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KARAMOJA

NAKAPIRIPIRIT District

HAZARD, RISK AND VULNERABILITY PROFILE

August 2014

With support from:

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Kampala, Uganda
For more information: www.undp.org

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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	Contagious Caprine Pleuro Pneumonia
CBPP	Contagious Bovine Pleuro Pneumonia
PPR	Peste des petits ruminants

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.

Our gratitude goes also to the UNDP for providing funds to support this initiative and to the UNDP/ OPM Team comprised of Mr. Jose Neil A. C. Manzano, Disaster Risk Management Advisor; Mr. Gilbert Anguyo, Disaster Risk Reduction Analyst; and Mr. Sidney Tupper, Climate Risk Management Specialist, for providing valuable technical support in the organization of the exercise, review of maps and findings, and editing of the profiles.

Finally, the field team led by Mr. Solomon Elungat, Senior Disaster Management Officer and supported by Mr. Moses Banduga, GIS Expert, Mr. Samuel Lwetutte, Ms. Pamella Drate, GIS Specialists and the entire district technical team 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 Nakapiripirit District Hazard, Risk and Vulnerability Profile integrates scientific information provided by GoU agencies and hazard and vulnerability knowledge provided by communities on the district base map to contribute to a Ugandan atlas of disaster risk. It will support planning and decision-making processes to manage disaster risk in the District

The methodology provided for four phases of work:

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

The report characterizes the district in terms of location, geography, gender demographics by sub-county 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 show the areas where the hazard is significant, and also hotspots as points of incidence of the hazard.

Nakapiripirit District has its geographic centroid at 01°55'N 34°40'E and is bordered in the north by Moroto District, in the east Amudat, in the west Katakwi and in the south Kumi, Sironko and Kapchorwa.

The report findings identify strong wind, bushfire, cattle theft, environmental degradation, drought, crop and animal disease, land conflict, flood, vermin, hailstorms and lightning, landslide, human disease, and industrial accidents as the predominate hazards in the district, in order of decreasing risk.

All of the sub-counties have significant vulnerability to disaster, accumulating risk from several hazards. Namalu, Moruita, Nabilatuk and Lorengedwat record the highest aggregate vulnerability levels compared to the other sub-counties in the district. Even the least vulnerable, Loregae Sub-County, has high risk of strong winds, bushfires, cattle theft and drought. This aggregated vulnerability to several hazards at once compounds the exposure to disaster risk and the complexity of managing it.

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.

INTRODUCTION

The Nakapiripirit 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 Nakapiripirit 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 Nakapiripirit District.

Methodology

The multi-hazard, risk and vulnerability mapping approach employed a people-centered, multi-sectoral, and multi-stakeholder approach. A mapping team led by the Office of the Prime Minister (OPM) and involving representatives from UNDP and district sector offices deployed on a field mission to 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 districts in Karamoja 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

Nakapiripirit District was one of the eleven Districts established by the Sixth Parliament of Uganda. Unlike the others, Nakapiripirit had been a District before (1973-1981). According to the 2002 Population and Housing Census, Nakapiripirit District had a population of 90,922 persons and was projected to have 121,101 in 2007 and 161,298 in 2012. Nakapiripirit District has its geographic centroid at 01°55'N 34°40'E and is bordered in the north by Moroto District, in the east Amudat, in the west Katakwi and in the south Kumi, Sironko and Kapchorwa. The District has an area of about 4,196 km^2.

Administrative arrangement

Nakapiripirit District comprises 2 counties, 7 sub-counties and 1 town council.

Table 1 Administrative Units

County	Sub-counties/town council	No. of parishes	No. of Villages
Chwekwii	Kakomongole	5	26
	Moruita	2	14
	Nakapiripirit TC	3	7
	Namalu	4	41
	Loregae	6	22
Pian	Lolachat	5	16
	Lorengedwat	3	12
	Nabilatuk	7	22
Total		35	160

N.B Eight more villages have been created by council but not yet approved.

Table 2 Population by gender, sub-county, county

County	Sub-counties Town council	No. of HH	Male	Female	Total	Average HH size
Chwekwii	Kakomongole	1,805	4,323	4,898	9,221	5.1
	Moruita	1,630	5,329	4,684	10,013	6.1
	Nakapiripirit TC	281	844	796	1,640	5.8
	Namalu	5,944	14,774	16,551	31,325	5.3
	Sub-Total	9,660	25,270	26,929	52,199	5.4
Pian	Lolachat	2,544	6,060	7,170	13,230	5.2
	Lorengedwat	1,168	2,870	3,219	6,089	5.2
	Nabilatuk	3,710	8,650	10,753	19,404	5.2
	Sub-total	7,422	17,581	21,142	38,723	5.2
	Total	17,082	42,851	48,071	90,922	5.5

Source: Population and Housing Census 2002

Socio-economic situation

The district is one of the least developed areas in the country with high levels of illiteracy, high infant mortality rates and high levels of malnutrition among under-fives and a higher prevalence of abject poverty (no disposable income). Hence the Human development index ranks as one of the lowest in the country (0.24). The development initiatives and service delivery have greatly been hampered by internal and external sporadic occurrence of insecurity due to uncontrolled guns held by the Karimojong, the Pokot and the Kadama.

The majority of people make their livelihoods from livestock and agricultural produce (sorghum and maize). However, because of the dry spells and lack of adequate water for livestock, the people lead a semi-nomadic life style moving among neighboring districts in search of water and pasture.

Game reserves and tourism

The district has about 2,500 square kilometers of game reserve and about 3,600 square kilometers of controlled hunting area, leaving less than 1,000 square kilometers for people.

The tourism industry in the district is still young but rapidly growing. The district has picturesque natural scenery of open and rolling flat plains abounding in wildlife and beautiful vegetation. The Pian-Upe Game Reserve is currently receiving an increasing number of tourists, both. There is good accommodation in the reserve and strategically placed camping sites for viewing animals passing by.

Forests, gum arabic and other products

The district has about 300 square kilometers of forest reserve located around Mt. Kadam and Napak. The district vegetation is of acacia species which produce a natural gum (gum Arabic) that has a good market in the soft drinks industry. There are also large reserves of aloe vera, growing wild in many parts of the district.

Minerals

A detailed minerals survey carried out by a firm from the Democratic People's Republic of Korea in 1994 revealed that the district has viable deposits of limestone, marble, gold, iron ore, diamond, gems and rubies that can be commercially exploited. Already, Tororo Cement is extracting marble stones and limestone, essential inputs in the making of cement.

Livelihoods

Table 3 Nakapiripirit District livelihoods, by sub-county

Agro Ecological Zone	Livelihood	Sub County
Agricultural zone	Crop cultivation	Namalu, Nakapiripirit TC, Moruita, and Kakomongole
	Brick laying	Nakapiripirit TC, Moruita, Nabilatuk and Kakomongole
	Trade	Namalu, Nakapiripirit TC, Moruita, and Kakomongole
	Tourism	Namalu,Nakapiripirit TC and Moruita
	Agricultural markets	Namalu, Lolachat and Nabilatuk
	Apiculture	Nakapiripirit TC, Moruita, and Kakomongole
	Mining	Moruita and kakomogole
	Livestock rearing	Namalu, Moruita, Lolachat, Nabilatuk, Lorengae and Kakomongole
	Charcoal burning	Namalu, Moruita, Nabilatuk, Lolachat, Lorengedwart and Kakomongole
Agro pastoral zone	Crop cultivation	Lorengawat, Nabilatuk, Lolachat and loregae.
	Livestock rearing	Lorengawat, Nabilatuk, Lolachat and loregae.
	Petty trade	Lorengawat, Nabilatuk, Lolachat and loregae.
	Charcoal burning	Lorengawat, Nabilatuk, Lolachat and loregae.
	Cattle markets	Lorengadwat, Nabilatuk, Lolachat
	Apiculture	Nabilatuk.
	Sand scooping	Nabilatuk, Lolachat, loregae and Kakomongole
	Stone quarry	Lorengawat, Nabilatuk.

Women's livelihoods

Traditional attitudes about women in Karamoja expect them to meet the demands for their families especially in food security. In most cases women in Karamoja are denied by their partners to participate in decision making at family level and outside the family.

Ethnicity

Table 4 Major tribes and languages spoken in Nakapiripirit District

Sub county	Tribe	Languages
Lorengedwat	Karimojong	Ngakarimojong
Lorega	Karimojong	Ngakarimojong
Nabilatuk	Karimojong, Bagisu and Iteso	Ngakarimojong
Namalu	Karimojong, Bagisu, Baganda, Iteso	Ngakarimojong, lumasaba, luganda, iteso
Kakomongole	Karimojong	Ngakarimojong
Moruita	Kadama, Pokot, karimojong, Bagisu, Bakusu, Baganda	Ngakarimojong, pokot, lumasaba, kadama, lukusu
Lolachat	Karimojong	Ngakarimojong
Nakapiripirit TC	Kadama, Pokot, karimojong, Bagisu, Baganda , Basonga and iteso	Ngakarimojong, luganda, lusonga, iteso

HAZARD

Hazard Summary

Table 5 Hazard summary

Hazard category	Status	Sub County	Rank
Drought	Instances of prolonged dry spells of 6-7 Months reported yearly	Lorengedwat, Nabilatuk, Namalu, Loregae, Kakomongole, Nakapiripirit TC, Lolachat, Moruita	1
Flood	Instances reported	Lorengedwat, Nabilatuk, Namalu, Loregae, Kakomongole, Moruita, Lolachat, Nakapiripirit TC	2
Environmental degradation	Incidence of degraded environment due to deforestation reported	Lorengedwat, Nabilatuk, Namalu, Loregae, Kakomongole, Moruita, Lolachat, Nakapiripirit TC	3
Cattle theft	Instances reported	Lorengedwat, Nabilatuk, Namalu, Loregae, Kakomongole, Moruita, Lolachat, NakapiripiritTC	4
Crop/animal disease	Incidence of tick born disease, tsetse flies infestation, foot and mouth disease reported. For crops: maize streak and sorghum smuts reported	Lorengedwat, Nabilatuk, Namalu, Loregae, Kakomongole,Moruita, Lolachat, Nakapiripirit TC	5
Human disease	Serious incidence of cholera and jiggers between 2010 - 2012 was reported	Lorengedwat, Nabilatuk, Namalu, Nakapiripirit TC	6
Bushfire	Incidence reported	Lorengedwat, Nabilatuk, Namalu, Loregae, Kakomongole, Moruita, Lolachat, Nakapiripirit TC	7
Vermin and problem animals	Incidence of baboons, wild pigs, snakes, monkeys, leopards reported	Lorengedwat, Nabilatuk, Namalu, Kakomongole, Moruita, Nakapiripirit TC	8
Land conflict	Incidence of conflicts between institutions and the local community reported	Lorengededwat, Nabilatuk, Namalu Kakomongole, Moruita	9
Strong wind	Incidence reported	Lorengedwat, Loregae, Kakomongole, NakapiripiritTC, Lolachat, Moruita, Nabilatuk	10
Hailstorm, lightning	Incidence of death and destruction of crops and rooftops reported	Lorengedwat, Nabilatuk, Lolachat, Namalu, Moruita	11

Hazard category	Status	Sub County	Rank
Landslides	Incidence reported	Namalu Kakomongole, Moruita, Nakapiripirit TC	12
Industrial accidents	Road accidents, threat of environmental degradation, cholera at mining sites	Moruita	13

Table 6 Summary of hazards by sub-county

Sub county	Floods	Land conflict	Hailstorms. lightning	Sttrong winds.	Bushfire	Cattle theft	Drought	Vermin	Environmental degradation	Human disease	Crop/animal disease	Landslides	Industrial accidents	Total
Lorengedwat	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			11
Nabilatuk	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			11
Lolachat	✓		✓	✓	✓	✓	✓		✓		✓			08
Namalu	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓		11
Loregae	✓		✓	✓	✓	✓	✓		✓		✓			08
Kakomongole	✓	✓		✓	✓	✓	✓		✓		✓	✓		09
Nakapiripirit TC	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		11
Moruita	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓	11
Totals	08	05	07	07	08	08	08	05	08	04	08	04	01	80

Table 6 Summary of hazards by sub-county

Hazard Risk

The sub-county communities judged the likelihood of hazard events and their severity, to assess the risk of each hazard, shown as non-existent (none), low, medium or high in Table 7.

Table 7 Hazard risk

Hazard	Lorengedwat	Nabilatuk	Lolachat	Namalu	Kakomongole	Loregae	Nakapiripirit TC	Moruita
Flood	L	L	M	H	M	M	L	M
Drought and Food Insecurity	H	H	H	L	M	H	L	L
Land Conflict	H	H	L	H	L	L	L	M
Strong Winds	H	H	H	H	H	H	H	H
Cattle Theft	H	H	H	H	H	H	M	H
Bushfire	H	H	H	H	H	H	H	H
Vermin	M	H	L	L	L	N	M	H
Environmental Degradation	H	H	H	M	H	M	L	H
Landslides	N	N	N	H	H	N	M	H
Crop, Animal Disease	M	M	M	M	M	M	M	M
Industrial Accidents	N	N	N	N	N	N	N	H
Human Disease	L	L	N	M	N	N	M	N
Hailstorm, Lightning	H	H	M	M	N	N	N	M

RISKS

Flood Risk

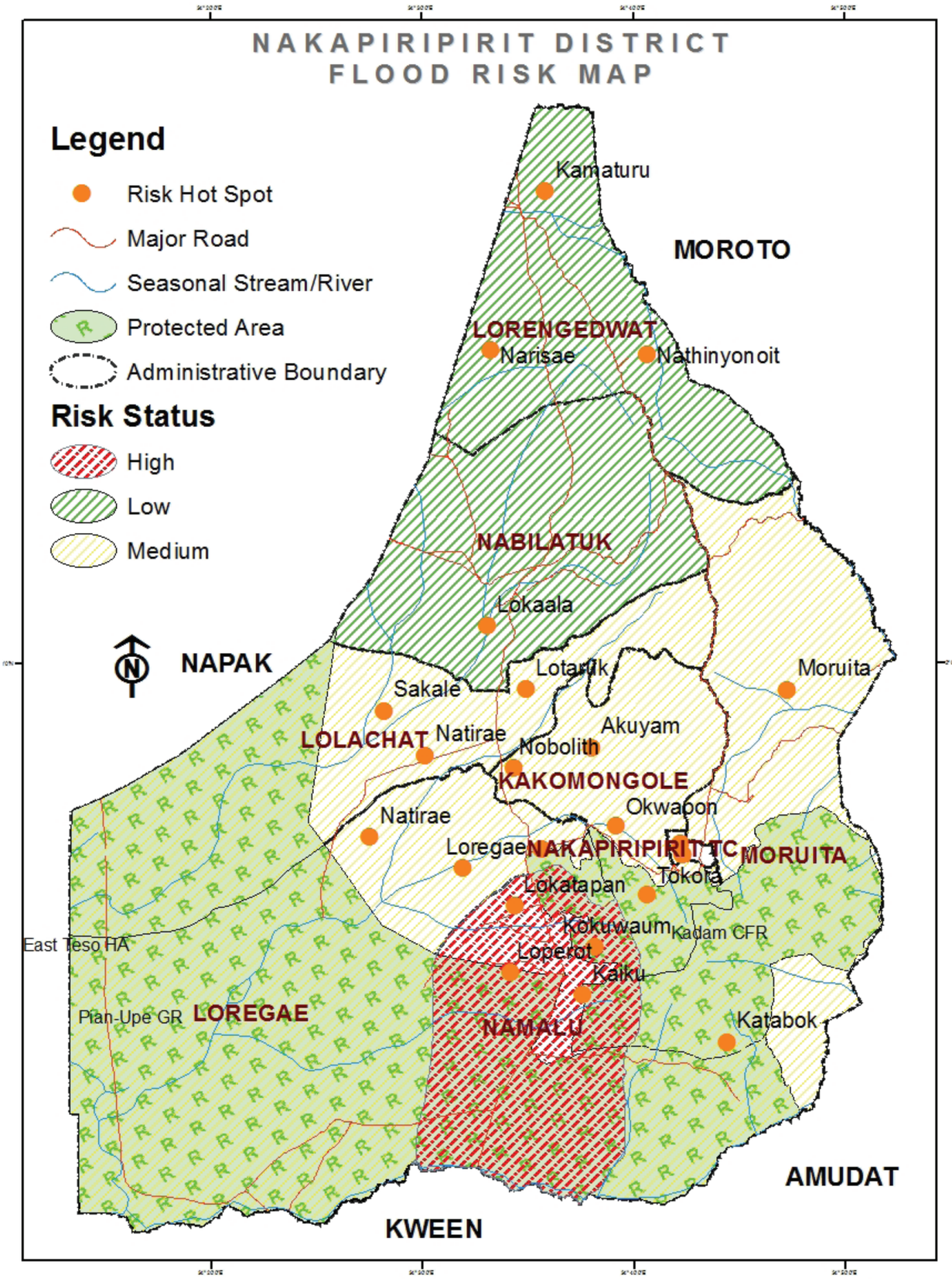


Figure 1 Flood risk

Flash floods during the rainy seasons are reported in the district. Some bridges and roads in most sub counties of the district are washed out and others just submerged. Destruction of crops especially those along the foot of Mt Kadam cause water logging in most gardens in the low lands thus affecting crop productivity. Flooded and washed-out roads affect connectivity and access to services. For example, Nakapiriprit- Naturum road, Moroto-Nakapiripirit road are often submerged during rainy seasons. Other risk hot spots are reported in Katabok, Tokora (Moruita Sub County). Namalu sub county reported the highest risk levels with the following hot spots; Kaiku, Loperot, Kokuwaum and Lokatapan Parishes. Low risk levels are in Nakapiripirit Town Council and Lorengedwat.

Drought and Food Insecurity Risk

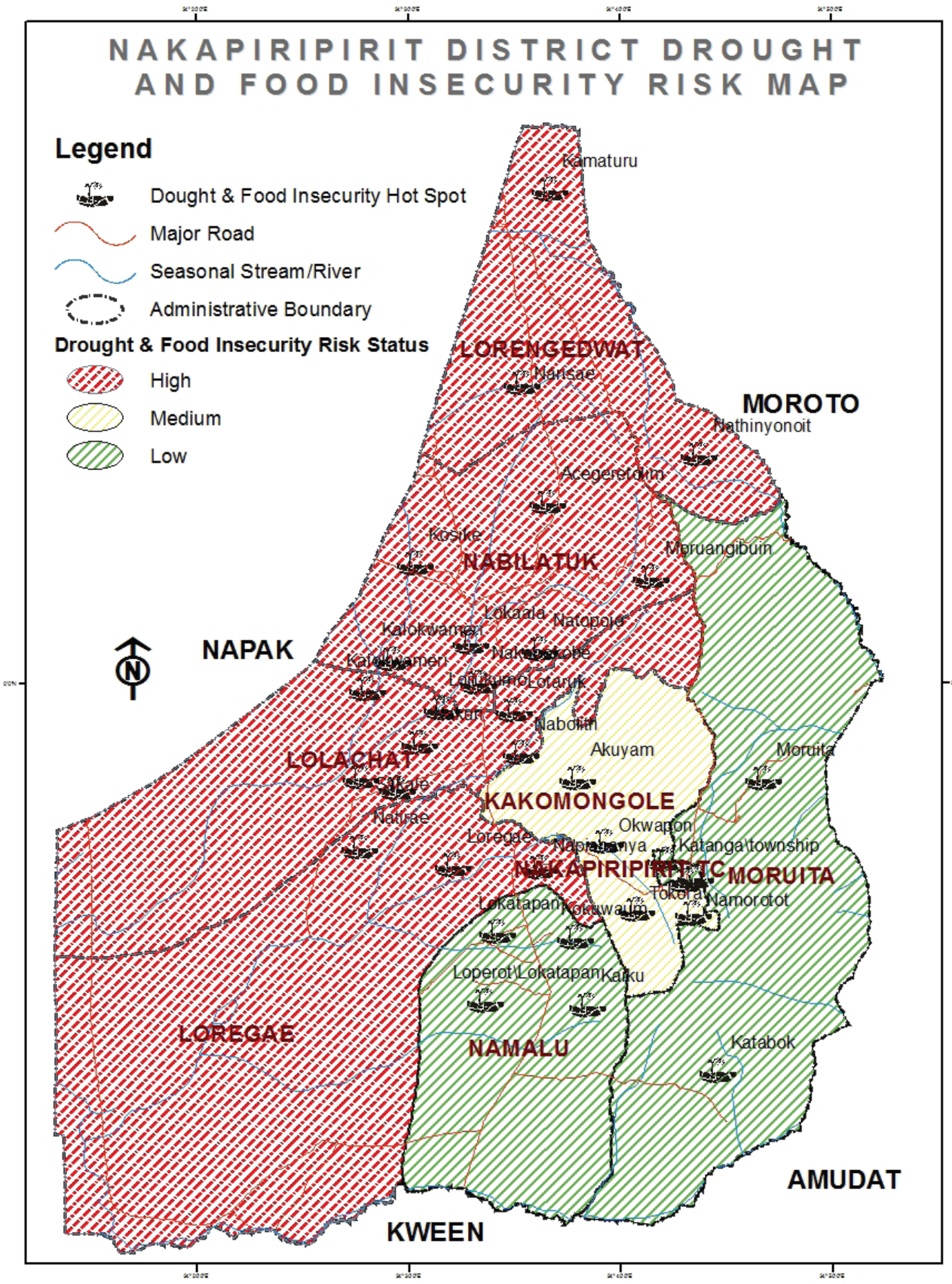
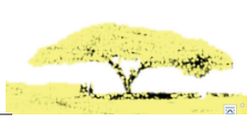


Figure 2 Drought risk

Prolonged dry spells lasting 6-7 months usually hit the entire Nakapiripirit district accompanied by strong destructive winds. Unpredictable climatic patterns results in food insecurity, shortage of pasture, water, social disintegration and migration. Among the main causes for poor food production are crop pest and disease infestation and flooding experienced in the district. High risk levels are reported in Lorengea, Nabilatuk, Lorengedwat and Lolachat sub-counties. Relatively low risk levels are reported in Moruita and Namalu sub-counties.



Land Conflict Risk

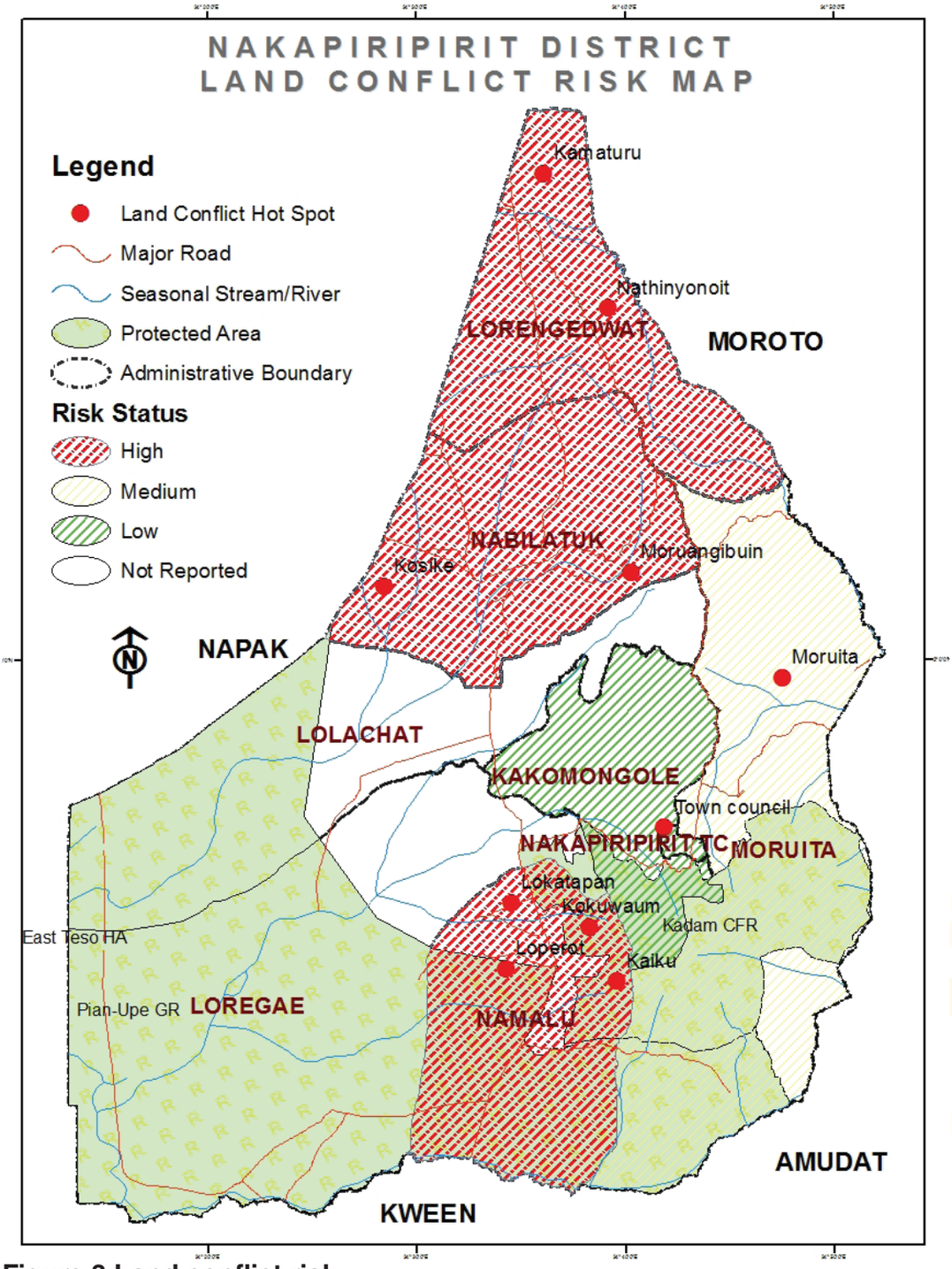


Figure 3 Land conflict risk

Conflict mainly occurs between institutions and communities, particularly the Uganda Wild Life Authority (UWA), National Forest Authority (NFA) and Uganda prisons. The improved security situation in the district has attracted previously-displaced people returning to reclaim their land and come into conflict with other communities who have in the meantime settled there. For example Namalu, Nabilatuk and Lorengedwat sub-counties report high risk levels. Other risk hot spots are in Kamaturu Parish, Arengekeju village (Lorengedwat Sub-County) with boundary conflict between Moroto and Nakapiripirit. Other land conflicts are recorded in Moruita sub county (Moruita Parish) between the Pokot community and the Karamojong.

Strong Wind Risk

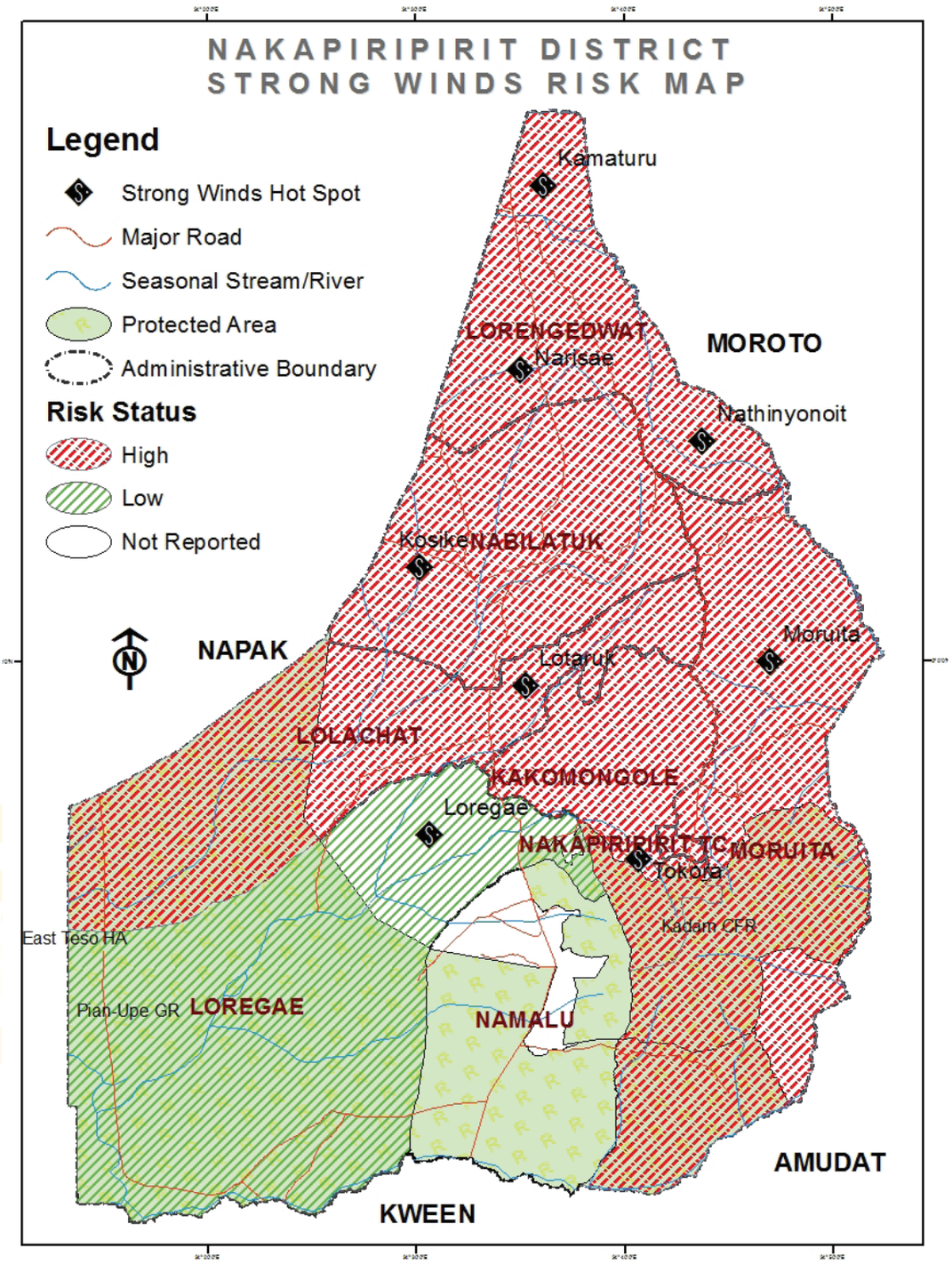


Figure 4 Strong wind risk

Strong winds in the sub counties of Lorengedwat, Loregae ,Kakomongole, Nakapiripirit Town Council, Lolachat, Moruita and Nabilatuk are common towards the end of the dry seasons, uprooting trees and blowing off roof tops. Risk levels are highest in Lolachat, Moruita, Nabilatuk, Kakomongole, Lorengedwat and the town council itself. Low risk levels are in the southern sub counties of loregae and Namalu that are largly lie in the Pian Upe game reserve, Kadam central forest reserve and East Teso hunting areas.

Cattle Theft Risk

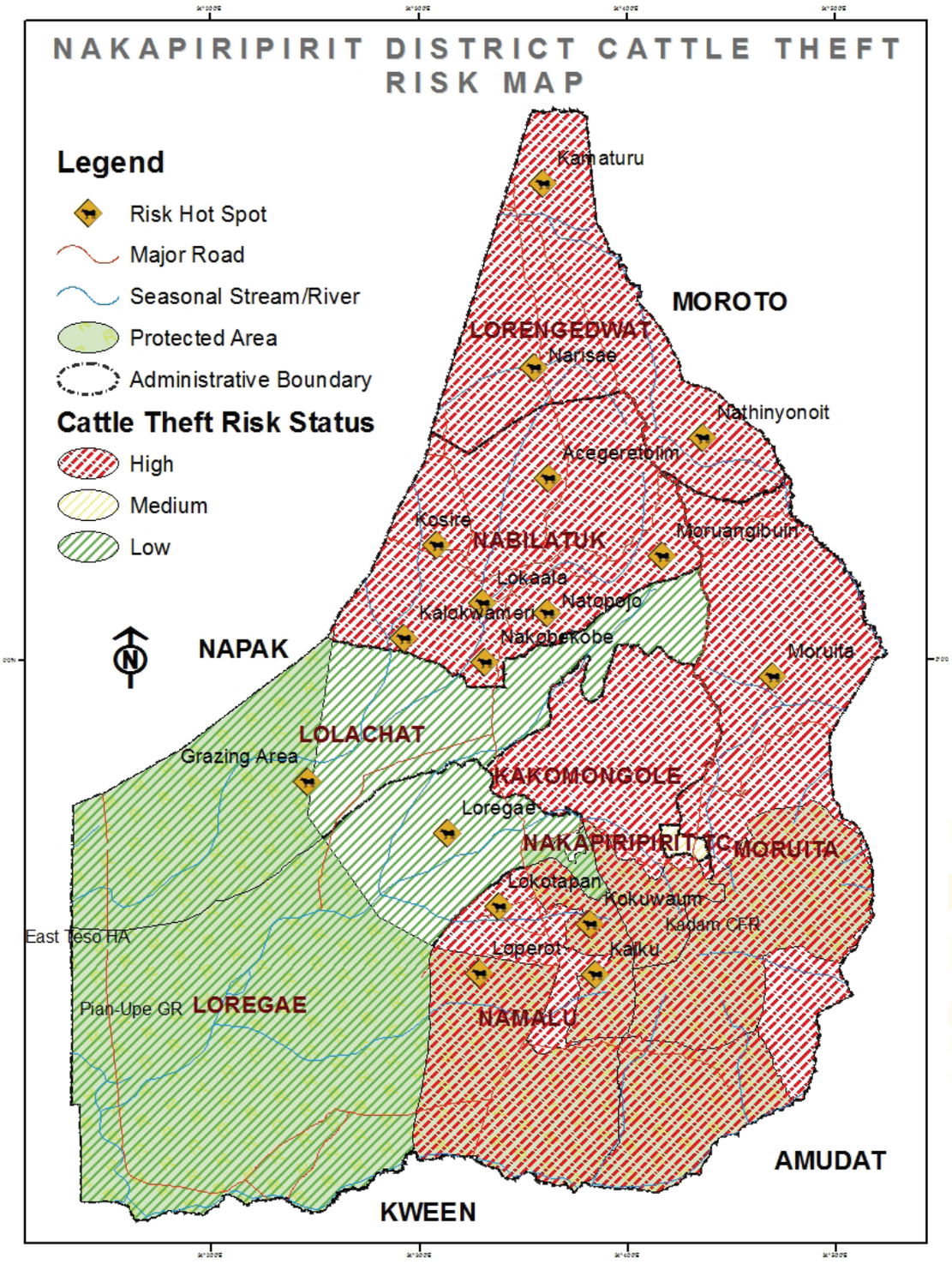


Figure 5 Cattle theft risk

Previously the district suffered from massive cattle raids but because of disarmament, the security situation has significantly improved in the district. A few instances of cattle theft are reported throughout the district, highest in Namalu, Moruita, Kakomongole, Nabilatuk, Lorengedwat and the town council. Cattle theft risk hot spots are reported in Moruita Sub-County between the Pokot community and the Karamojong communities. Others are reported in all parishes in Nabilatuk Sub-County especially theft from the neighbouring Moroto, Napak and Amudat Districts.

Bushfire Risk

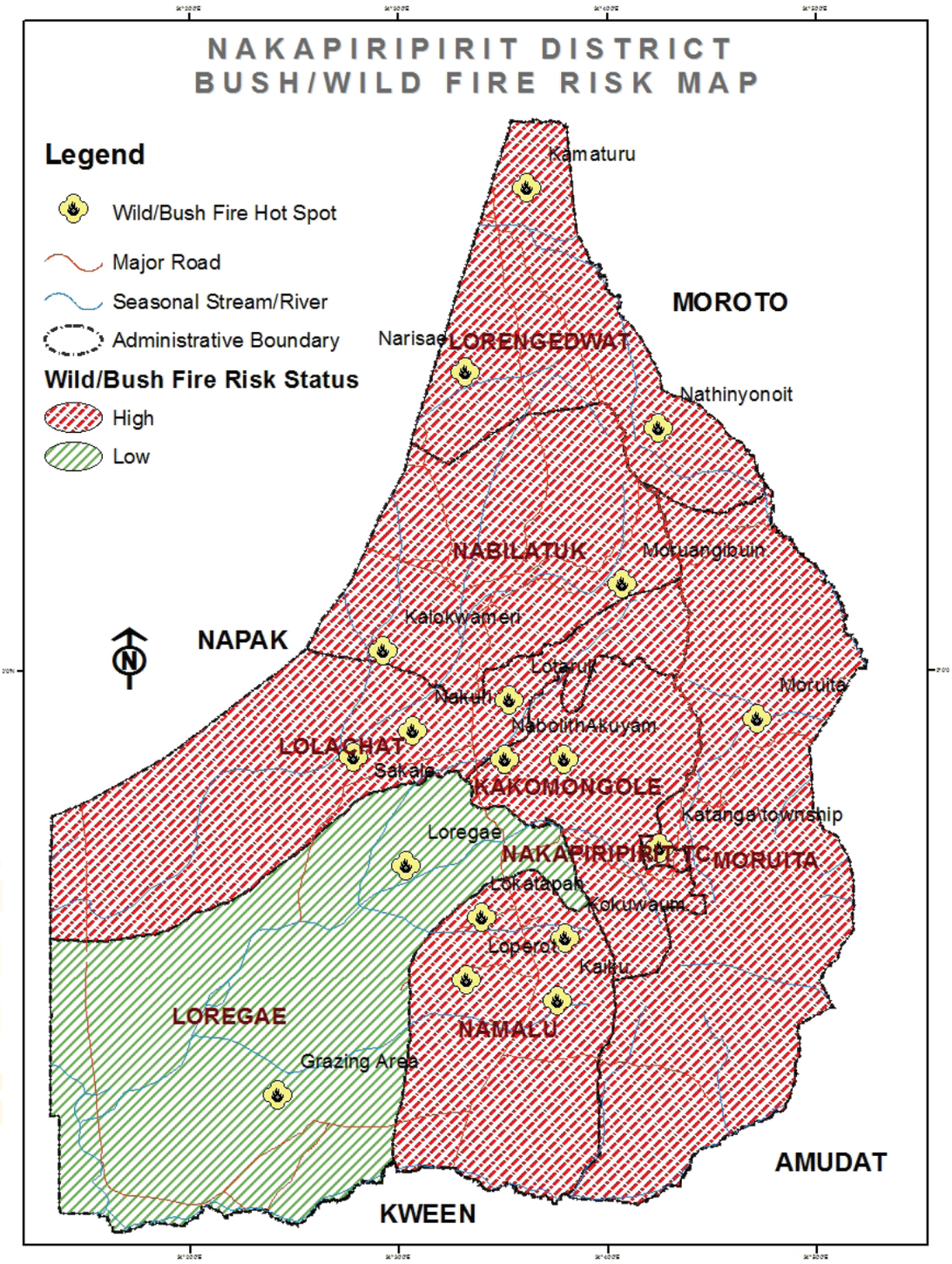


Figure 6 Bushfire risk

Bushfires result from people clearing their gardens, cattle farmers burning grass to encourage fresh pasture and hunters attempting to flush game. Dry winds and prolonged dry spells accelerate fires, causing destruction of homesteads and vegetation. Risk hot spots are reported in Akuyam parish, Lokale village where 27 houses were destroyed in 2013. The risk is evident throughout the district with higher risk in Namalu, Moruita, Kakomongole, Lolachat, Lorengadwat and Nabilatuk Town Council.

Vermin and Problem Animal Risk

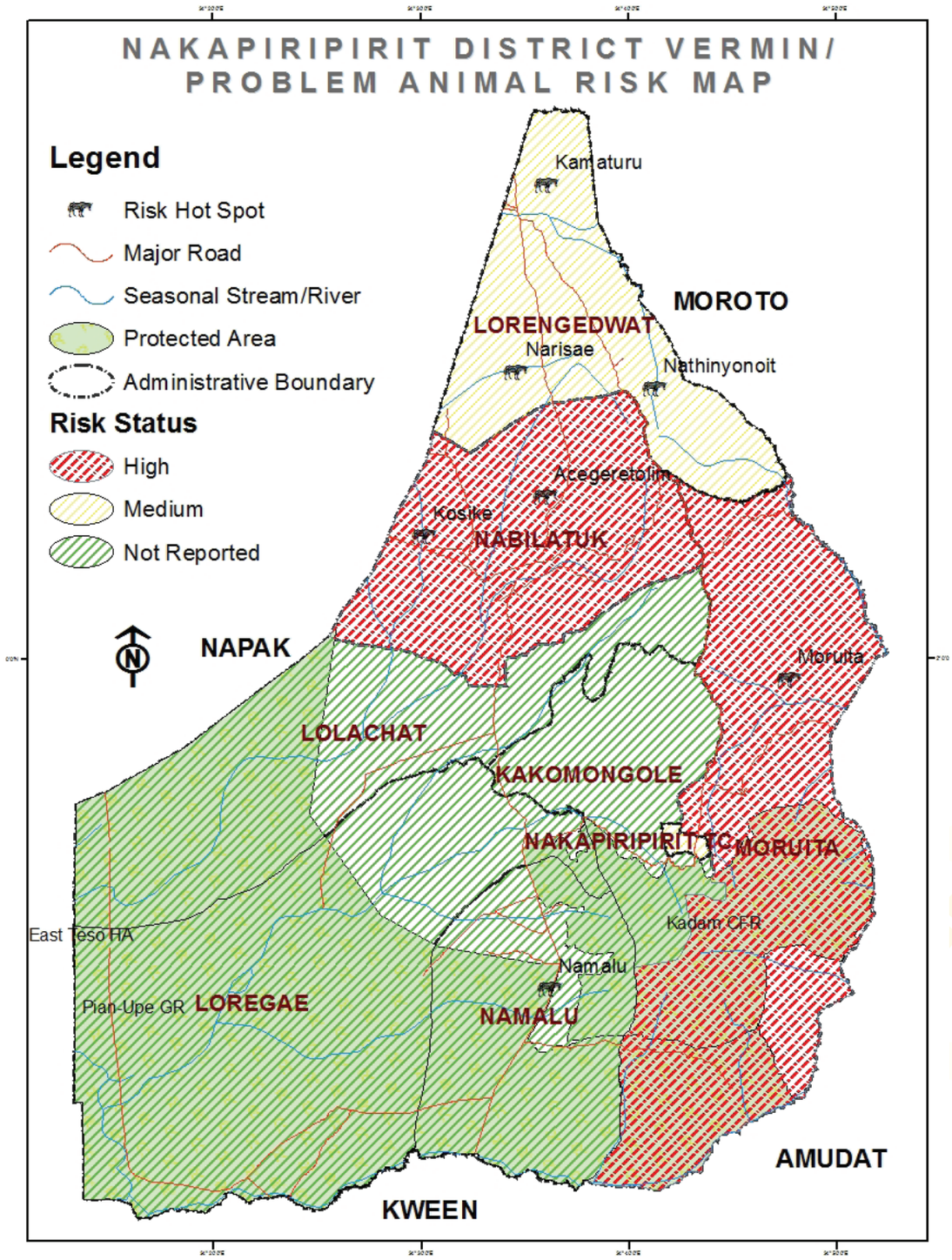


Figure 7 Vermin and problem animal risk

Presence of the forests reserve in the district has led to number of vermin destroying crops and livestock. Baboons, wild pigs, monkeys and squirrels are the most common, especially in the sub counties of Namalu, Moruita, Loregedwat, Nakapiripirit town council and Kakomogole. Risk levels are high in Moruita and Nabilatuk sub-counties. The main problem animals in the district include leopards, buffalos and elephants, reported in all sub-counties adjacent to forest reserves.

Environmental Degradation Risk

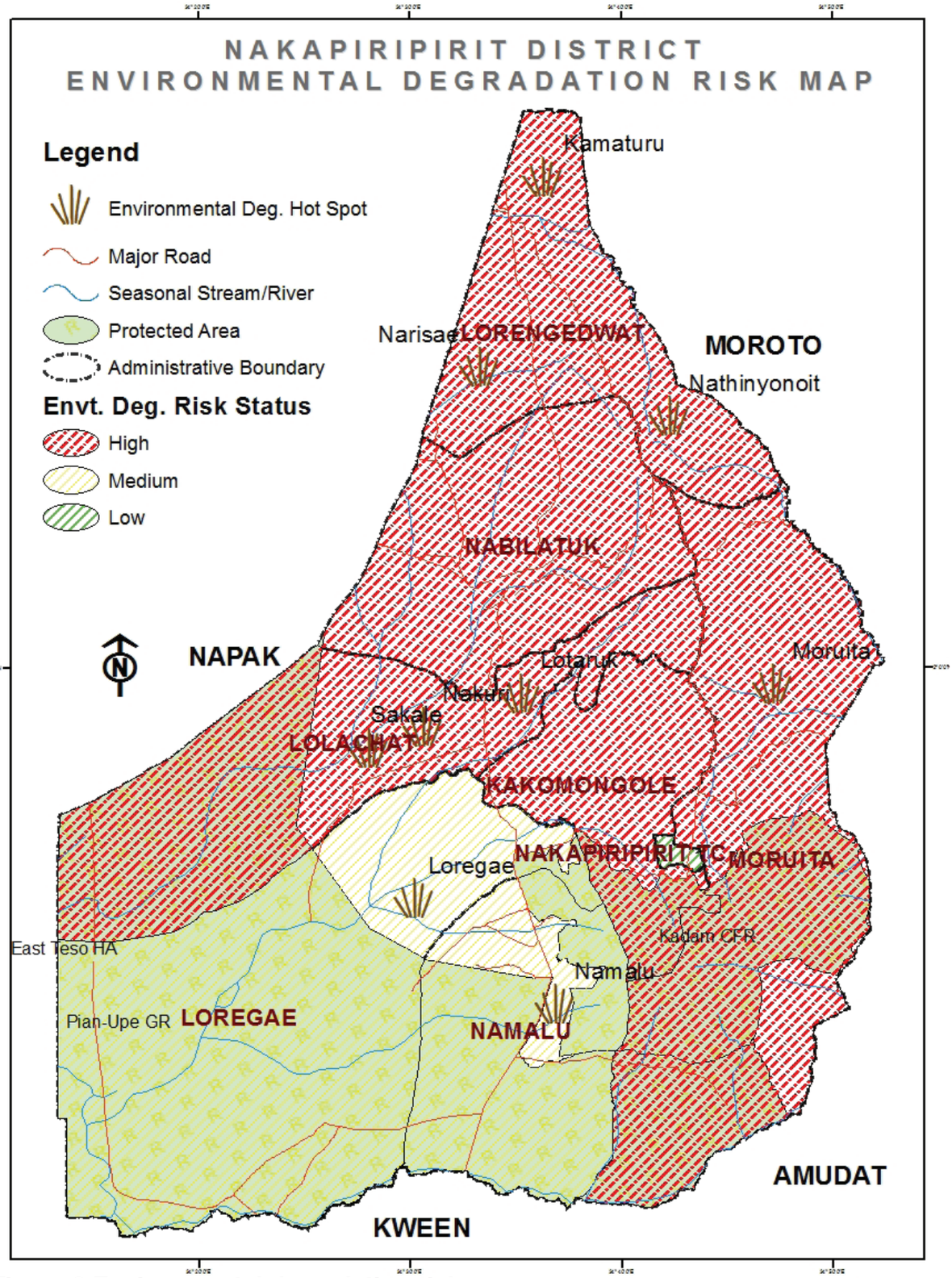


Figure 8 Environmental degradation risk

Deforestation caused by tree cutting for charcoal burning, brick burning, and house construction is the main source of environmental degradation in Nakapiripirit. Charcoal burning, one of the main source of income for a majority of the population, is common across the district. The community blames deforestation leaving strong winds unbroken by trees as the cause of wind damage.

Land/Rock slide Risk

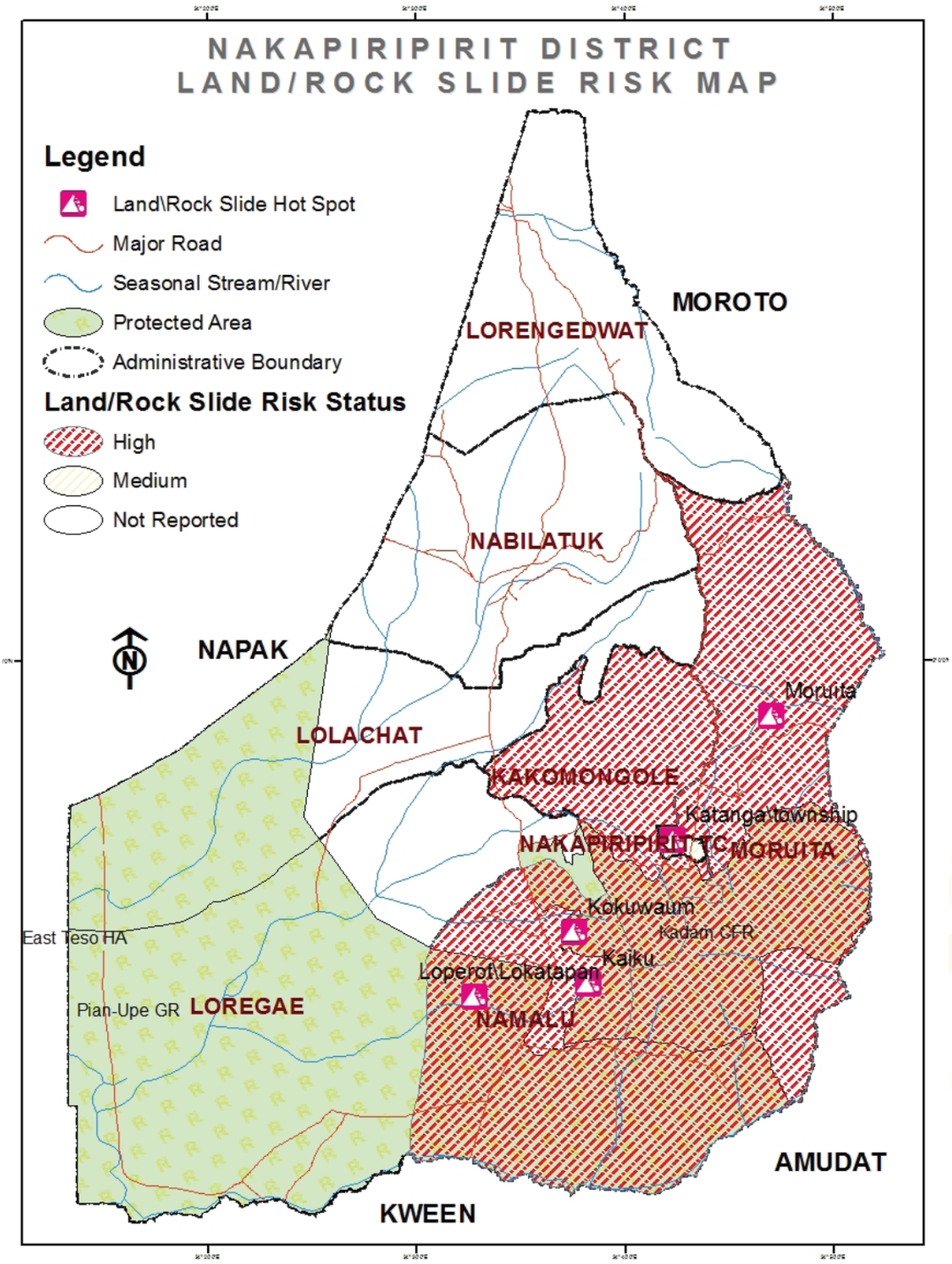


Figure 9 Landslide risk

Rock slides are common during rainy seasons in the hilly areas. The movement of rock boulders down the hills damages the vegetation and home steads at the foot hills. Rock boulders sometimes break drainage channels and thus worsen flooding on farm lands and settlements on the lower slopes of the mountain. Roads are often blocked sometimes making them impassible, commonly in Namalu, Kakomongole, Moruita, Nakapiripirit Town council sub counties.

Crop and Animal Disease Risk

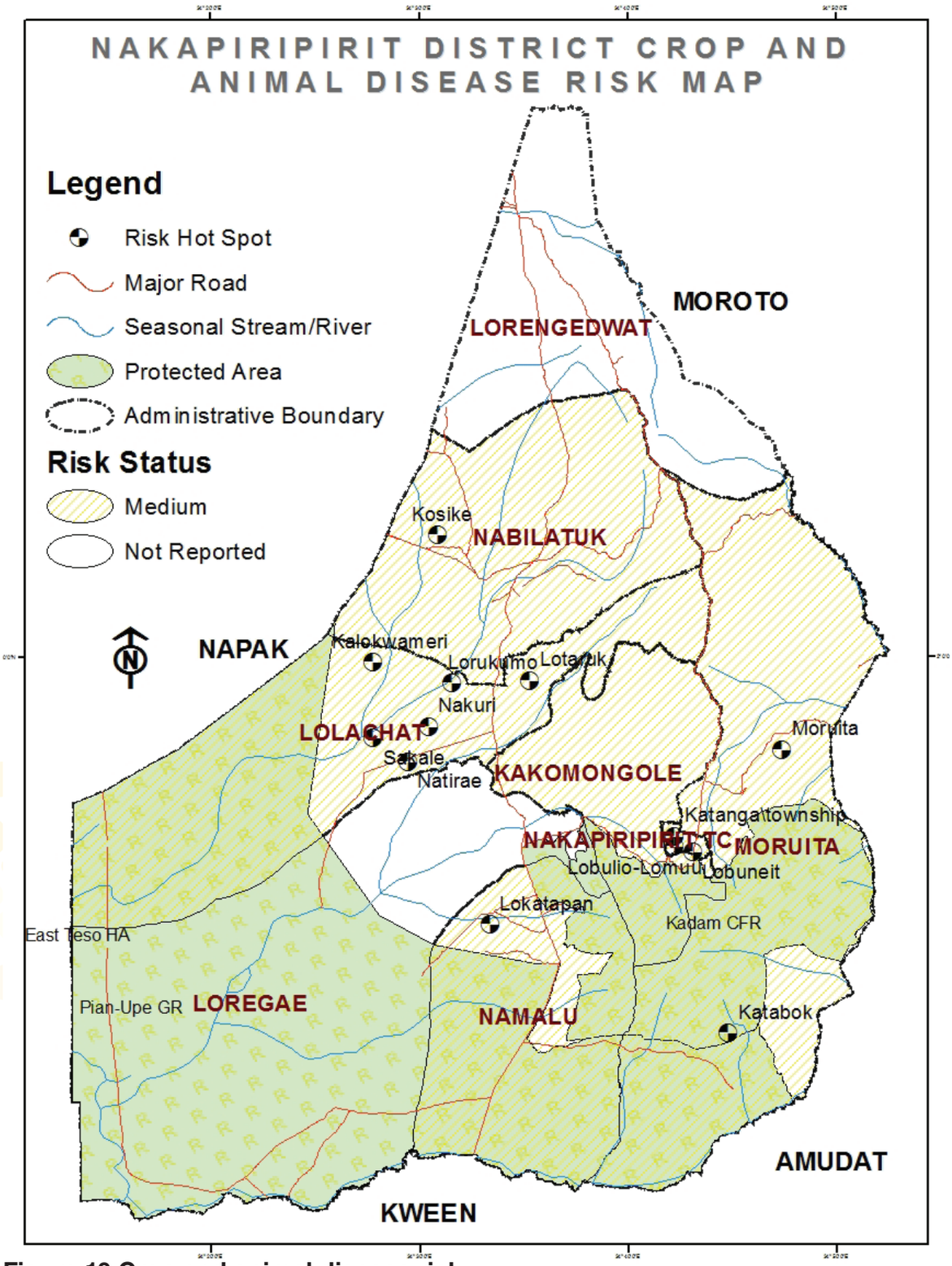


Figure 10 Crop and animal disease risk

Crop and animal diseases are common in Nakapiripirit, putting the livelihood of the entire population at risk. The prevalent crop diseases are maize streak, sorghum smuts and honey dew among others. Animal diseases are mainly due to ticks and tsetse flies. The district also has unique diseases such as kalaza, guinea worm and filia-alisis. Risk hot spots are reported in Katabok and Lokatapan in Moruita. Other hot spots are in Nabilatuk (Kosike and Kalokwameri parishes). However overall, crop and animal disease risk in the district is moderate.

Industrial Accidents Risk

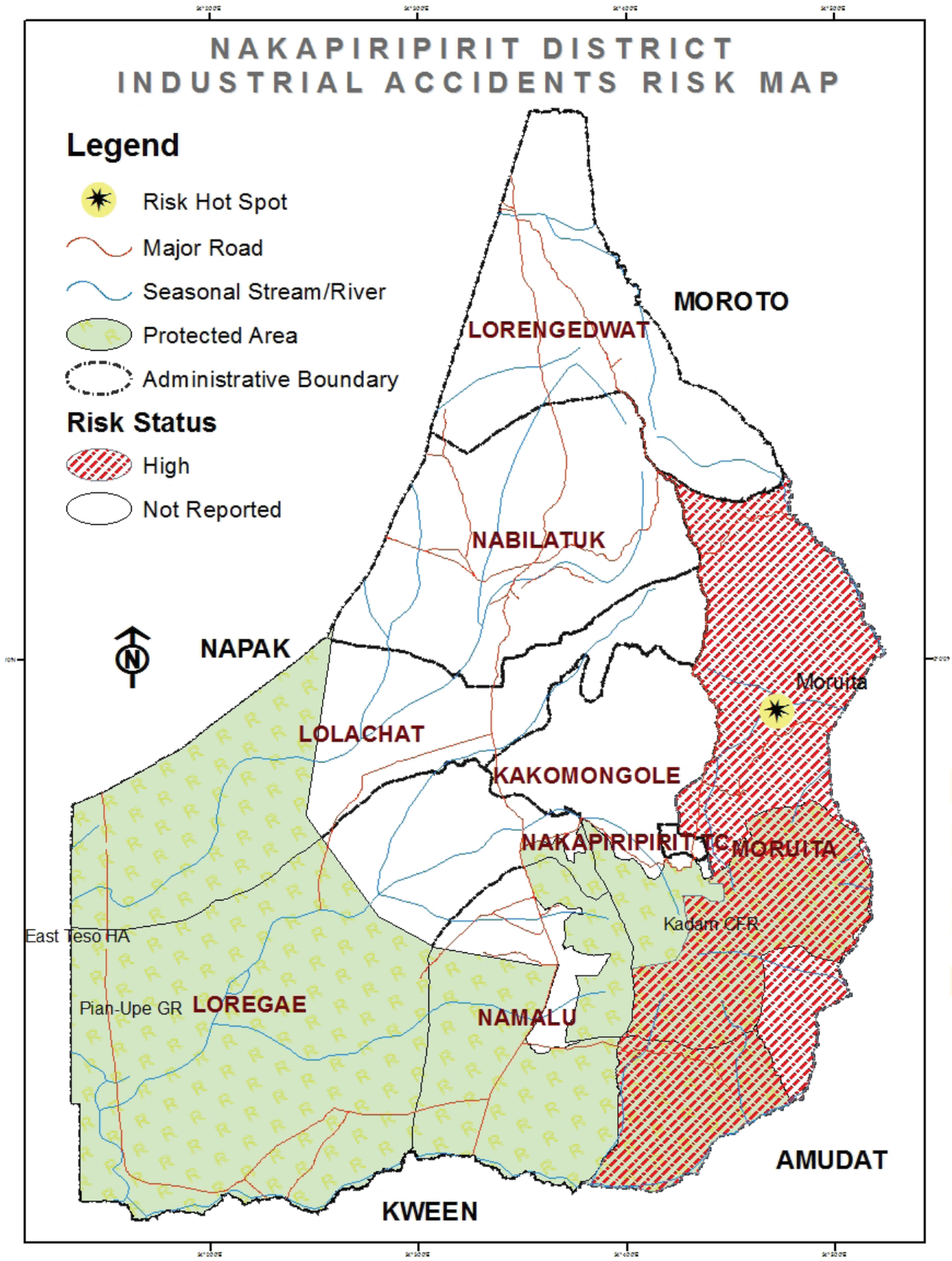


Figure 11 Industrial accidents risk

Incidents of industrial accidents are reported in the gold mines of Moruita (Utut village) leaving a greater part of the district free from industrial related hazards.

Hailstorm and Lightning Risk

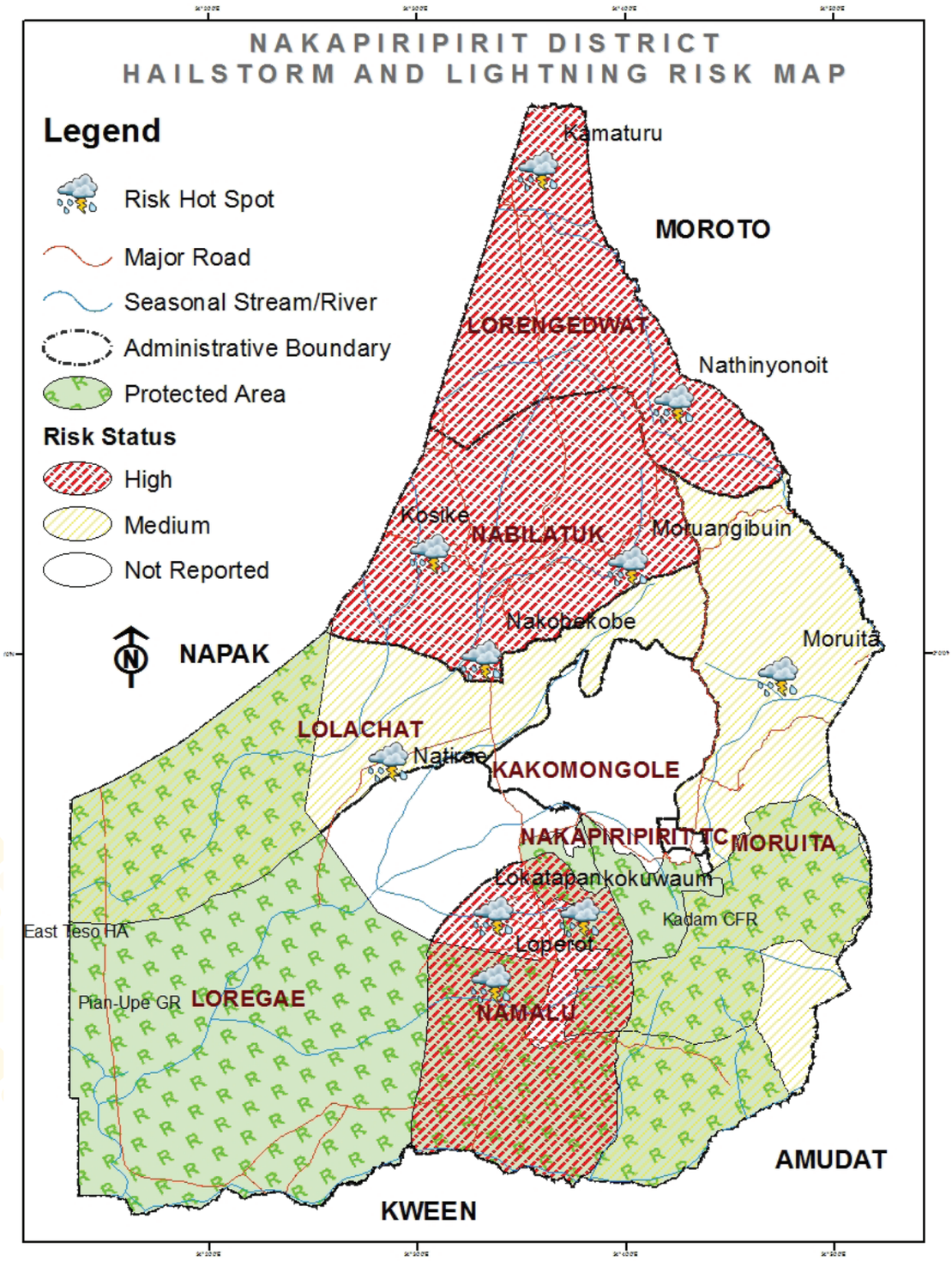


Figure 12 Hailstorm and lightning risk

Like the other districts in the sub-region, Nakapiripirit experiences lightning during the wet seasons, sometimes with destruction of property and loss of life. High risk levels are reported in Namalu, Lorengedwat and Nabilatuk sub-counties. In Lorengedwart for instance, lightning caused severe damage to sorghum crops and over twenty goats in Lorukumo village were killed at once. In Naligoi Parish, Lolachat Sub-County, five cows were struck fatally by lightning. Other risk hot spots are in Nabilatuk (Kositke, Nakobekobe and Nathinyonoit Parishes). In Namalu, risk hot spots are Lokatapan, kokuwaum and Loperot Parishes.

Human Disease Risk

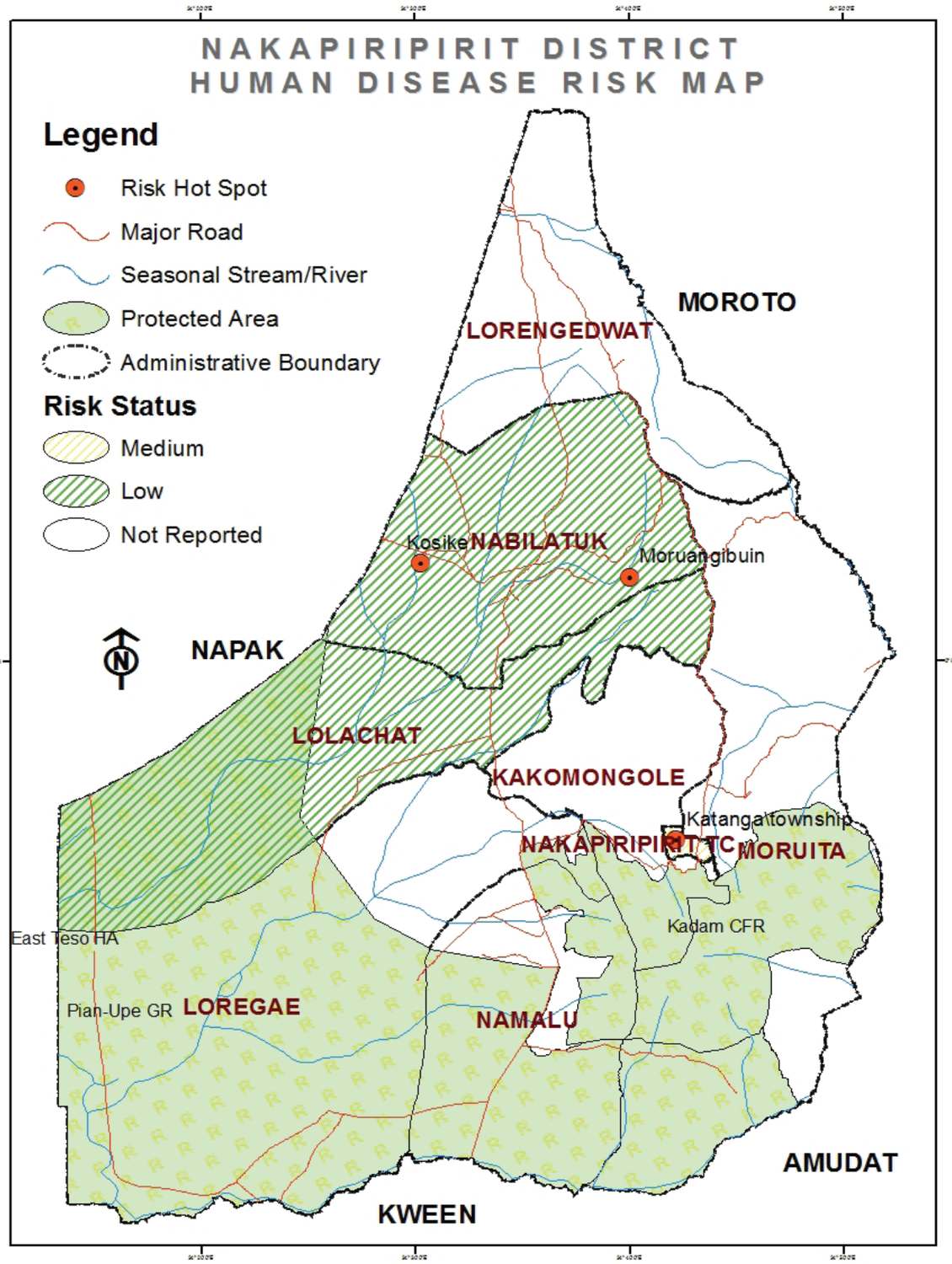


Figure 13 Human disease risk

Human diseases, mainly cholera, brucellosis, jiggers, hepatitis E and malaria, are common in Nakapiripirit District. For example, a high incidence in 2010 and 2012 of cholera deaths occurred in Nakapiripirit Town council. This year (2014) hepatitis E hit the district, resulting in quarantining. Other risk hot spots are in Nabilatuk Sub-County (Kosike Moruangibuin) with cases of hepatitis E reported.

VULNERABILITY

Risk and Vulnerability Assessment

Table 8 quantifies the high/med/low risk assessments in Table 7 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

Hazard Category	Lorengedwat.	Nabilatuk.	Lolachat.	Namalu	Kakomongole	Loregae	Nakapiripirit TC	Moruita.	Total
Strong wind	3	3	3	3	3	3	3	3	24
Bushfire	3	3	3	3	3	3	3	3	24
Cattle theft	3	3	3	3	3	3	2	3	23
Environmental degradation	3	3	3	2	3	2	1	3	20
Drought	3	3	3	1	2	3	1	1	17
Crop, animal disease	2	2	2	2	2	2	2	2	16
Land conflict	3	3	1	3	1	1	1	2	15
Flood	1	1	2	3	2	2	1	2	14
Vermin	2	3	1	1	1	0	2	3	13
Hailstorms, lightning	3	3	2	2	0	0	0	2	12
Landslide	0	0	0	3	3	0	2	3	11
Human disease	1	1	0	2	0	0	2	0	6
Industrial accidents	0	0	0	0	0	0		3	3
Total	27	28	23	28	22	19	20	30	197
Scores: High = 3, Medium = 2, Low = 1, Not reported = 0									

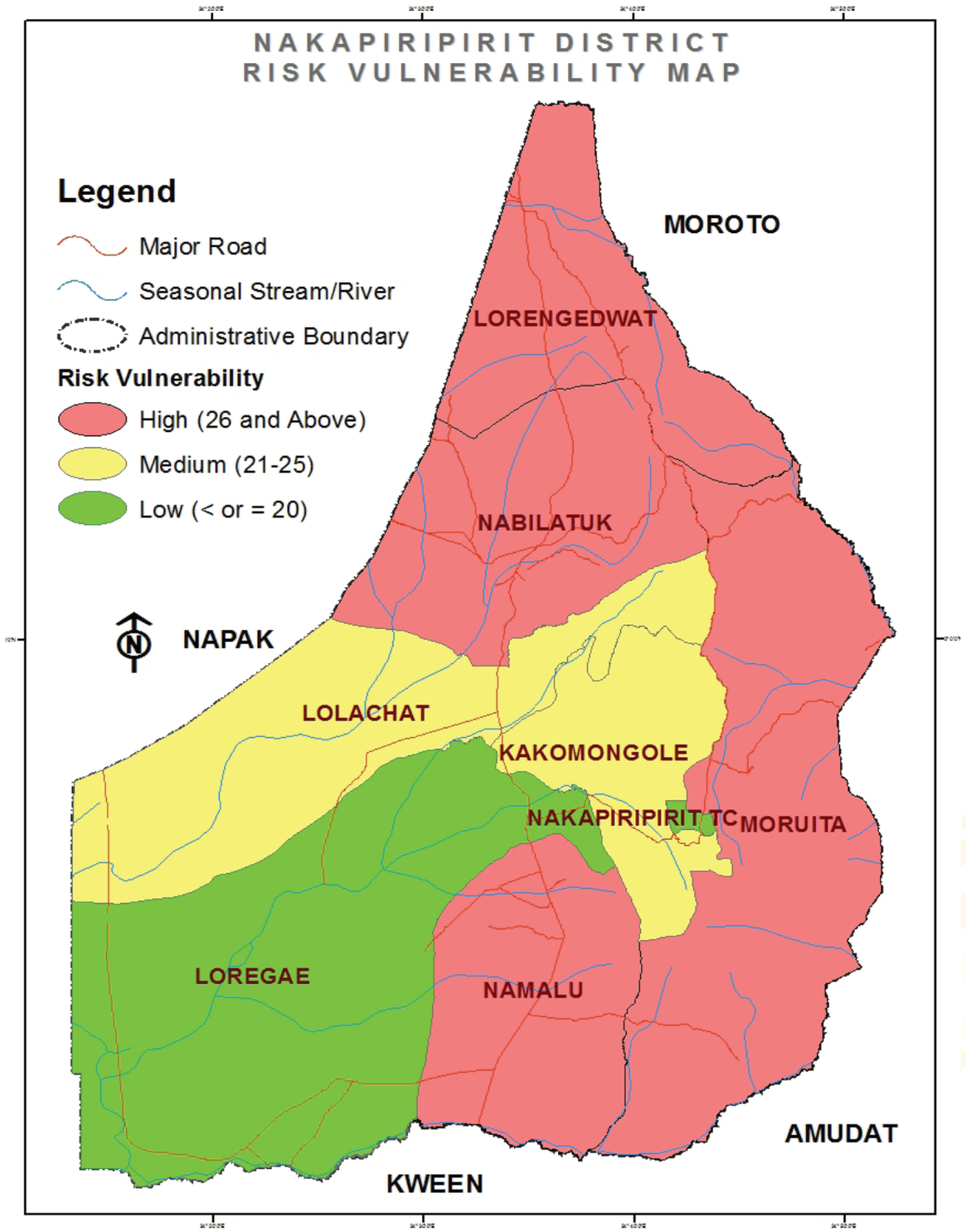


Figure 14 Vulnerability map

The vulnerability map in Figure 14 uses ranges of the aggregate risk totals from Table 8 to colour-code the sub-counties according to their level of aggregate risk.

Community perception of vulnerability is high in Namalu, Moruita, Nabilatuk and Lorengedwat, based on the frequency and magnitude of losses suffered due to, principally, wind storms, bushfires, drought, cattle theft and environmental degradation. However, all of the sub-counties and even the town council have significant hazard risks, and significantly aggregated risks.

CONCLUSIONS

The multi-hazard vulnerability profile produced in this mapping exercise combines physical data and perceptual information captured with participatory methods in Nakapiripirit 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 strong wind, bushfire, cattle theft, environmental degradation, drought, crop and animal disease, land conflict, flood, vermin, hailstorms and lightning, landslide, human disease, and industrial accidents as the predominate hazards in the district, in order of decreasing risk.

All of the sub-counties have significant vulnerability to disaster, accumulating risk from several hazards. Namalu, Moruita, Nabilatuk and Lorengedwat record the highest aggregate vulnerability levels compared to the other sub-counties in the district. Even the least vulnerable, Loregae Sub-County, has high risk of strong winds, bushfires, cattle theft and drought. This aggregated vulnerability to several hazards at once compounds the exposure to disaster risk and the complexity of managing it.

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

DEFINITIONS OF TERMS

Food insecurity. Food Insecurity is the severe shortage of food that may lead to malnutrition and death.

Floods. A flood occurs when large amounts of water cover a place that is meant to be dry. Floods usually occur with high rainfall.

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

Epidemics. This is the occurrence of a disease, in a particular community and at a particular period, beyond normal levels and numbers. Epidemics may affect people, crops or livestock.

Human epidemics. The diseases include cholera, meningitis, hepatitis E, marbug, plague, avian influenza, ebola and sleeping sickness among others.

Crop and animal epidemics. Animal epidemics include swine fever, foot and mouth disease, naganan, and bird flu. Crop disease epidemics include coffee wilt, banana bacterial wilt, cassava mosaic and cassava brown streak disease.

Heavy storms. Heavy storms in Uganda are often accompanied by hail, lightning and violent winds. Storms can result in destruction of crops, animals, public facilities and human settlements. Lightning can be deadly and may be mitigated by lightning ground conductors on buildings.

Pest infestation. These are destructive insects, worms, caterpillars or any other animal that attacks crops or livestock. Common pests in Uganda include weevils, locusts and caterpillars.

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

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

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

Environmental Degradation. This results from poor land use and other unsustainable ecosystem exploitation that lead to deterioration of the environment. Overgrazing, cultivation on sloping land, unguided and uncontrolled use of fertilizers and pesticides, bush burning, overfishing, deforestation, mining, poor wastewater treatment, inappropriate waste disposal and wetlands reclamation are examples of causes of environmental degradation.

Mines and unexploded ordinance. Mines are devices designed to explode with fatal effect when

disturbed. Unexploded ordinance are unspent bullets, grenades, rockets, etc., which are discarded or stored.

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

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

Invasive Species. A non-native plant or animal that invades a habitat or bioregion with adverse economic, environmental, and/or ecological effects. An example is a grass that is dominating pasture in the Rwenzori sub-region, reducing the grazing capacity of the land.

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