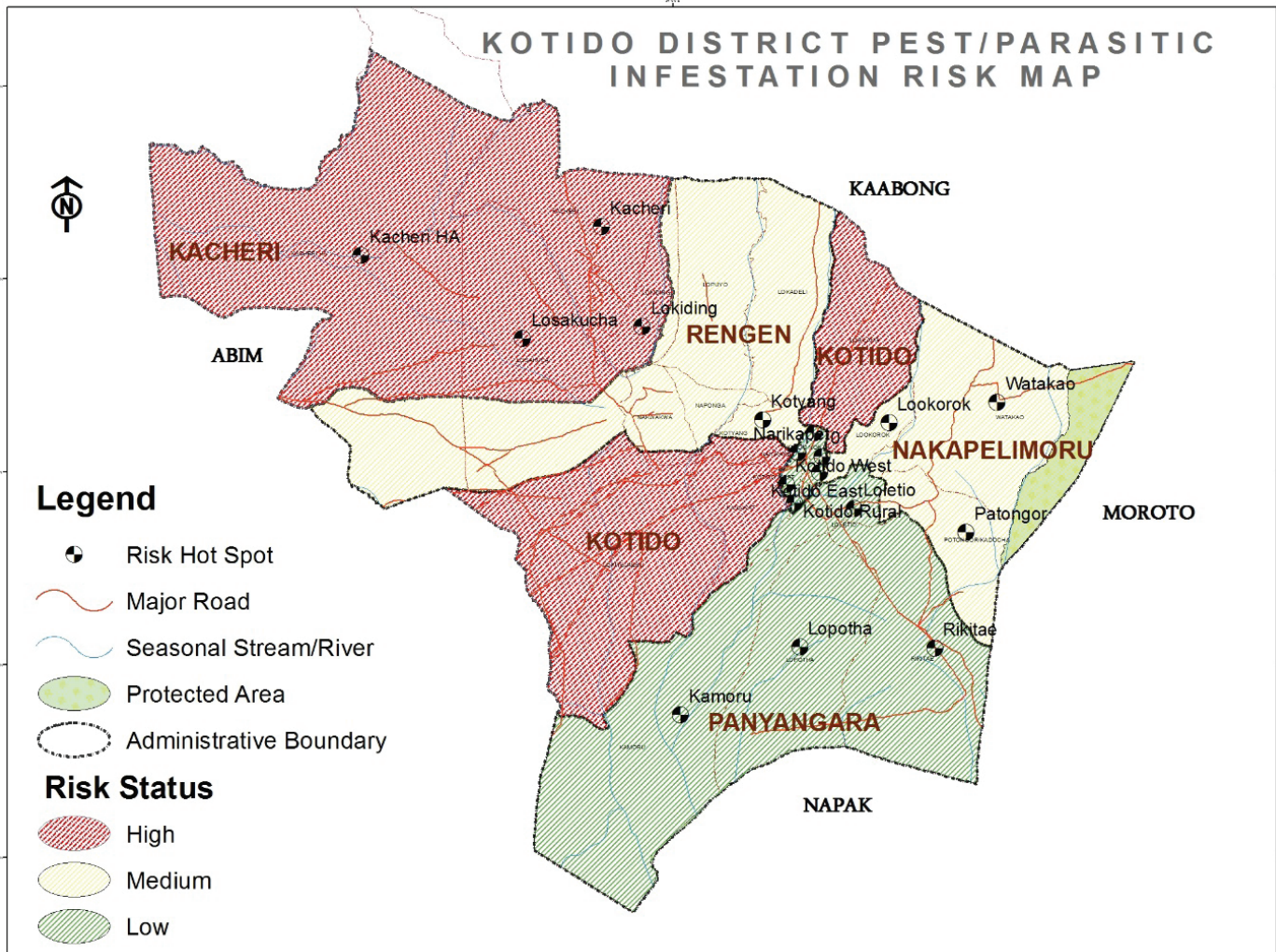


Figure 8 Pest and parasitic infestations risk

Kotido experiences pest infestations in all the sub-counties but more severely in Kacheri and Kotido sub-counties. Sorghum stalk borers are problematic in Nakapelimoru sub county (Patongor, Watakao, Lookorok parishes) and Kotido Town Council especially Kotido Rural ward, and ticks in Panyangara affect livestock (parishes of Kamoru, Lopotha and Rikatae). Risk hot spots for Tsetse flies are reported Kacheri HA, losakucha and lokitding parishes in Kacheri Sub-County as well as in Rengen Sub-County mainly in Kotyang Parish.

Cattle theft risk

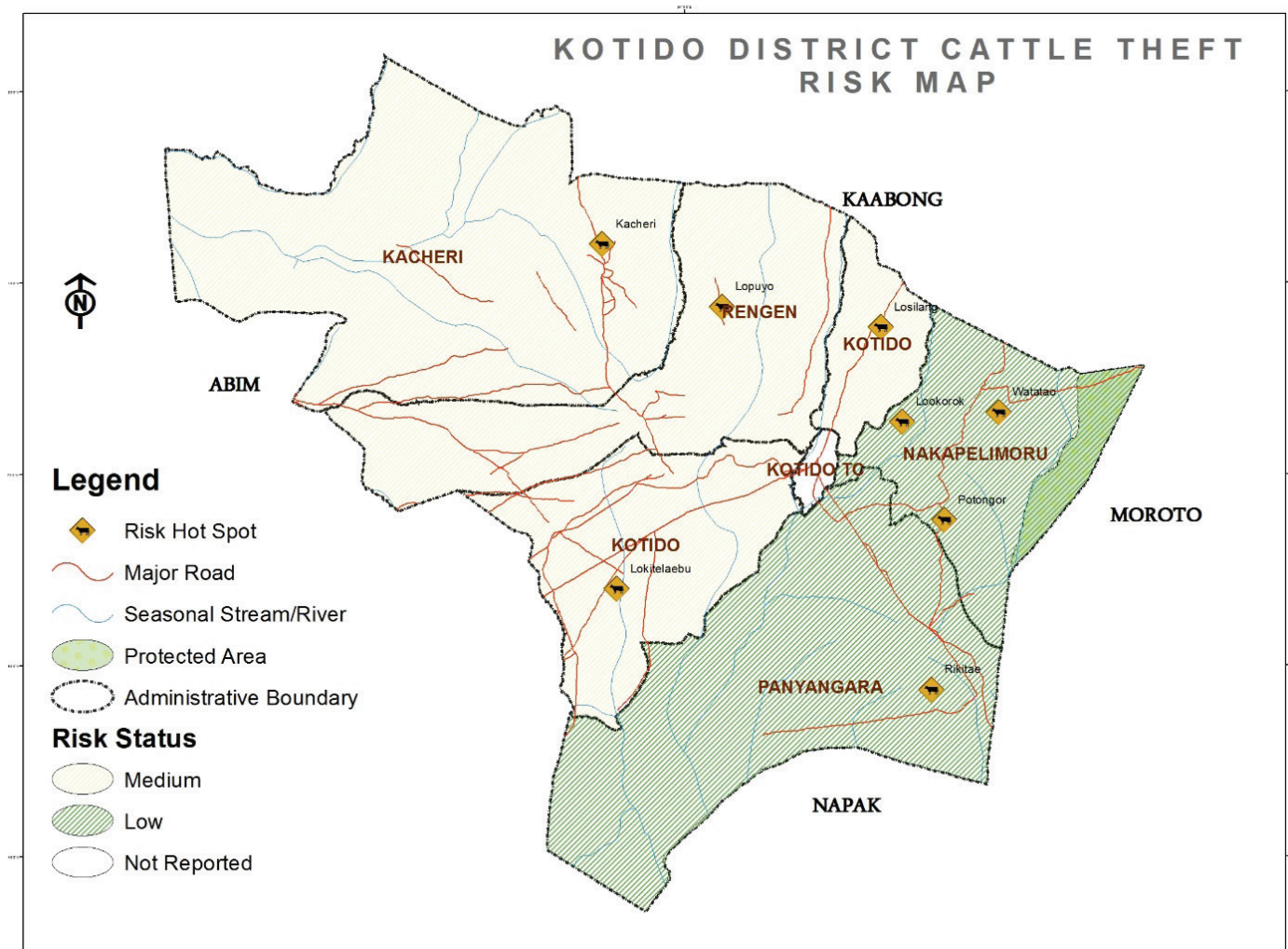


Figure 9 Cattle theft risk

Kotido like other Karamoja Districts still experiences a moderate incidence of theft of cattle, sheep and goats. These animals are trucked to neighboring districts such as Kaabong and Napak. Others are taken as far as South Sudan. There is also internal theft in the Jie community in Kotido. In Nakapelimoru the communities of Dodoth and the Bokora report incidents. In Rikitaa (Panyangara Sub County) more than 9 animals were reported stolen and carried to South Sudan and one person was killed. In 2014 two cattle thefts were recorded in February, one in March and one in April; reportedly these animals have been carried to Kaabong and South Sudan.



Environmental degradation risk

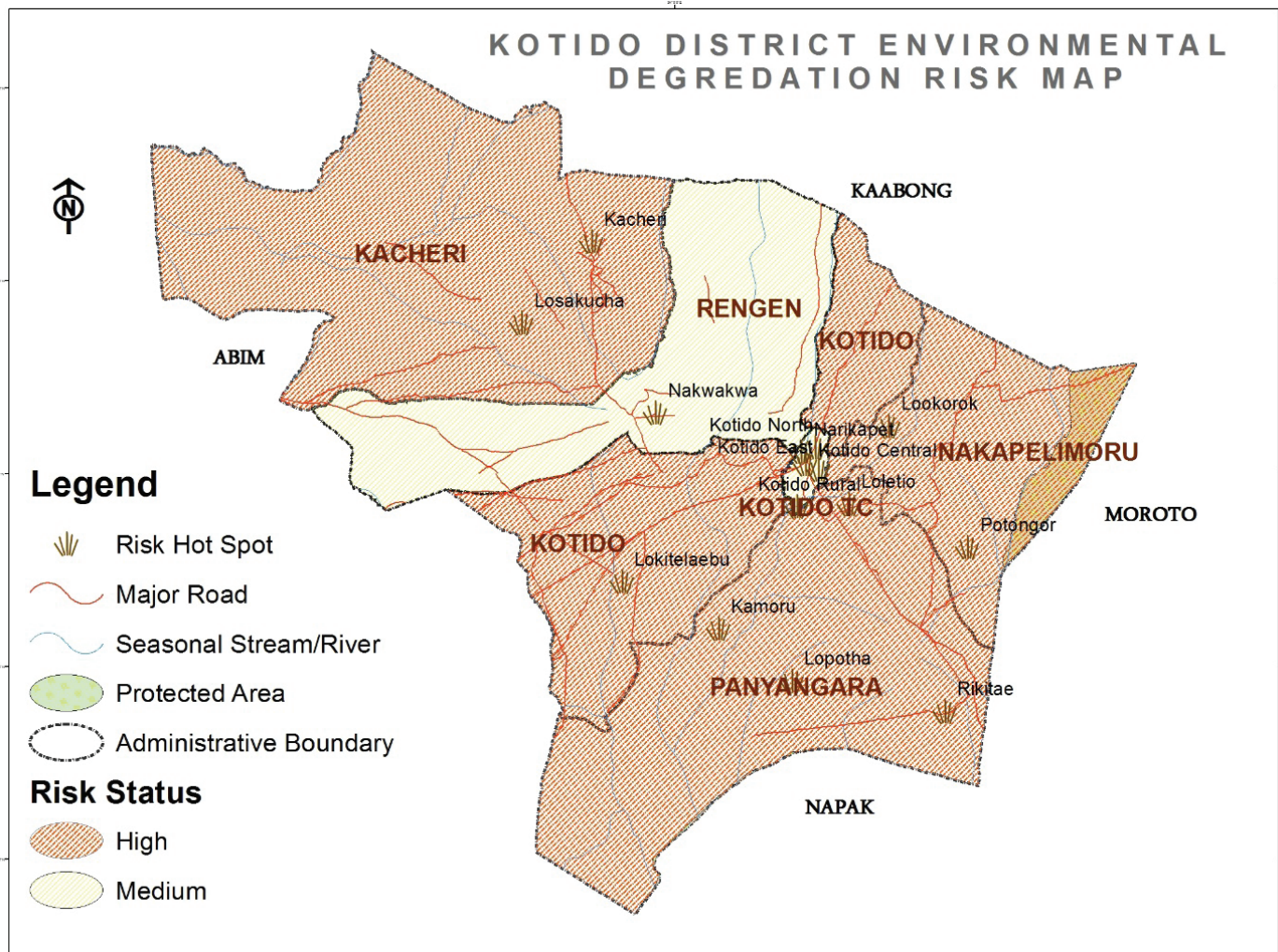


Figure 10 Environmental degradation risk

In Kotido a number of environmentally degraded sites have impacted the livelihoods of the people. Areas of relatively severe environmental damage are reported in all the sub counties, apart from Rengen, with medium risk levels reported.

Notable risk hot spots are linked to deforestation in Chamkok and Kogiligili (Kotido Sub County), and commercial charcoal burning in Lokitelaebu (Kotido Sub county), Kacheri and Nakwakwa parishes (Rengen Sub county).

Near Toror (Panyangara), forest has been lost to clearing land for resettlement in Potongor in Nakapelimoru, Kangorok (Panyangara Sub county) and Lobanya (Kacheri Sub county). Brick making in Prisons and Narikapet (Kotido Town Council) and Near Dopeth river (Kotido Sub county) scars the land, and over-grazing in all the Sub Counties except Town Council leaves the topsoil vulnerable to erosion. Poor planning and lack of sanitation facilities in urban areas like Kotido Town Council, Kanawat and Lokitelaebu (Kotido Sub county), Kapadokok (Panyangara Sub county) and Napwatapuli (Kacheri Sub county) have polluted watercourses. In general, poor agricultural practices like bush burning, monoculture and others are reducing crop productivity.

Human disease risk

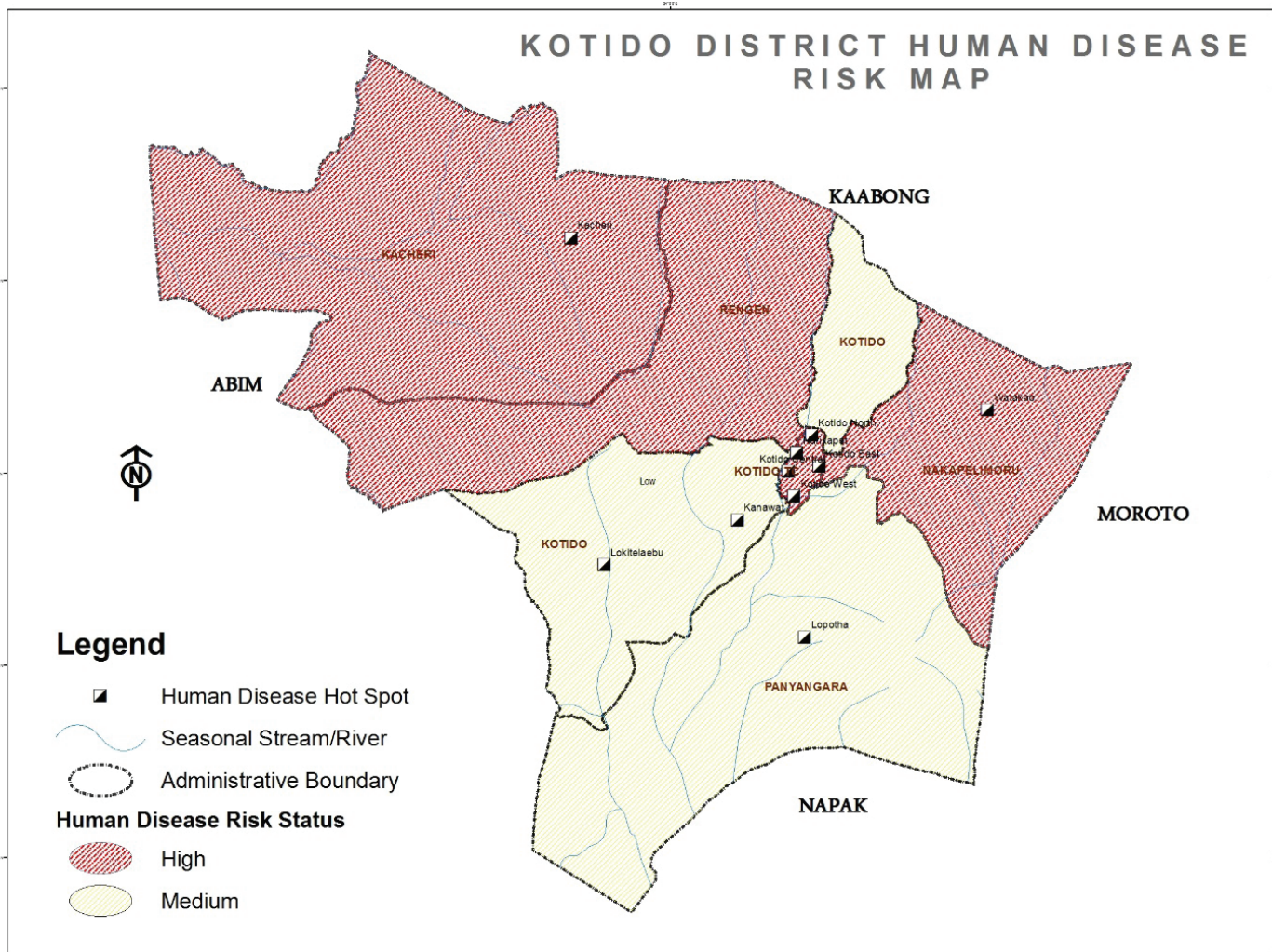


Figure 11 Human disease risk

Incidence of human disease is reported throughout the district, highest in Kacheri, Nakapelimoru Town Council and Rengen. Cholera, typhoid, meningitis, malaria, yellow fever, hepatitis, jiggers, pneumonia and brucellosis are common. The most recent hot spots were in 2011 and 2012 with cholera in Watakao Parish (Nakapelimoru Sub County), Kanawat and Lokiteleabu (Kotido Sub County), Loletio (Panyangara Sub county), Kotido Town Council and Kacheri. Jigger infestations have been reported in Rengen Sub County from April 2013 to date, and meningitis in Kotido town council and Rengen Sub County in 2011. These impact the livelihoods of the population in the district.



Vermin and problem animal risk

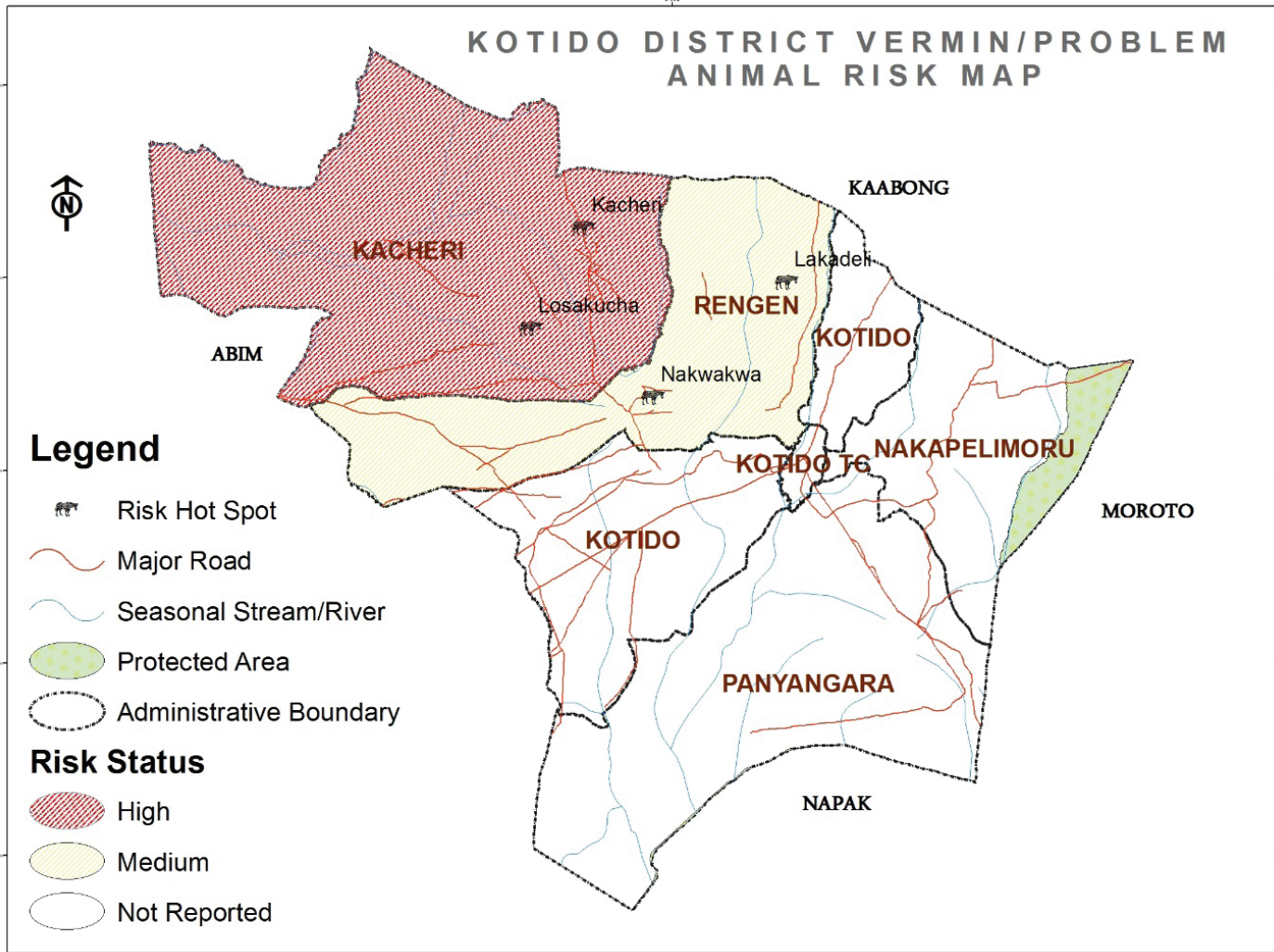


Figure 12 Human disease risk

Vermin and problem animals affect the people of Kotido especially in the areas of Kacheri (high risk) and Rengen (medium) due to elephants, buffaloes, and warthogs from game and forest reserves and Kidepo National Park. This leads to destruction of crops, property and loss of lives in those respective areas.

VULNERABILITY

Table 7 shows the perception of the communities of the relative severities and likelihoods of the reported hazards. The cells contain cells with quantification of risk in discrete values assigned from **Table 6** as (High = 3, Medium = 2, Low = 1, No risk reported = 0). The right-hand column sums the risk scores, by which the table is sorted, in descending order of risk value to rank the hazards by decreasing community vulnerability. Similarly, the bottom row sums the risk scores of the sub-countries and town councils, to give an indication of their relative vulnerabilities.

Table 7 Vulnerability assessment

HAZARD CATEGORY	Nakapelimoru	Panyangara	Kotido TC	Kacheri	Kotido SC	Rengen	Total
Drought	3	3	3	2	3	3	17
Environmental degradation	3	3	2	3	3	2	16
Human disease	3	2	3	3	2	3	16
Floods	2	2	2	3	3	3	15
Crop and animal disease	3	2	1	3	3	1	13
Strong wind	3	3	3	0	2	2	13
Land conflict	2	2	3	2	2	2	13
Pest, parasite infestations	2	1	1	3	3	2	12
Bush fire	1	2	0	2	2	1	8
Cattle theft	1	1	0	2	2	2	8
Hailstorms and lightning	2	0	1	1	1	2	7
Vermin, problem Animals	0	1	0	3	0	2	5
Total	25	22	19	27	26	25	



Vulnerability map

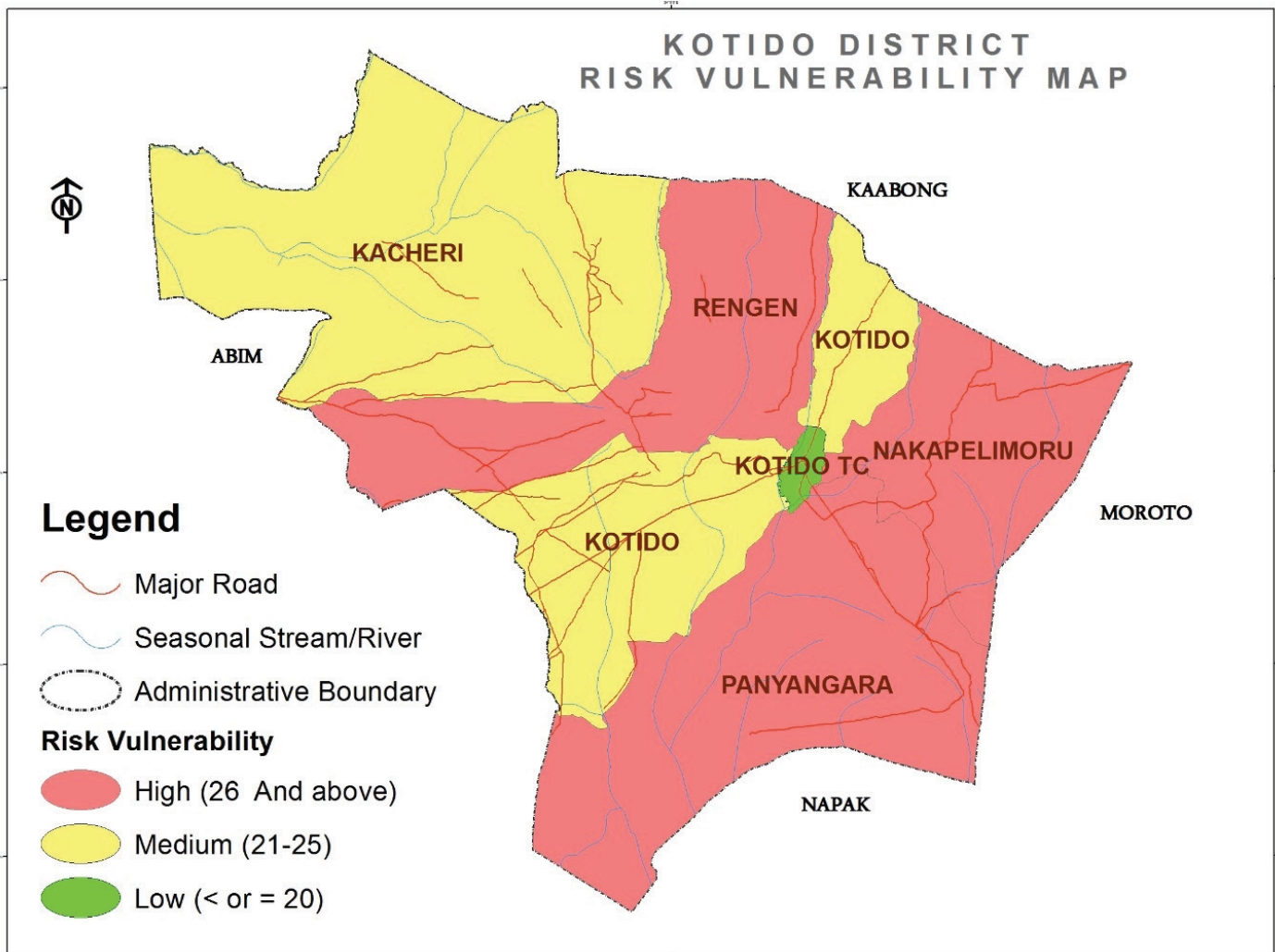


Figure 13 Vulnerability map

Based on the frequency of hazard events and the magnitude of loss suffered, Rengen, Nakapelimoru and Panyangara Sub-Counties are assessed at high risk and vulnerability levels. Kotido Town Council rates lowest vulnerability levels in the district.

Significant risks registered in the most vulnerable sub-counties are in Panyangara, Nakapelimoru and Rengen, with drought and food insecurity, strong winds, environmental degradation and human disease. Cholera was reported in Watakao Parish (Nakapelimoru Sub-County), jigger infestations in Rengen Sub-County, and meningitis in Rengen Sub-County in 2011.

Significant instances of environmental degradation in the highly vulnerable sub-counties are charcoal burning in Kacheri and Nakwakwa parishes (Rengen Sub-County) near Toror (Panyangara), and land clearing for resettlement in Potongor in Nakapelimoru and Kangorok (Panyangara Sub-County) respectively.

CONCLUSIONS

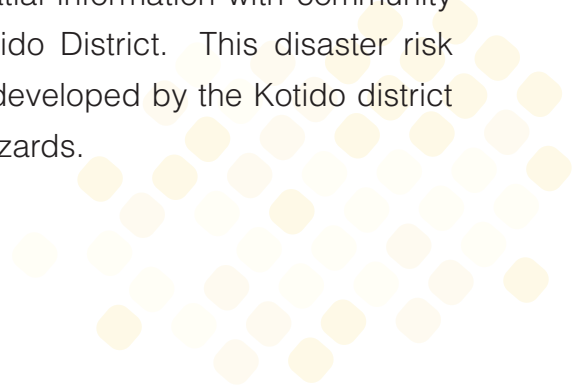
The multi-hazard vulnerability profile produced in this mapping exercise combines physical data and perceptual information captured with participatory methods in Kotido District. It provides an understanding of how the district perceives each hazard based on likelihood of occurrence and its impact on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

The findings identify twelve hazards predominant in the district, in order of decreasing risk: drought and food insecurity, environmental degradation, human disease, flooding, pest infestations, crop and animal disease, land conflicts, strong winds, bushfires, cattle theft, hail storm and lightning, and vermin and problem animals.

Drought, environmental degradation, human disease ranked closely as the most dangerous and high-risk hazards for people throughout Kotido District.

All of the sub-counties have significant vulnerability to disaster, accumulating risk from these hazards. Kacheri and Kotido sub-counties have the highest risks, and Rengen is distinguished by manifesting all twelve hazards. This aggregated vulnerability to several hazards at once compounds the exposure to disaster risk and the complexity of managing it. Kotido Town Council has the lowest risk but still aggregates significant vulnerability to most of the hazards.

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



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