



THE REPUBLIC OF UGANDA

# Kasese District

## Hazard, Risk and Vulnerability Profile



2016



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**Hon. Hilary O. Onok**

Minister for Relief, Disaster Preparedness and Refugees

## Executive Summary

This Kasese 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, land use, livelihoods and gender demographics by Administrative Unit.

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.

Kasese District is located in the Western region of Uganda at 00°11'N 30°05'E, and bordered by the Districts of Kabarole to the Northeast and east, Bundibugyo to the Northwest, Kamwenge to the Southeast, Bushenyi to the South and the Democratic Republic of Congo to the West.

Twelve endemic hazards threaten the District: floods, landslides, drought, animal attacks on crops, animals and human beings, crop pests and diseases, animal pests and diseases, environmental degradation, internal conflict, invasive weed species, hail storms, wild fires and earthquakes.

Flooding is the most serious threat overall, with incidence in Nyakiyumbu, Kisinga, Kyarumba, Kilembe, Maliba, Bugoye, Kaseses Municipal Council, Hima Town Council, Karusandara, Kitwamba, and Mubuku town.

Landslide risk ranks second with incidence in Kisinga, Mahango, Kilembe, Bwesumbu, Bugoye, Maliba, Kyabarungira, Buhuhira, and Muhokya.

The District has a fairly high level of cumulative vulnerability to hazards. Karusandara is the most vulnerable Sub-county with a weighted vulnerability of 9. Hima Town Council, Katwe-kabatooro Town Council, Kilembe, Kitwamba, L. Katwe, Maliba, Muhokya, Nyakatonzi, Nyakiyumbu and Nyamwamba Sub-counties are moderately vulnerable with weighted vulnerability values lying between 5 and 7.

The rest of the sub counties are less vulnerable to the resident hazards with weighted vulnerabilities well below 5 but should be fortified against occurrences of new hazards and exacerbation of resident hazards now occurring at lower magnitudes but which may be worsened by climate extremes expected in the near future.

Timely early warning systems and other DRR interventions would be able to enhance the resilience of the people of Kasese to the effects of climate change.

## Acronyms

|      |                                        |
|------|----------------------------------------|
| CBPP | Contagious bovine pleuropneumonia      |
| DDMC | District Disaster Management Committee |
| DRM  | Disaster Risk Management               |
| GIS  | Geographic Information System          |
| GPS  | Geographic Positioning System          |
| KCCL | Kasese Cobalt Company Limited          |
| KDLG | Kasese District Local Government       |
| LLG  | Lower Level Government                 |
| MC   | Municipal Council                      |
| MLG  | Ministry of Local Government           |
| MS   | Microsoft                              |
| MW   | Mega watts                             |
| NGO  | Non-Government Organization            |
| OPM  | Office of the Prime Minister           |
| SC   | Sub-county                             |
| TC   | Town Council                           |
| UNDP | United Nations Development Programme   |



## 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, B, Marburg, Plague, Avian influenza/Birdflu, 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 and 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.

## Introduction

Kasese District is vulnerable to a number of hazards that often eSub-Countyalate to disasters. They include flooding, landslides, prolonged dry spell, animal attacks on crops, livestock and humans, crop pests and diseases, animal pests and diseases, environmental degradation, internal conflicts, invasive species, hailstorms/severe storms, bush fires and earthquakes. Although these hazards and some of their occurrences have been reported, there has not been an attempt to consolidate and map the information in order to analyse the District's exposure to disaster risks.

The Kasese District Local Government and the Department of Relief, 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 various hazards and analysing the disaster risks and vulnerabilities of Kasese 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, as well as inform the development of the District's contingency and development plans.

## Objectives

The objective of the hazard, risk, and vulnerability mapping exercise is to produce a District Profile that will aid planning and decision-making processes that address disaster risks in Kasese 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 Rwenzori 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-Sub-Countyale approach involving the integration of primary and secondary data. Secondary data were acquired through Government sources (relevant ministries, departments and agencies, the Districts in Rwenzori 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 deSub-Countyriptive 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 Sub-County mapping 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, eTown Council. 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 Sub-County levels. 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 eTown Council. Non-mappable and non-physical situations were captured through remote sensing (e.g. satellite images) and physical observation.

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

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

### **Phase III: Data Analysis and Verification**

**Analysis of collected data.** The mapping team and District Government Officials analysed the collected data, and developed thematic disaster maps by integrating features generated from GPS data with base maps and high resolution satellite images. The main activities at this phase included:

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

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

- Geo-processing, data transformation and geo-referencing
- DiSub-Countyussions/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, Sub-Countyreen 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.

**DeSub-Countyriptive 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.

#### **District Overview**

Kasese District, one of 111 Districts in Uganda (MLG, 2010), is divided into three Counties, Bukonzo, Busongora and Kasese Municipalities, which are further split into 28 lower Local Governments. These include 3 Municipal Divisions, 3 Town Councils and 22 rural Sub-Counties.

Located in the Western region of Uganda at 00°11'N 30°05'E, Kasese District is bordered by the Districts of Kabarole to the Northeast and East, Bundibugyo to the Northwest, Kamwenge to the Southeast, Bushenyi to the South and the Democratic Republic of Congo to the West.

The District has an area of 3,389.6 km<sup>2</sup>, of which only 1,076.6 km<sup>2</sup> (37%) is available for habitation and cultivation, as the greater percentage is occupied by water bodies, wildlife conservation areas, nature or forest reserves as well as Government projects such as irrigation Sub-County themes and prison farms (KDLG, 2005). In view of this, the population of Kasese District is concentrated in a narrow corridor of land running between the Rwenzori Mountains and the Western Rift Valley. Subsequently there is high population pressure on the available land to sustain the growing population. This is a factor in the widespread environmental degradation in the District.

Based on 2009 population projections and the area of land for usable human settlement and activity, the average population density of Kasese District is over 450 people per square kilometre.

#### **Economic drivers**

The following sectors drive economic activities in Kasese.

**Industry:** The two major industries in Kasese are Hima Cement Ltd and Kasese Cobalt Company Limited (KCCL). Hima Cement Ltd employs approximately 305 staff plus close to 500 contractors, and produces just over 800,000 tons of cement per year. KCCL employs roughly 250 people plus contractors and casual workers, and produces 685 tons of cobalt per annum, for export. Between them, these two industries also have significant indirect impacts on the economy of the District through the creation of other related employment

activities, such as food vending and truck delivery services.

Another manufacturer in the District, RECO Industries, produces and processes a variety of goods including mattresses, tomatoes related products and fruit juice.

**Tourism:** Tourism has significant economic impact in Kasese, and in Uganda as a whole. A number of national parks and other protected areas (e.g. Queen Elizabeth National Park, Rwenzori Mountains National Park and Kibale National Park) situated within the District borders are sanctuaries for bird and other wildlife, and attract tourists throughout the year. Tourism provides alternative employment to the youthful population and a source of local revenue to the District, which enhances the Government’s social service delivery. It contributes to the local economic development by providing markets for local products, improvement in housing infrastructure and the promotion of culture and traditional crafts.

**Hydropower production:** Kasese District has three hydro-electric power stations (Kilembe Mines Ltd, KCCL and Tronder Power). Cumulatively, they produce between 20–30.5 MW of power, serving private power requirements as well as feeding into the national grid.

**Cotton and coffee production and processing:** Cotton is the single major cash crop for which the largest proportion of District land is cultivated in every year, in almost all of the mid lowlands of Kasese. Three cotton-processing plants (ginneries) are operational in the District (Nyakatonzi Growers Cooperative Union, Rwenzori Cotton Ginnery and Western Uganda Cotton Co.). Arabica Coffee is the second most important cash crop, mainly cultivated in the mountain areas. Many business people in urban centers are engaged in buying, selling and transporting coffee, and a few small processing plants exist throughout the District (including Bakwanya and Bukonzo Joint).

**Urban and cross border commerce:** Trade is the main engagement in the urban centers of Kasese, augmented by cross border commerce with the Democratic Republic of Congo especially in the border LLG of Mpondwe Lhubiriha.

**Intensified agriculture:** The cultivation of maize, passion fruit, mangoes and pineapples, the latter two crops on a commercial Sub-Countyale, is a relatively new and growing economic driver.

## Demographics

**Table 1 Projected population (Mid 2012) Kasese District**

|                          | Male    | Female  | Total   |
|--------------------------|---------|---------|---------|
| Kasese District          | 290,600 | 311,600 | 602,200 |
| Kasese Municipal Council | 61,100  | 63,300  | 124,400 |
| Central Division         | 38,000  | 38,800  | 76,800  |
| Bulembia Division        | 9,300   | 10,100  | 19,400  |
| Nyamwamba Division       | 13,800  | 14,400  | 28,200  |

|                                   |        |        |        |
|-----------------------------------|--------|--------|--------|
| KaseseKatweKabatooro Town Council | 8,200  | 4,100  | 8,400  |
| KaseseHima Town Council           | 15,000 | 9,200  | 17,400 |
| KaseseBwera-Mpondwe Town Council  | 4,300  | 15,900 | 30,900 |

**Table 2 Projected population (Mid 2012) Sub-Counties**

| Sub-county   | Male   | Female | Total  |
|--------------|--------|--------|--------|
| Buhuhira     | 6,600  | 6,800  | 13,400 |
| Bugoye       | 21,800 | 23,400 | 45,200 |
| Bwera        | 4,500  | 4,300  | 8,800  |
| Ihandiro     | 8,000  | 8,500  | 16,500 |
| Isango       | 9,400  | 10,600 | 20,000 |
| Karambi      | 14,200 | 16,000 | 30,200 |
| Karusandara  | 6,500  | 6,300  | 12,800 |
| Kilembe      | 8,000  | 7,900  | 15,900 |
| Kisinga      | 9,100  | 27,900 | 53,800 |
| Kitholhu     | 9,800  | 10,400 | 20,200 |
| wesumbu      | 21,700 | 21,800 | 43,500 |
| Kyabarungira | 10,300 | 11,600 | 21,900 |
| Kyarumba     | 19,600 | 21,500 | 41,100 |
| Kyondo       | 11,200 | 12,200 | 23,400 |
| L.Katwe      | 9,500  | 9,500  | 19,000 |
| Mahango      | 10,600 | 11,500 | 22,100 |
| Maliba       | 25,800 | 27,300 | 53,100 |
| Mpondwe      | 13,000 | 14,600 | 27,600 |
| Muhokya      | 11,500 | 12,000 | 23,500 |
| Munkunyu     | 18,200 | 20,200 | 38,400 |
| Nyakiyumbu   | 15,400 | 10,000 | 32,700 |
| Kitswamba    | 25,900 | 17,300 | 19,100 |



## Hazards

**Table 3 Hazard status**

| Hazard                                            | Status                                                                                                                           | Sub-Counties                                                                                                                                                        |
|---------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Floods                                            | Incidence of flash and river flooding (Nyamwamba, Nyamugasani, Mubuku and Rwimi rivers)and on the shores of Lake Edward reported | Nyakiyumbu, Kisinga, Kyarumba, Kilembe, Maliba, Bugoye, Kaseses MC, Hima Town Council, Karusandara, Kitswamba, Mubuku town                                          |
| Landslides                                        | Instances reported                                                                                                               | Kisinga, Mahango, Kilembe, Bwesumbu, Bugoye, Maliba, Kyabarungira, Buhuhira, Muhokya                                                                                |
| Droughts                                          | Widely reported                                                                                                                  | Nyakatonzi, Nyakiyumbu, Karusandara, Rukoki, Muhokya, Kisinga, Kitswamba, Lake Katwe                                                                                |
| Animal attacks on crops, animals and human beings | Incidence of elephants, buffalos, lions, baboons, velvet monkeys and warthogs invading gardens, and animals reported             | Isango, Nyakiyumbu, Munkunyu, Nyakatonzi, Kabirizi, Muhokya, Kitswamba, Karusandara, Nyakatonzi, Central Division, Katwe-Kabatooro Town Council, Nyamwamba Division |
| Crop pests and diseases                           | Incidence of Cassava Mosaic, Banana Bacteria Wilt, Coffee leaf Rust, Maize Lynthonicrosis, Maize Streak reported                 | Bwesumbu, Buhuhira, Kyabarungira, Bugoye, Maliba, Rukoki, Kilembe, Mahango                                                                                          |
| Animal pests and diseases                         | Incidence of CBPP, Black Quarter, Anthrax, Foot and Mouth Disease, Avian flu, Swine fever reported                               | Nyakiyumbu, Nyakatonzi, Lake Katwe, Muhokya, Karusandara, Kitswamba, Katwe-Kabatooro                                                                                |
| Environmental degradation                         | Incidence of tree cutting on the slopes, and murram, sand and stone extraction reported                                          | Bwesumbu, Kyabarungira, Maliba, Bugoye, Kilembe, Kyarumba, Kyondo, Kitholhu, Ihandiro, Kisinga, Karusandara, Katwe, Kabatooro, Lake Katwe                           |

|                       |                                                                                              |                                                                                                                    |
|-----------------------|----------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|
| Internal conflict     | Incidence of conflict over land, resource use and cultural issues reported                   | Kitswamba, Karasundara, Nyamwamba, Muhokya, Nakiyumbu                                                              |
| Invasive weed species | Incidence of (Lantana Camara) reported, Pathenium in and along Queen Elizabeth National Park | Malibu Sub-County, Karusandara, Nyamwaba Sub-County,, Hima Town Council, Mubuku T/B, Kabirizi, Nyakatonzi, Muhokya |
| Severe storms         | Incidence of strong winds and hailstorms reported                                            | Maliba, Bugoye, Nakiyumbu, Hima, Kibuga, Karusandara, Kisinga, Kyarumba                                            |
| Wild fires            | Incidence reported seasonally/ annually                                                      | Kitholu, Kyondo, Maliba, Ihandiro, Bugoye, Rukooki, Mahango                                                        |
| Earthquakes           | Earthquakes and tremors regularly reported                                                   | Kaseses MC, Bugoye Sub-County, Kilembe                                                                             |

Table 3 displays the status and summarizes the nature of hazards in the District and provides the locations of instances.

Table 4 provides another view of the relative significance of hazards. The right most column is ordered by the number of hazards endemic in each sub-county, and is a measure of compound vulnerability. The bottom row is ordered by the number of Sub-Counties that experience each hazard, giving an indication of its geographic prevalence. Table 5 ranks the hazards in their order of occurrence, frequency and magnitude. Their ranking reflects the perception of stakeholders of the relative severity of the corresponding impacts on them.

**Table 4: Summary of hazards by sub-county**

| Administrative Units           | Hazards   |              |                           |           |                           |                       |               |            |            |                         |             |                    |            |
|--------------------------------|-----------|--------------|---------------------------|-----------|---------------------------|-----------------------|---------------|------------|------------|-------------------------|-------------|--------------------|------------|
|                                | Floods    | Crop Raiding | Environmental degradation | Drought   | Animal pests and diseases | Invasive Weed Species | Severe storms | Bush fires | Landslides | Crop pests and diseases | Earthquakes | Internal Conflicts | Total      |
| Bugoye                         | ✓         | ✓            | ✓                         |           |                           |                       | ✓             | ✓          | ✓          | ✓                       | ✓           |                    | 7          |
| Buhuhira                       | ✓         |              | ✓                         |           |                           |                       |               | ✓          | ✓          | ✓                       |             |                    | 5          |
| Bulembia Division              | ✓         | ✓            | ✓                         |           |                           |                       |               |            |            |                         | ✓           |                    | 4          |
| Bwera                          |           |              | ✓                         |           |                           |                       |               |            |            |                         |             |                    | 1          |
| Bwesumbu                       | ✓         |              | ✓                         |           |                           |                       |               | ✓          | ✓          | ✓                       |             |                    | 5          |
| Central Division               |           | ✓            |                           |           |                           |                       |               |            |            |                         | ✓           |                    | 3          |
| Hima Town Council              | ✓         |              | ✓                         | ✓         | ✓                         | ✓                     | ✓             |            |            |                         |             |                    | 6          |
| Ihandiro                       |           |              | ✓                         |           |                           |                       |               | ✓          |            |                         |             |                    | 2          |
| Isango                         |           | ✓            | ✓                         |           |                           |                       |               |            |            |                         |             |                    | 2          |
| Karambi                        |           |              | ✓                         |           |                           |                       |               |            |            |                         |             |                    | 1          |
| Karusandara                    | ✓         | ✓            | ✓                         | ✓         | ✓                         | ✓                     | ✓             | ✓          |            | ✓                       |             | ✓                  | 10         |
| Katwe, Kabatoro Town Council   |           | ✓            | ✓                         | ✓         | ✓                         | ✓                     | ✓             |            |            |                         |             |                    | 7          |
| Kilembe                        | ✓         |              | ✓                         |           |                           |                       |               | ✓          | ✓          | ✓                       | ✓           |                    | 6          |
| Kisinga                        | ✓         | ✓            | ✓                         | ✓         |                           |                       | ✓             |            | ✓          |                         |             |                    | 6          |
| Kitholhu                       |           |              | ✓                         |           |                           |                       |               | ✓          |            |                         |             |                    | 2          |
| Kitswamba                      | ✓         | ✓            | ✓                         | ✓         | ✓                         | ✓                     |               |            |            | ✓                       |             | ✓                  | 8          |
| Kyabarungira                   |           |              | ✓                         |           |                           |                       |               |            | ✓          | ✓                       |             |                    | 3          |
| Kyarumba                       | ✓         | ✓            | ✓                         |           |                           |                       | ✓             |            |            |                         |             |                    | 3          |
| Kyondo                         | ✓         | ✓            | ✓                         |           |                           |                       |               | ✓          |            |                         |             |                    | 2          |
| L. Katwe                       |           | ✓            | ✓                         | ✓         | ✓                         | ✓                     |               |            |            |                         |             |                    | 4          |
| Mahango                        |           |              | ✓                         |           |                           |                       |               | ✓          | ✓          | ✓                       |             |                    | 4          |
| Maliba                         | ✓         |              | ✓                         |           |                           | ✓                     | ✓             | ✓          | ✓          | ✓                       |             | ✓                  | 8          |
| Mpondwe-Lhubiriha Town Council |           |              | ✓                         |           |                           |                       |               |            |            |                         |             |                    | 1          |
| Muhokya                        |           | ✓            | ✓                         | ✓         | ✓                         | ✓                     |               |            | ✓          | ✓                       |             | ✓                  | 9          |
| Munkunyu                       |           | ✓            | ✓                         | ✓         | ✓                         |                       |               |            |            | ✓                       |             |                    | 5          |
| Nyakatonzi                     |           | ✓            | ✓                         | ✓         | ✓                         | ✓                     |               |            |            |                         |             | ✓                  | 6          |
| Nyakiyumbu                     | ✓         | ✓            | ✓                         | ✓         | ✓                         |                       | ✓             |            |            | ✓                       |             | ✓                  | 8          |
| Nyamwamba Division             | ✓         | ✓            | ✓                         | ✓         | ✓                         | ✓                     | ✓             |            |            |                         | ✓           | ✓                  | 9          |
| Rukoki                         |           |              | ✓                         | ✓         |                           |                       |               | ✓          |            |                         |             |                    | 3          |
| <b>Total</b>                   | <b>14</b> | <b>16</b>    | <b>28</b>                 | <b>12</b> | <b>10</b>                 | <b>9</b>              | <b>9</b>      | <b>11</b>  | <b>9</b>   | <b>12</b>               | <b>5</b>    | <b>7</b>           | <b>142</b> |

**Table 5: Ranking of hazards**

| S/ No. | Hazard                    | Frequency (Most Freq=3, Freq=2, Not Freq=1) | Area (No. of Sub-Counties affected ≤6=1, 7-12=2, 13-18=3, 19-24=4, ≥25=5) | Magnitude (High=3, Medium=2, Low=1) | Total (Sum of Columns 3,4 &5) | Rank (A Sub-County ending order) |
|--------|---------------------------|---------------------------------------------|---------------------------------------------------------------------------|-------------------------------------|-------------------------------|----------------------------------|
| 1      | Environmental degradation | 3                                           | 5                                                                         | 3                                   | 11                            | 1                                |
| 2      | Floods                    | 3                                           | 3                                                                         | 3                                   | 9                             | 2                                |
| 3      | Crop Raiding              | 3                                           | 3                                                                         | 3                                   | 9                             | 2                                |
| 4      | Drought                   | 3                                           | 2                                                                         | 2                                   | 7                             | 4                                |
| 5      | Animal pests and diseases | 3                                           | 2                                                                         | 2                                   | 7                             | 4                                |
| 6      | Invasive Species          | 2                                           | 2                                                                         | 2                                   | 6                             | 6                                |
| 7      | Bush fires                | 2                                           | 2                                                                         | 2                                   | 6                             | 6                                |
| 8      | Crop pests and diseases   | 2                                           | 2                                                                         | 2                                   | 6                             | 6                                |
| 9      | Internal Conflicts        | 2                                           | 2                                                                         | 2                                   | 6                             | 6                                |
| 10     | Severe storms             | 1                                           | 2                                                                         | 1                                   | 4                             | 10                               |
| 11     | Landslides                | 1                                           | 2                                                                         | 1                                   | 4                             | 10                               |
| 12     | Earthquakes               | 1                                           | 1                                                                         | 1                                   | 3                             | 12                               |

**Table 6: Hazard risk assessment**

| Administrative Units           | Hazards |              |                           |                     |                           |                  |               |            |            |                         |             |                    |
|--------------------------------|---------|--------------|---------------------------|---------------------|---------------------------|------------------|---------------|------------|------------|-------------------------|-------------|--------------------|
|                                | Floods  | Crop Raiding | Environmental degradation | Prolonged dry spell | Animal pests and diseases | Invasive Species | Severe storms | Bush fires | Landslides | Crop pests and diseases | Earthquakes | Internal Conflicts |
| Bugoye                         | M       | L            | L                         | N                   | N                         | N                | L             | L          | M          | M                       | L           | N                  |
| Buhuhira                       | L       | N            | M                         | N                   | N                         | N                | N             | L          | L          | M                       | N           | N                  |
| Bulembia Division              | H       | L            | H                         | N                   | N                         | N                | N             | N          | N          | N                       | L           | N                  |
| Bwera                          | N       | N            | H                         | N                   | N                         | N                | N             | N          | N          | N                       | N           | N                  |
| Bwesumbu                       | L       | N            | M                         | N                   | N                         | N                | N             | L          | L          | L                       | N           | N                  |
| Central Division               | N       | L            | N                         | N                   | N                         | N                | N             | N          | N          | N                       | L           | N                  |
| Hima Town Council              | L       | N            | H                         | H                   | H                         | H                | M             | N          | N          | N                       | N           | N                  |
| Ihandiro                       | N       | N            | H                         | N                   | N                         | N                | N             | H          | N          | N                       | N           | N                  |
| Isango                         | N       | H            | M                         | N                   | N                         | N                | N             | N          | N          | N                       | N           | N                  |
| Karambi                        | N       | N            | H                         | N                   | N                         | N                | N             | N          | N          | N                       | N           | N                  |
| Karusandara                    | H       | H            | H                         | H                   | H                         | H                | M             | M          | N          | M                       | N           | M                  |
| Katwe-Kabatoro Town Council    | N       | H            | H                         | H                   | H                         | H                | M             | N          | N          | N                       | N           | N                  |
| Kilembe                        | H       | N            | H                         | N                   | N                         | N                | N             | M          | M          | M                       | M           | N                  |
| Kisinga                        | L       | H            | H                         | L                   | N                         | N                | L             | N          | L          | N                       | N           | N                  |
| Kitholhu                       | N       | N            | H                         | N                   | N                         | N                | N             | H          | N          | N                       | N           | N                  |
| Kitswamba                      | M       | M            | M                         | M                   | M                         | H                | N             | N          | N          | L                       | N           | H                  |
| Kyabarungira                   | N       | N            | H                         | N                   | N                         | N                | N             | N          | M          | M                       | N           | N                  |
| Kyarumba                       | H       | M            | H                         | N                   | N                         | N                | L             | N          | N          | N                       | N           | N                  |
| Kyondo                         | H       | M            | H                         | N                   | N                         | N                | N             | H          | N          | N                       | N           | N                  |
| L. Katwe                       | N       | H            | M                         | H                   | H                         | H                | N             | N          | N          | N                       | N           | N                  |
| Mahango                        | N       | N            | H                         | N                   | N                         | N                | N             | H          | H          | M                       | N           | N                  |
| Maliba                         | H       | N            | H                         | N                   | N                         | M                | L             | M          | L          | M                       | N           | M                  |
| Mpondwe-Lhubiriha Town Council | N       | N            | M                         | N                   | N                         | N                | N             | N          | N          | N                       | N           | N                  |
| Muhokya                        | N       | H            | H                         | H                   | H                         | H                | N             | N          | L          | H                       | N           | H                  |
| Munkunyu                       | N       | L            | H                         | M                   | H                         | N                | N             | N          | N          | M                       | N           | N                  |
| Nyakatonzi                     | N       | H            | H                         | H                   | H                         | H                | N             | N          | N          | N                       | N           | H                  |
| Nyakiyumbu                     | M       | H            | H                         | H                   | M                         | N                | L             | N          | N          | H                       | N           | H                  |
| Nyamwamba Division             | H       | H            | H                         | H                   | M                         | M                | M             | N          | N          | N                       | L           | M                  |
| Rukoki                         | N       | N            | H                         | H                   | N                         | N                | N             | H          | N          | N                       | N           | N                  |

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

## Hazard Risk Assessment

Table 6 above expresses the communities' assessment of severity and likelihood of risk in their respective Sub-Counties. Each of the columns in the table translates into respective hazard risk maps in the following section. The colours red, yellow, and green showing the severity of the hazard risk in the table are also reflected in the corresponding maps.

# Risks

## Flood

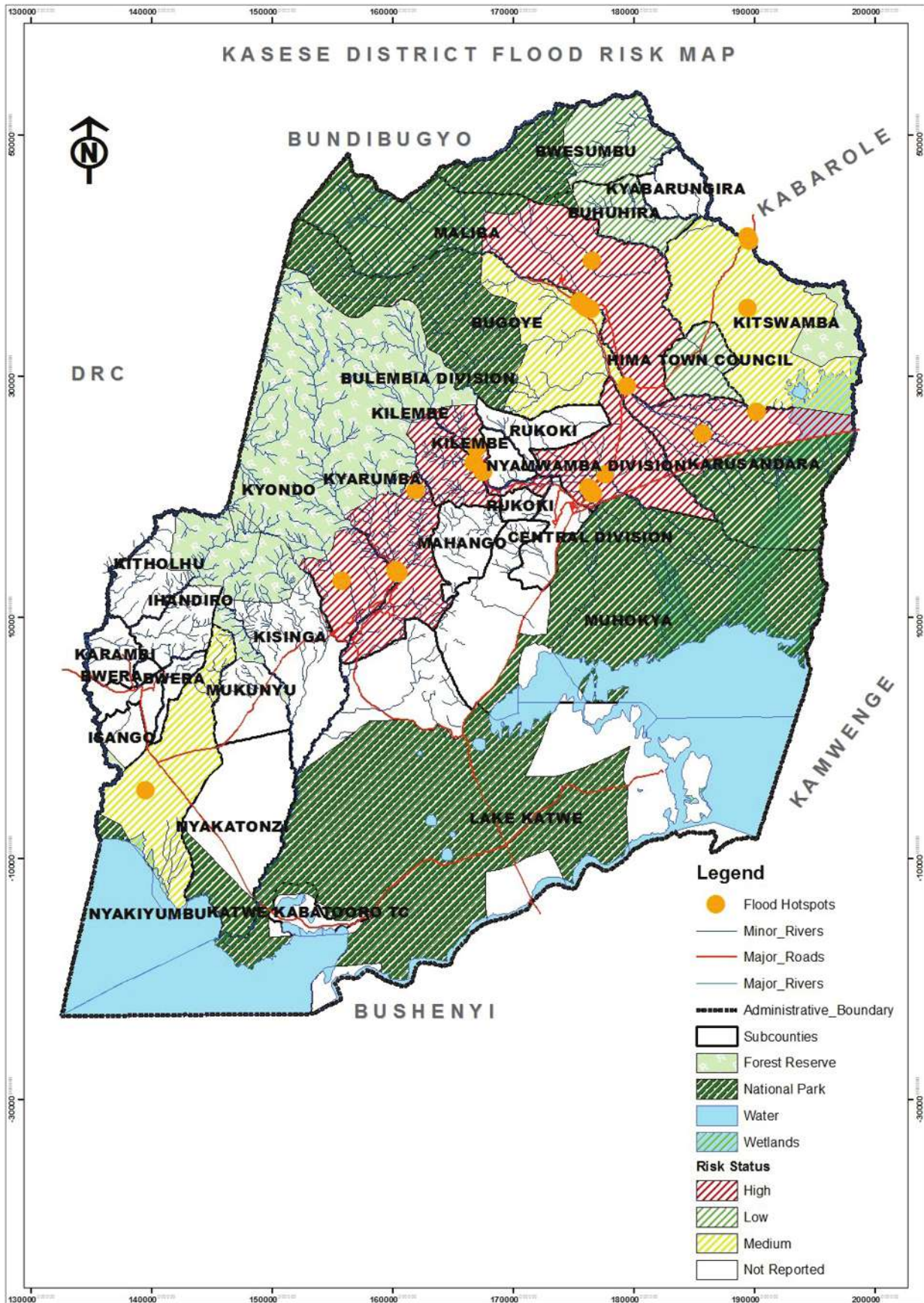


Figure 1 Flood Risk Map



Figure 1 above shows risk status of floods in Kasese District. In Kasese, Bulembia Division, Nyamwamba Division, Karusandara, Kilembe, Kyarumba, Kyondo and Maliba Sub-Counties are prone to high risks of flood. To the contrary, Central Division, Bwera, Ihandiro, Isango, Karambi, Katwe-Kabatoro Town Council, Kitholhu, Kyabarungira, L. Katwe, Mahango, Mpondwe-Lhubiriha Town Council, Muhokya, Munkunyu, Nyakatonzi and Rukoki Sub-Counties and Town Councils are not prone to floods.

Floods in Kasese are caused by rivers and streams that overflow their banks into the neighboring low lying areas. Table 7 below details impacts on the affected Villages and Parishes.

**Table 7. Flooding and the communities at risk in Kasese District**

| Source             | Sub County        | Parish   | Village              | Effect                                                                    |
|--------------------|-------------------|----------|----------------------|---------------------------------------------------------------------------|
| Lake Edward shores | Nyakiyumbu        | Kayanzi  | Kayanzi              | Submerged beach, landing site and fish ponds                              |
| R. Nyamugasani     | Kyarumba          | Kaghema  | Kaghema Town Council | Broken riverbanks and bridge                                              |
|                    |                   | Kihungu  | Nyakeya II           | Broken road, crops washed away                                            |
|                    |                   | Kitaabu  | Buswagha             | Washed away livestock and woodlots                                        |
|                    |                   | Kabirizi | Karujumba            | Flooded into agricultural area                                            |
|                    | Kyondo            | Kanyatsi | Musasa,              | Broken riverbanks and bridge                                              |
|                    |                   | Buyagha  | Kinyabisiki          | Flooded into agricultural area                                            |
|                    |                   | ibimbo   | Kisanga              | Flooded into agricultural area                                            |
|                    |                   | Kasokero | Kasemire             | Flooded into agricultural area                                            |
|                    | Kisinga           | Kagando  | Kagando II           | Flooded into agricultural area                                            |
|                    |                   |          | Kamuruli             | River bank flooding into agricultural land                                |
| River Nyamwamba    | Bulembia Division | Kyanzuki |                      | Broken bridge, burst river banks                                          |
|                    |                   | Katiri   | Kanyaruboga          | Residential area swept away,                                              |
|                    |                   | Katiri   | Katiri               | Hospital flooded, staff quarters swept away                               |
|                    |                   | Namuhuga | Road barrier         | River bank burst, flooding into agricultural land and deposit of boulders |



| Source                | Sub County         | Parish                 | Village      | Effect                                                                                                  |
|-----------------------|--------------------|------------------------|--------------|---------------------------------------------------------------------------------------------------------|
|                       | Nyamwamba Division | Nyakasanga East, West. |              | Outburst river banks, flooding into residential area and washing away crops                             |
|                       |                    | Kanyangeya             | Kanyangeya   | Deposit of sand and silt in residential area                                                            |
|                       |                    |                        | Saluti A, B  | Deposit of sand and silt in residential area                                                            |
|                       |                    | Kisanga A, B           | all Villages | Flooding of residential area                                                                            |
|                       |                    | Sub-Countyheme         | Kyondo       | Deposit of sand and silt in Agricultural area                                                           |
|                       | Karusandara        | Kyalanga               | Kyalanga     | Cropland flooding and livestock destruction                                                             |
| River Mubuku          | Maliba             | Bikone                 | Katindo      | Broken banks, river changed course, sweeping road, houses, woodlots, deposit of boulders                |
|                       |                    |                        | Katindo      | Deposit of sand and silt in agricultural and residential area, broken bridge                            |
|                       |                    | Mubuku                 | Buzibwera    | Deposit of boulders, sand and silt in agricultural and residential area, sweeping of crops and woodlots |
|                       |                    |                        | Kisojo       |                                                                                                         |
|                       |                    | Mubuku Town Board      |              | Threatened the bridge, deposited boulders and eroded the river bank                                     |
|                       | Karusandara        | Karusandara            |              | Loss of crops and animals, collapse of buildings                                                        |
|                       |                    | Kanamba                |              | Broken bridge, loss of crops and animals                                                                |
| River Lhume/<br>Rwimi | Bwesumbu           |                        |              | Broken river banks                                                                                      |
|                       | Kitwamba           |                        |              | Broken river banks, deposits of sand and silt                                                           |

# Landslides

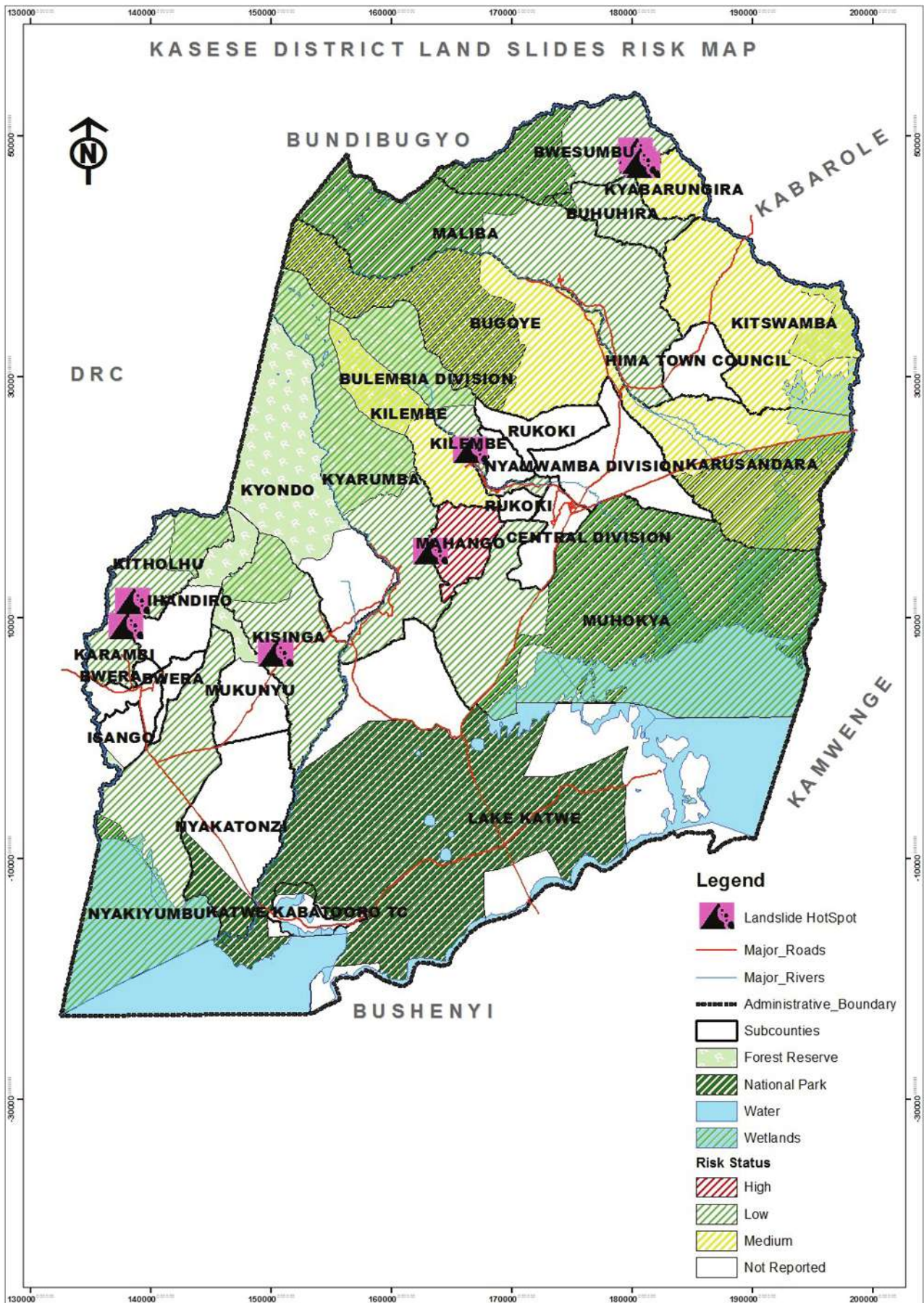


Figure 2: Landslide Risk Map

Figure 2 above depicts landslides risk status in Kasese District. Mahango and Rukoki Sub-Counties are prone to high risk of landslides while majority of the Sub-Counties are not prone to the hazard risk at all. Deforestation, steep slopes, weak soil structure and heavy rains are joint compounding factors to landslide risk in the District. The unstable soils slip down the slope, killing people and animals and damaging crops below. For example, in 2013 Mahango Sub-County, Nyamusule Parish had landslides resulting in lost lives and crops.

# Prolonged Dry Spell

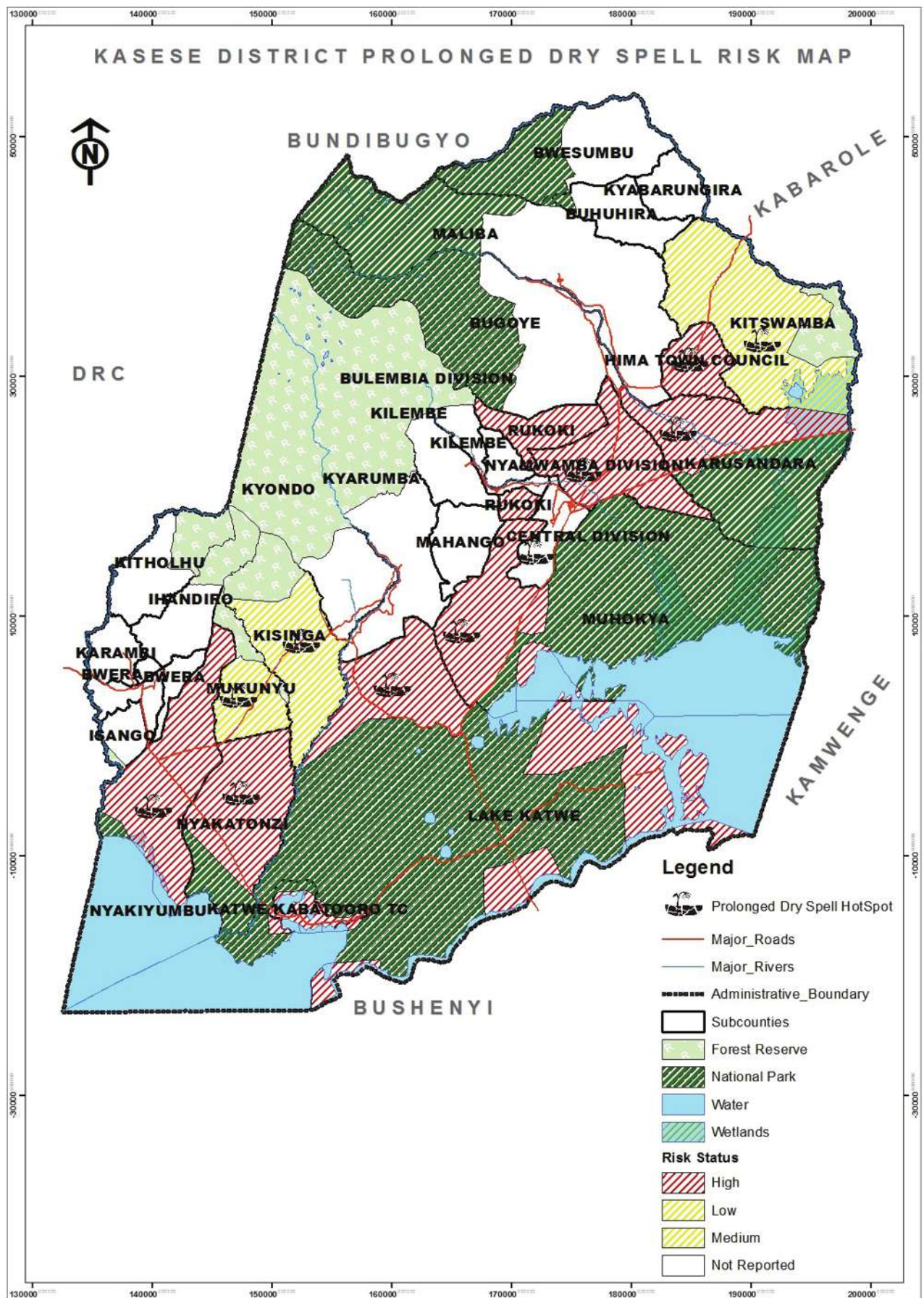


Figure 3: Prolonged Dry Spell Risk Map

Prolonged dry spells risk status in Kasese District are shown in figure 3 above. Prolonged dry spells are widespread in the District leading to crop failures in consecutive seasons. The prolonged dry spell risk is high in Hima Town Council, Karusandara Sub-County, Katwe-Kabatoro Town Council, L. Katwe, Muhokya, Nyakatonzi, Nyakiyumbu, Nyamwamba Division Nyamwamba Division and Rukoki Sub-County, while majority of the Sub-Counties and Town Councils are not prone to the prolonged dry spell risk at all. The extended dry spells are associated with crop failures and the subsequent food insecurity in the District.

# Crop Raiding and Wild Animals

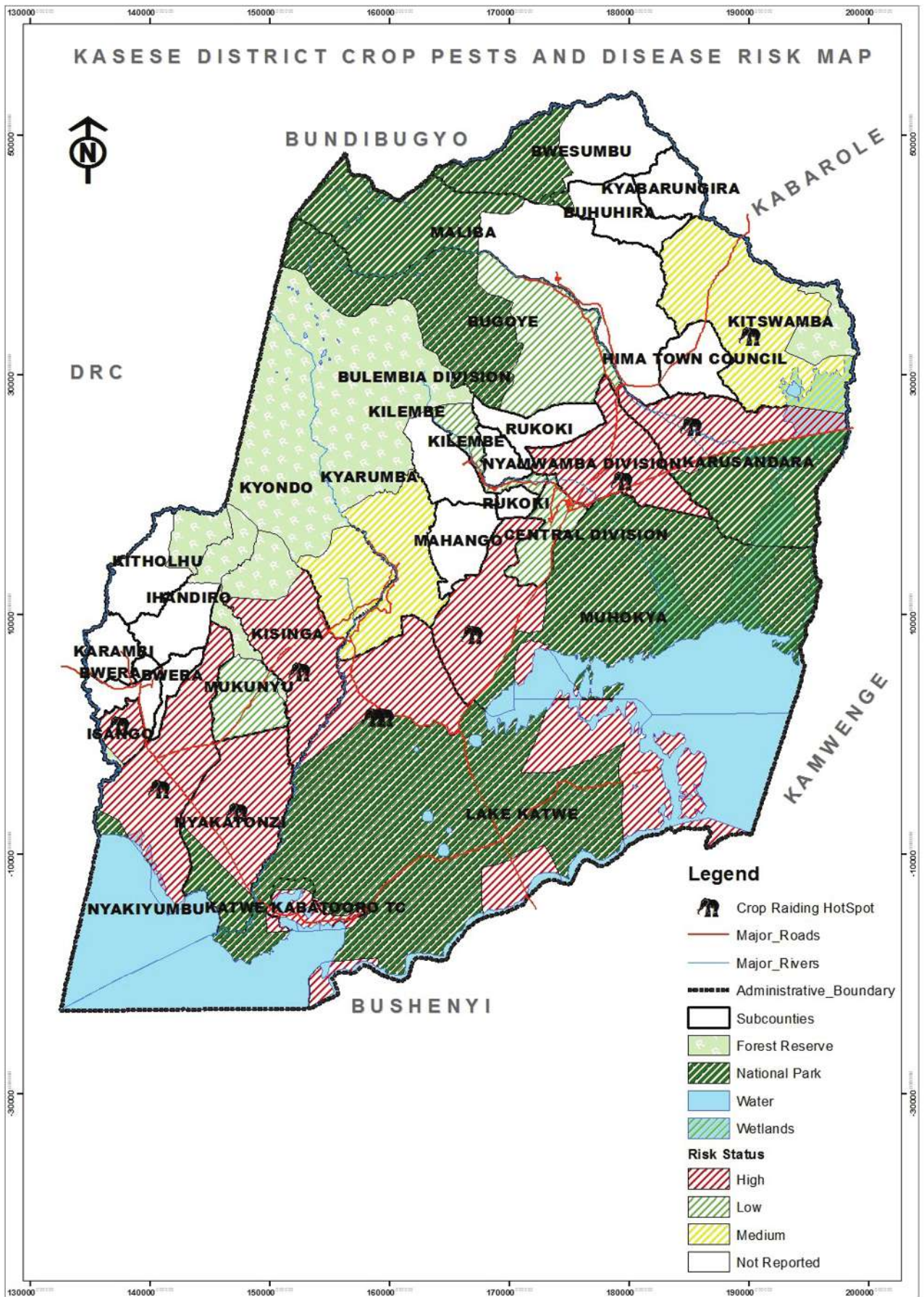


Figure 4: Crop Raiding Risk Map

The risk status of crop raiding in Kasese District is shown in figure 4 above. In the District instances of elephants, buffalos, baboons, velvet monkeys and warthogs invading gardens, and of lions taking livestock, were reported. The severity of the risk varies in magnitude from a maize garden being raided by velvet monkeys and warthogs, to an entire village being devastated by elephants.

The communities in Isango, Nyakiyumbu, Nyakatonzi, Muhokya, Karusandara, Kisinga, L. Katwe Sub-Counties, and Katwe Kabatooro Town Council and Kasese Municipal Council are prone to high risks of crop raiding. The phenomena can be so severe that people along Bwera-Kasese road spend their nights maintaining bonfires to Sub-County are away elephants which invade the gardens. These communities have not observed the required buffer zone of 100 meters from the boundaries of the Queen Elizabeth National Game Park, a factor which exacerbates the situation. The above situation notwithstanding, Buhuhira, Bwera, Bwesumbu, Ihandiro, Karambi, Kilembe, Kitholhu, Kyabarungira, Mahango, Maliba, Rukoki, Mpondwe-Lhubiriha Town Council and Hima Town Council are not prone to any risk of crop raiding.

# Crop Pests and Diseases

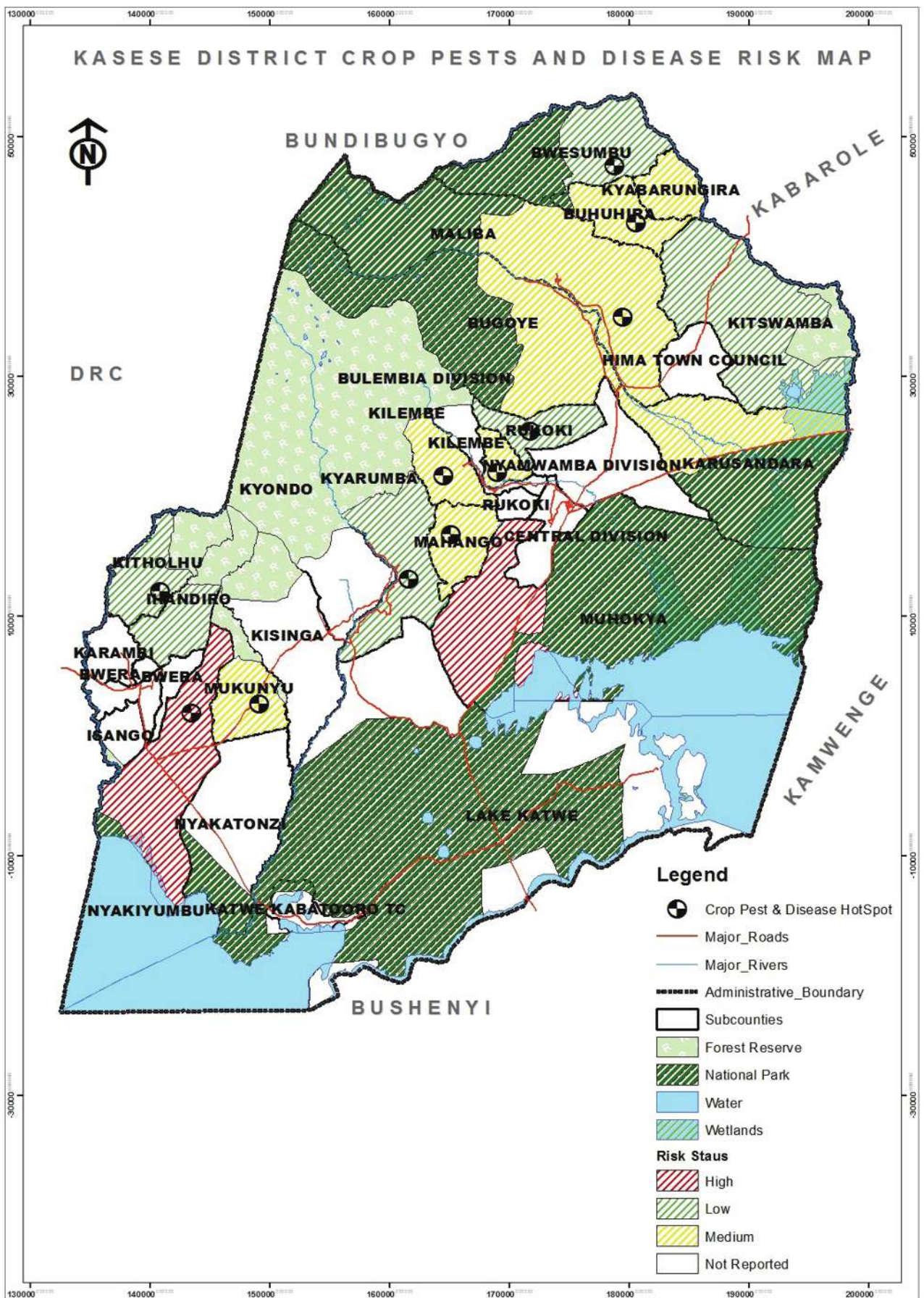


Figure 5: Crop Pests and Disease Risk Map



Crop pests and diseases risk status in Kasese District is presented in figure 5 above. The risk is high in Muhokya and Nyakiyumbu Sub-Counties while most of the Sub-Counties are not prone to the risk. The common pests and diseases in Kasese District include cassava mosaic (white flies), banana bacteria wilt, coffee leaf rust and maize streak virus are common mainly in the low-lying areas of Bwesumbu, Buhuhira, Kyabarungira, Maliba, Bugoye, Kilembe, Rukoki, Mahango, Kyarumba, Kyondo, Kisinga, Munkunyu, Nyakiyumbu, Ihandiro and Kitholu Sub-Counties, especially since 2010. Population pressure and consequent increased intensity of agricultural activity has unbalanced the ecology resulting in proliferation of these pests.

# Animal Vectors and Diseases

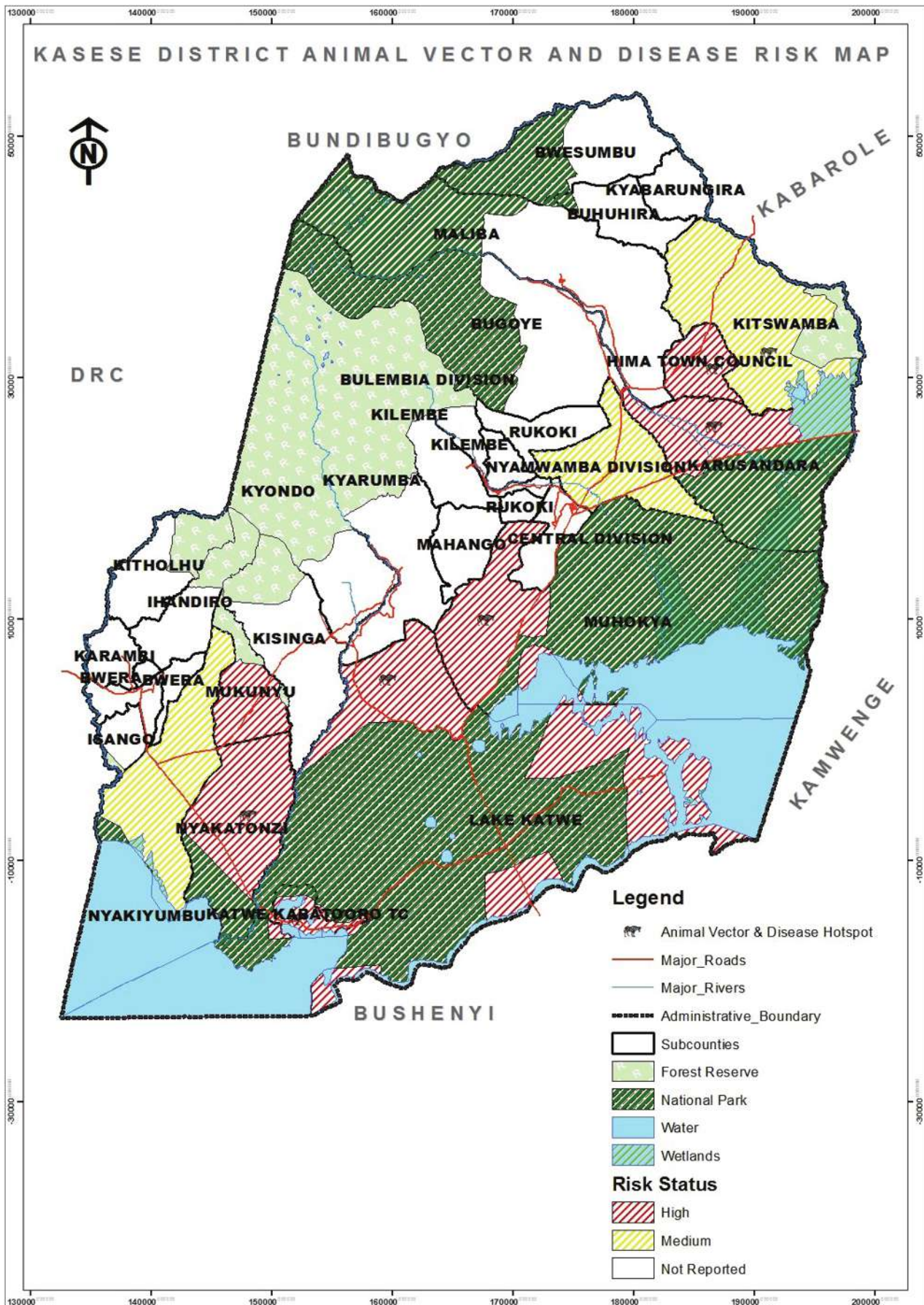


Figure 6: Animal Vectors and Disease Risk Map

Animal vector and diseases risk status in Kasese District is depicted in the figure 6 above. CBPP, black quarter, foot and mouth disease, avian flu and swine fever are common diseases among livestock, and anthrax has been reported in Queen Elizabeth National Park. The Sub-Counties at high risk of animal vector and diseases are Nyakatonzi, Lake Katwe, Katwe-Kabatooro Town Council, Muhokya, Hima Town Council, Karusandara and Munkunyu. This is most rampant during the dry season. Most of the Sub-Counties are not prone to the risk of animal vector and disease hazard. Tick and other insect vectors carry these diseases.

# Environmental Degradation

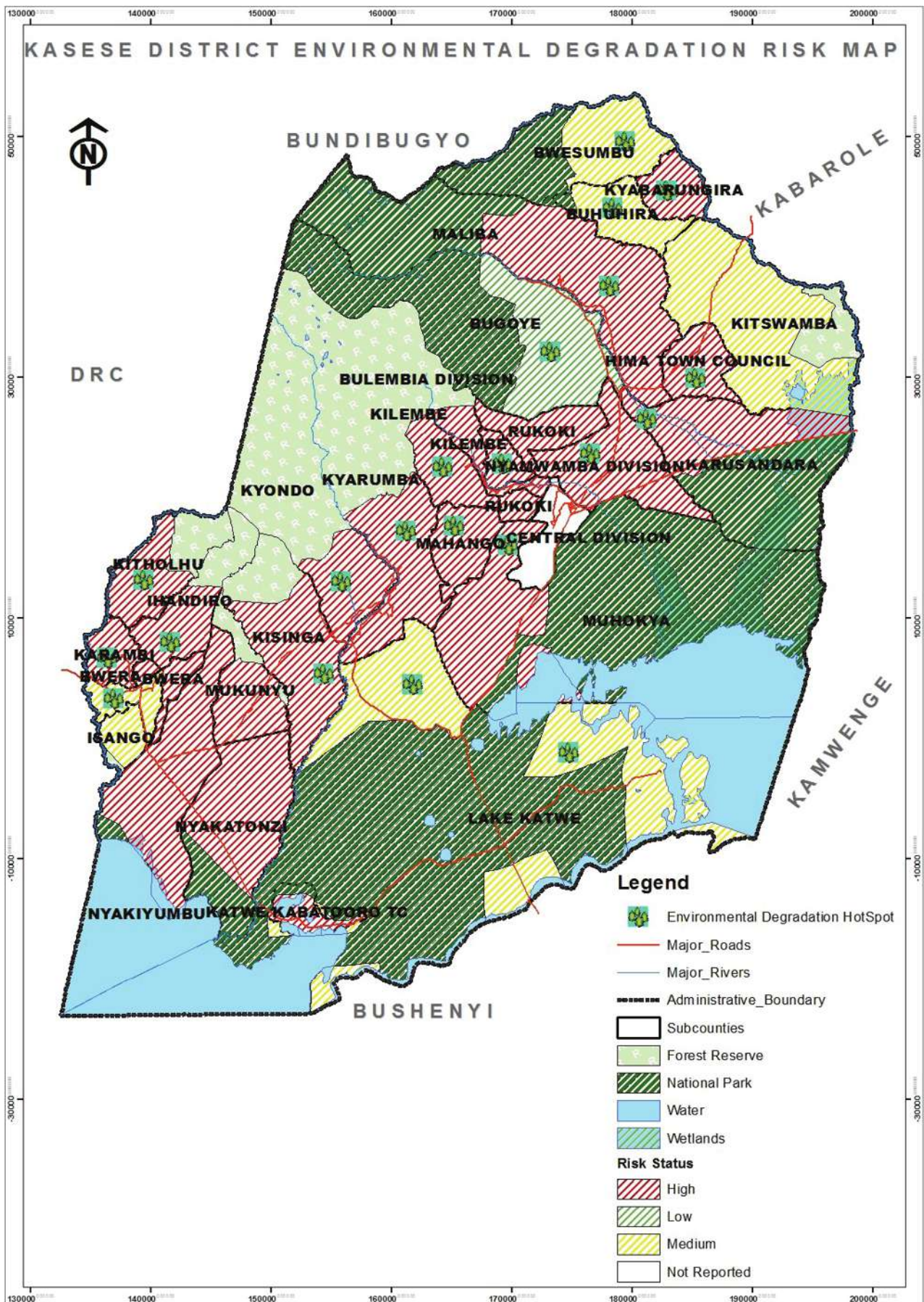


Figure 7 Environmental Degradation Risk Map

Environmental degradation risk status in Kasese District is depicted in the figure 7 above. A combination of factors including deforestation, wetland encroachment and reclamation, sand and stone mining (which weakens or destabilizes the river banks and mountain slopes), limestone mining, murram extraction and monoculture contribute to environmental degradation in the District. The majority of the Sub-Counties are at high risk of environmental degradation. They include Kitholu, Ihandiro, Karambi, Bwera, Mayango, Nyakiyumbu, Munkunyu, Kyondo, Kyarumba, Muhokya, Kilembe, Nyamwamba Division of Kasese Municipality, Hima Town Council, Kyabarungira, katwe-kabatooro, Lake Katwe Town Council, Bulembia Division, Kisinga, Maliba, Nyakatonzi, Rukoki Town Council and Bwesumbu. The only Division that is not at risk of environmental degradation is Central Division of Kasese Municipality.

# Land/Internal Conflict

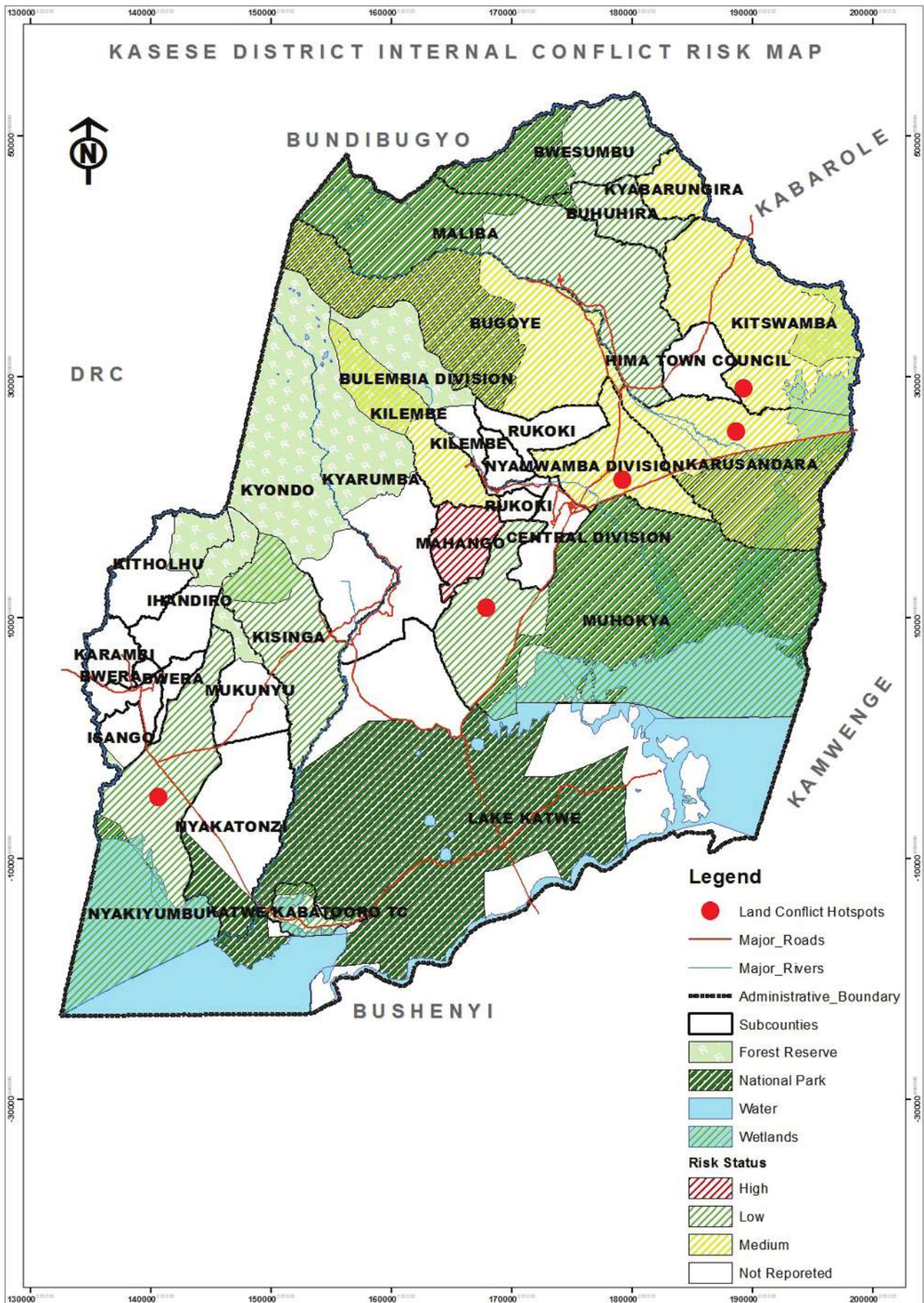


Figure 8 Land Conflict Risk Map

Land disputes in Kasese District are of two types: land use (pastoralists versus arable farmers) and land ownership. These occur mostly in Kitwamba, Muhokya, Nyakiyumbu, Nyakatonzi Sub-Counties where the communities are at high risk of internal conflicts and Nyamwamba Division of Kasese Municipal, Maliba and Karusandara are prone to moderate risk of internal conflicts. All the other Sub-Counties, Town Councils and Divisions are not prone to the hazard risk.

The conflicts were so severe between the years 2009 and 2013 that an inter-ministerial committee had to get involved in the negotiations. Table 8 provides some details.

**Table 8 Locations and nature of conflicts**

| Sub-county         | Parish         | Village       | Nature                             | Period                 |
|--------------------|----------------|---------------|------------------------------------|------------------------|
| Kitwamba           | Rugendabara    | Ibuga         | Pastoralists over agriculturalists | 2009, 2010, 2012, 2013 |
|                    |                | Bigando       |                                    |                        |
| Muhokya            | Muhokya        | Kisongora     | Land and tribal Conflicts          |                        |
| Nyakatonzi         | Nyakatonzi     | Bwanika I, II | Land conflicts                     |                        |
| Nyamwamba Division | Sub-Countyheme | Kyondo        |                                    |                        |
|                    |                | Kigoro        |                                    |                        |
|                    | Kihara         | Kihara        |                                    |                        |

# Invasive Weed Species

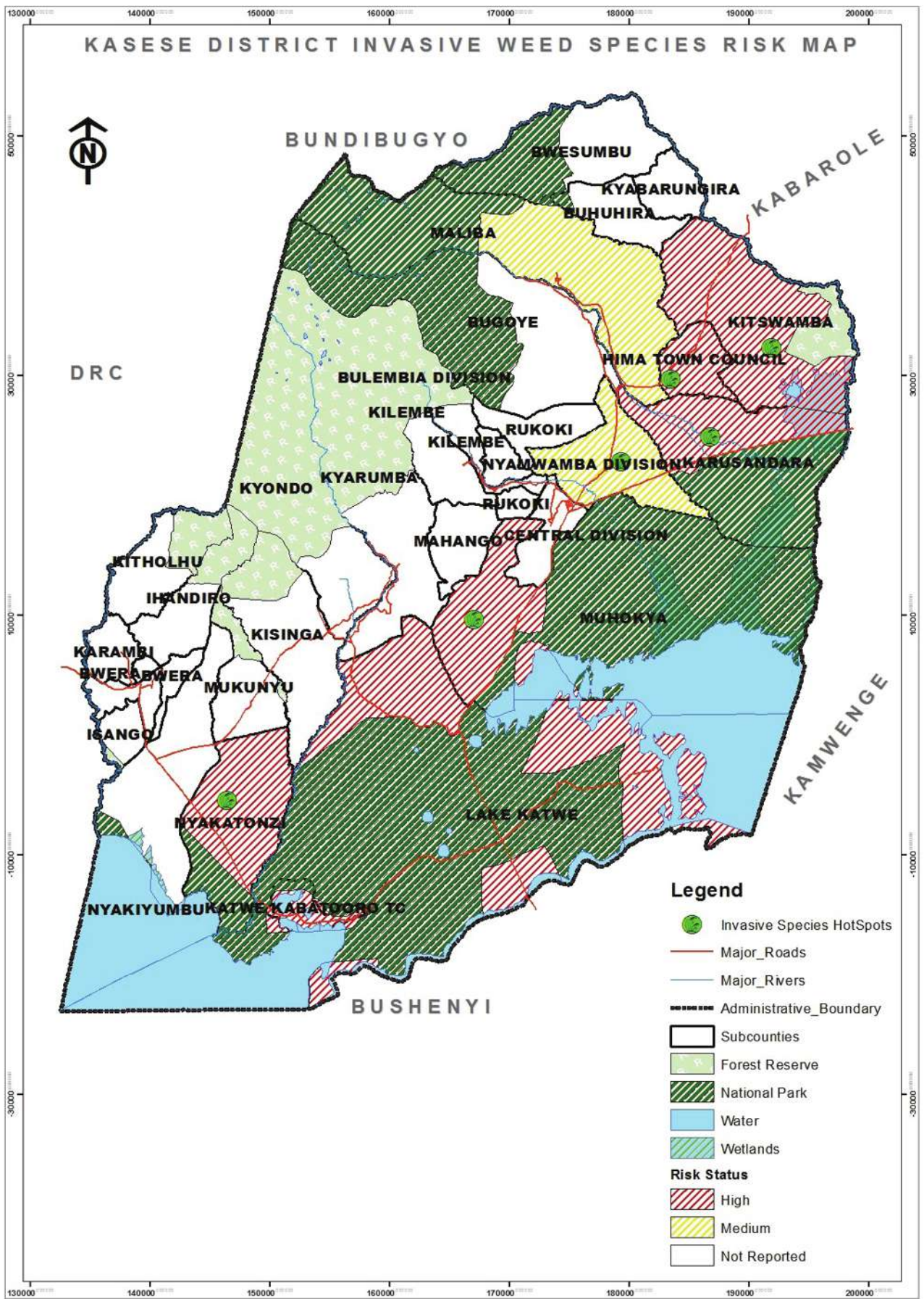


Figure 9: Invasive weed Species Risk Map



Figure 9 above depicts the risk status of proliferation of invasive weed species in Kasese District. Since the year 2007, *Parthenium hysterophorus* and *Lantana camara* are two notorious invasive weed species that have become a menace in the Queen Elizabeth National Game Park, and now are spreading to community lands. Loss of soil fertility motivated introduction of *Lantana camara* to replace nitrogen in fallow lands, but the species have got out of control. Contact with toxic *Parthenium* causes dermatitis and respiratory malfunction in humans, dermatitis in cattle and domestic animals, and miSub-Countyarriages in mammals. *Lantana* out-competes and displaces more desirable species.

These weeds are spreading widely in Kitswamba, Hima Town Council, Katwe-Kabatoro Town Council, Karusandara, Muhokya, Lake Katwe Town Council and Nyakatonzi Sub-Counties, which are at high risk of the hazard. Maliba Sub County and Nyamwamba Division are moderately at risk of invasive weed species while the rest of the District is yet safe from the hazard. This may be a factor in the raiding of crops by the wild animals from the national park, whose food sources have been replaced by inedible invasive weed species.

# Heavy Storms

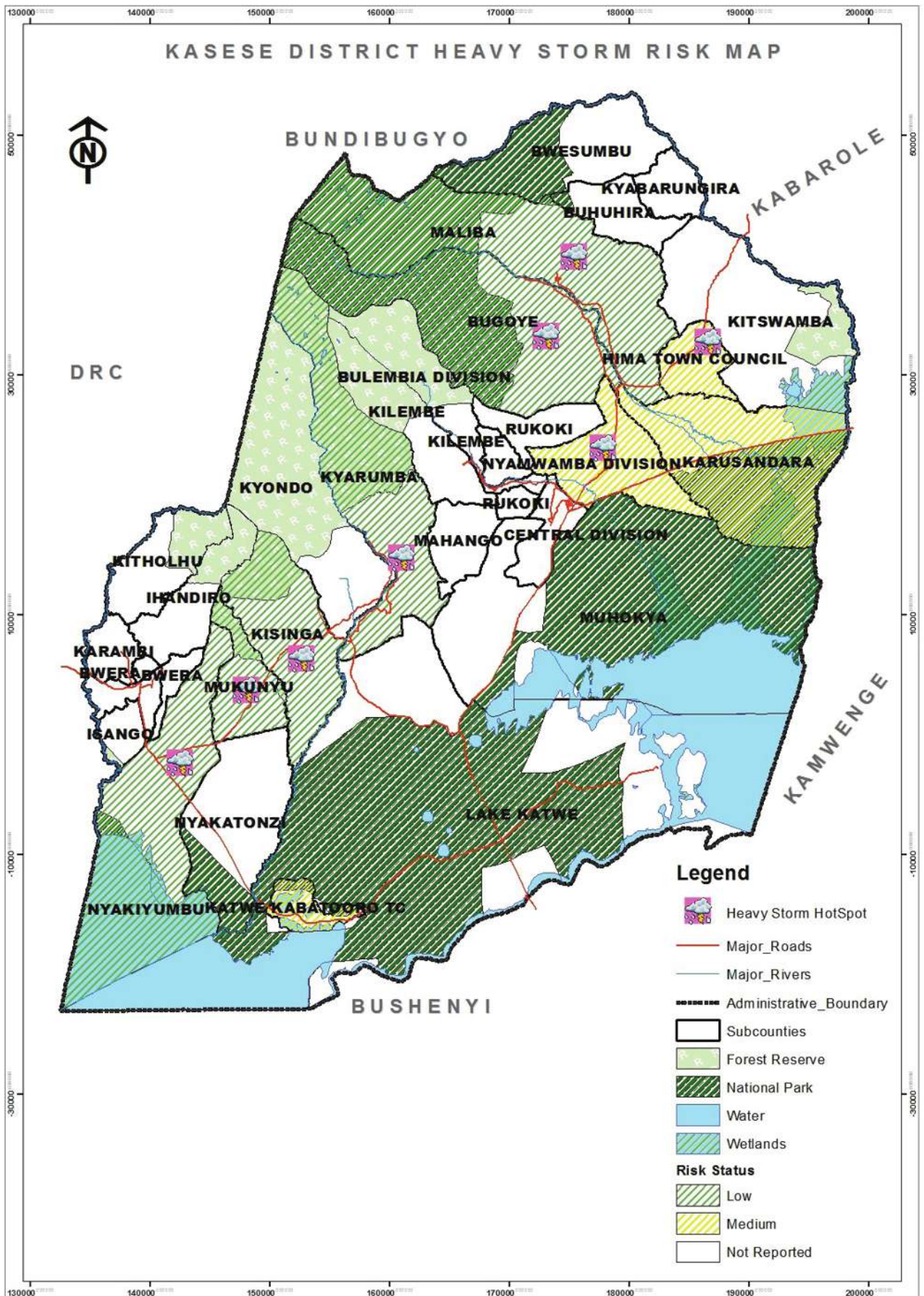


Figure 10 Heavy Storm Risk Map

Figure 10 above presents the heavy storm risk status of Kasese District. Heavy storms are comprised of hail storms, strong winds, torrential rain and lightning. These occur in parts of the District at the onset of the rainy seasons. Significant damage to crops (maize, bananas, cassava and coffee), infrastructure and buildings have been reported over the years. The Sub-Counties most affected are Hima Town Council, Karusandara, Katwe-Kabatooro Town Council and Nyamwamba Division of Kasese Municipal though according to the risk assessment presented in table 6, these Sub-Counties are prone to moderate risk of the hazard. Maliba, Bugoye, Kisinga, Kyarumba, and Nyakiyumbu Sub-Counties are prone to low risk of heavy storms, while the rest of the Sub-Counties are not prone to the risk.

# Bushfire

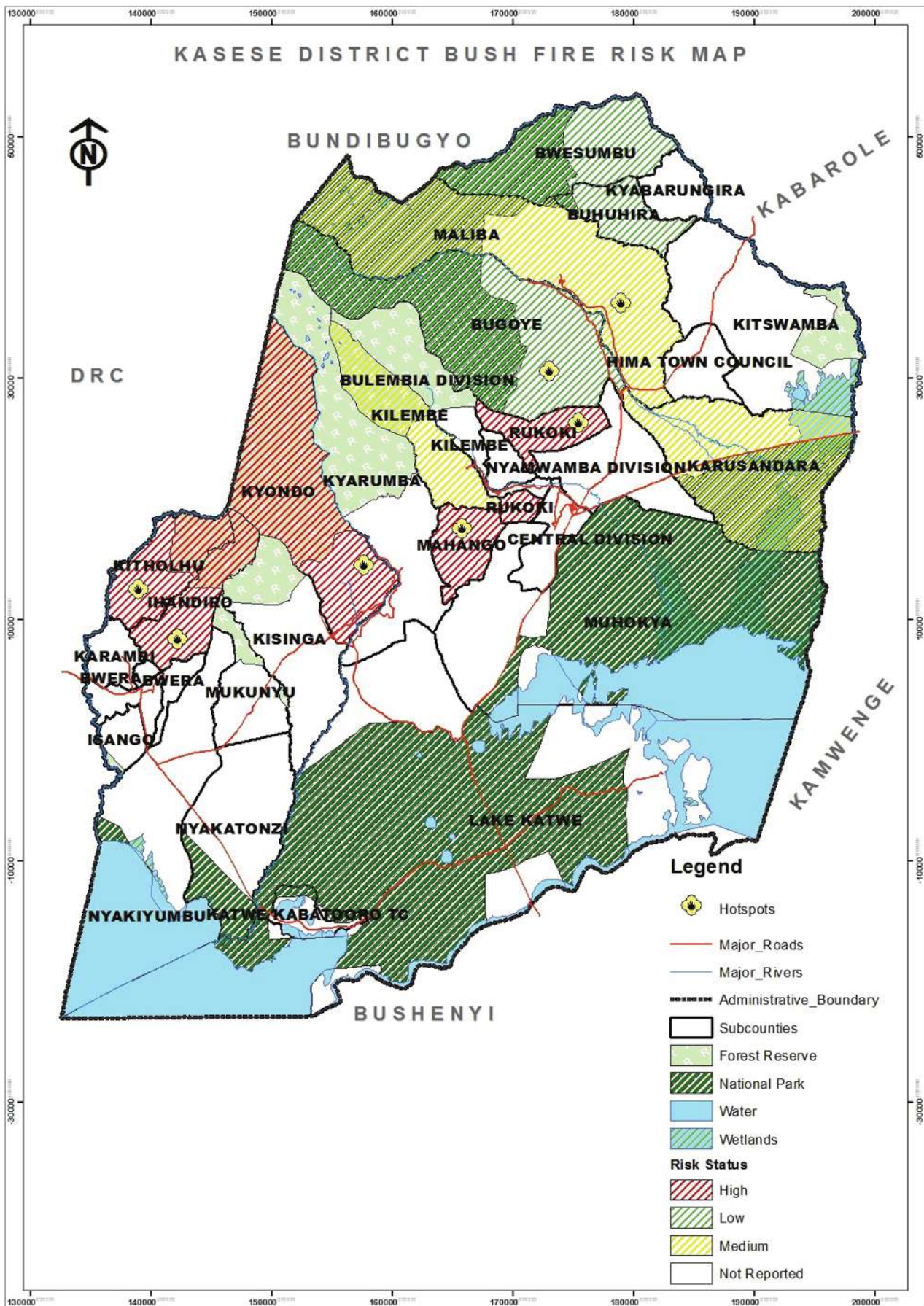


Figure 11 Bush Fire Risk Map

Figure 11 above presents the risk status of bush fires in Kasese District. In the District bush fires are common especially during the dry season when farmers burn grassland in order for new pasture to sprout for animals and also prepare gardens for the new planting season.

These practices are common in Mahango, Ihandiro, Kitholhu, Rukoki and Kyondo Sub-Counties, which are at high risk of bush fires. Maliba, Kilembe and Karusandara Sub-Counties are at moderate risk of bush fires while Bugoye, Buhuhira and Bwesumbu Sub-Counties are prone to low risk of bush fires. The rest of the Sub-Counties are not prone to the bush fires risk.

The epitome of the bush fires was witnessed in 2013 where bush fires of unprecedented magnitude occurred in the Mount Rwenzori Forest Reserve taking more than a month. After all conventional efforts to quell the fire failed, the cultural leadership intervened by summoning the rain makers. Rains fell and extinguished the fire, although unfortunately they culminated in the May 2013 floods.

# Earthquake

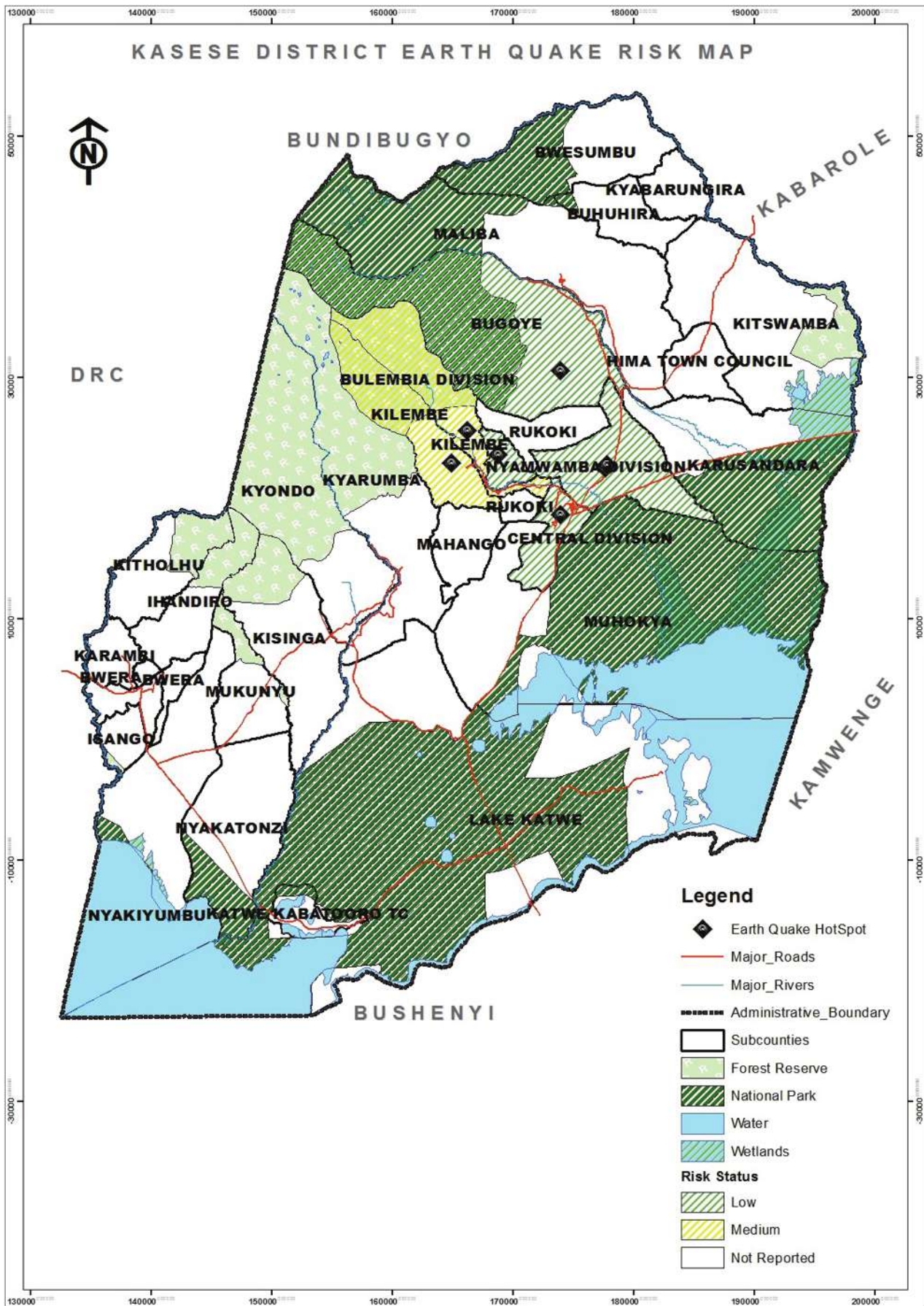


Figure 12: Earthquake Risk Map

Figure 12 above presents the earthquake risk status of Kasese District. The District just like other Rwenzori Districts is predisposed to the risk of earthquakes. Though at varying levels, the risk is increasing with increase in urban population density. Historically, the most remarkable seismic events occurred in 1969 and 1994 and were felt throughout the Rwenzori region. The most at risk communities are those of Kilembe and Bulembia Division, which are at moderate risk while Bugoye, Sub-county, Nyamwamba and Central Divisions of Kasese Municipal Council are prone to low risk as per the reports of the previous seismic activities otherwise potentially are at high risk.

## Vulnerability

Table 6 summarizes the communities' assessment of hazard severity and frequency in the Sub-Counties. Table 9 transforms those qualitative low/medium/high judgments to numerical values 1/2/3 which when summed vertically show the relative risk per hazard. The horizontal sums show both cumulative and weighted vulnerability



**Table 9: Risk and vulnerability assessment**

| Administrative area                                 | Hazards |              |                           |                     |                           |                  |               |            |            |                         |             |                    | Cumulative vulnerability (Absolute) | Weighted vulnerability (Cumulative/3) |
|-----------------------------------------------------|---------|--------------|---------------------------|---------------------|---------------------------|------------------|---------------|------------|------------|-------------------------|-------------|--------------------|-------------------------------------|---------------------------------------|
|                                                     | Floods  | Crop Raiding | Environmental degradation | Prolonged Dry Spell | Animal pests and diseases | Invasive Species | Severe storms | Bush fires | Landslides | Crop pests and diseases | Earthquakes | Internal Conflicts |                                     |                                       |
| Bugoye                                              | 2       | 1            | 1                         | 0                   | 0                         | 0                | 1             | 1          | 2          | 2                       | 1           | 0                  | 11                                  | 4                                     |
| Buhuhira                                            | 1       | 0            | 2                         | 0                   | 0                         | 0                | 0             | 1          | 1          | 2                       | 0           | 0                  | 7                                   | 2                                     |
| Bulembia Division                                   | 3       | 1            | 3                         | 0                   | 0                         | 0                | 0             | 0          | 0          | 0                       | 1           | 0                  | 8                                   | 3                                     |
| Bwera                                               | 0       | 0            | 3                         | 0                   | 0                         | 0                | 0             | 0          | 0          | 0                       | 0           | 0                  | 3                                   | 1                                     |
| Bwesumbu                                            | 1       | 0            | 2                         | 0                   | 0                         | 0                | 0             | 1          | 1          | 1                       | 0           | 0                  | 6                                   | 2                                     |
| Central Division                                    | 0       | 1            | 0                         | 0                   | 0                         | 0                | 0             | 0          | 0          | 0                       | 1           | 0                  | 2                                   | 1                                     |
| Hima Town Council                                   | 1       | 0            | 3                         | 3                   | 3                         | 3                | 2             | 0          | 0          | 0                       | 0           | 0                  | 15                                  | 5                                     |
| Ihandiro                                            | 0       | 0            | 3                         | 0                   | 0                         | 0                | 0             | 3          | 0          | 0                       | 0           | 0                  | 6                                   | 2                                     |
| Isango                                              | 0       | 3            | 2                         | 0                   | 0                         | 0                | 0             | 0          | 0          | 0                       | 0           | 0                  | 5                                   | 2                                     |
| Karambi                                             | 0       | 0            | 3                         | 0                   | 0                         | 0                | 0             | 0          | 0          | 0                       | 0           | 0                  | 3                                   | 1                                     |
| Karusandara                                         | 3       | 3            | 3                         | 3                   | 3                         | 3                | 2             | 2          | 0          | 2                       | 0           | 2                  | 26                                  | 9                                     |
| Katwe - Kabatooro Town Council                      | 0       | 3            | 3                         | 3                   | 3                         | 3                | 2             | 0          | 0          | 0                       | 0           | 0                  | 17                                  | 6                                     |
| Kilembe                                             | 3       | 0            | 3                         | 0                   | 0                         | 0                | 0             | 2          | 2          | 2                       | 2           | 0                  | 14                                  | 5                                     |
| Kisinga                                             | 1       | 3            | 3                         | 1                   | 0                         | 0                | 1             | 0          | 1          | 0                       | 0           | 0                  | 10                                  | 3                                     |
| Kitholhu                                            | 0       | 0            | 3                         | 0                   | 0                         | 0                | 0             | 3          | 0          | 0                       | 0           | 0                  | 6                                   | 2                                     |
| Kitswamba                                           | 2       | 2            | 2                         | 2                   | 2                         | 3                | 0             | 0          | 0          | 1                       | 0           | 3                  | 17                                  | 6                                     |
| Kyabarungira                                        | 0       | 0            | 3                         | 0                   | 0                         | 0                | 0             | 0          | 2          | 2                       | 0           | 0                  | 7                                   | 2                                     |
| Kyarumba                                            | 3       | 2            | 3                         | 0                   | 0                         | 0                | 1             | 0          | 0          | 0                       | 0           | 0                  | 9                                   | 3                                     |
| Kyondo                                              | 3       | 2            | 3                         | 0                   | 0                         | 0                | 0             | 3          | 0          | 0                       | 0           | 0                  | 11                                  | 4                                     |
| L. Katwe                                            | 0       | 3            | 2                         | 3                   | 3                         | 3                | 0             | 0          | 0          | 0                       | 0           | 0                  | 14                                  | 5                                     |
| Mahango                                             | 0       | 0            | 3                         | 0                   | 0                         | 0                | 0             | 3          | 3          | 2                       | 0           | 0                  | 11                                  | 4                                     |
| Maliba                                              | 3       | 0            | 3                         | 0                   | 0                         | 2                | 1             | 2          | 1          | 2                       | 0           | 2                  | 16                                  | 5                                     |
| Mpondwe-Lhubiriha Town Council                      | 0       | 0            | 2                         | 0                   | 0                         | 0                | 0             | 0          | 0          | 0                       | 0           | 0                  | 2                                   | 1                                     |
| Muhokya                                             | 0       | 3            | 3                         | 3                   | 3                         | 3                | 0             | 0          | 1          | 3                       | 0           | 3                  | 22                                  | 7                                     |
| Munkunyu                                            | 0       | 1            | 3                         | 2                   | 3                         | 0                | 0             | 0          | 0          | 2                       | 0           | 0                  | 11                                  | 4                                     |
| Nyakatonzi                                          | 0       | 3            | 3                         | 3                   | 3                         | 3                | 0             | 0          | 0          | 0                       | 0           | 3                  | 18                                  | 6                                     |
| Nyakiyumbu                                          | 2       | 3            | 3                         | 3                   | 2                         | 0                | 1             | 0          | 0          | 3                       | 0           | 3                  | 20                                  | 7                                     |
| Nyamwamba Division                                  | 3       | 3            | 3                         | 3                   | 2                         | 2                | 2             | 0          | 0          | 0                       | 1           | 2                  | 21                                  | 7                                     |
| Rukoki                                              | 0       | 0            | 3                         | 3                   | 0                         | 0                | 0             | 3          | 0          | 0                       | 0           | 0                  | 9                                   | 3                                     |
|                                                     | 31      | 37           | 76                        | 32                  | 27                        | 25               | 13            | 24         | 14         | 24                      | 6           | 18                 | 32                                  |                                       |
| Key: 3 = High, 2 = Medium, 1= Low, 0 = Not reported |         |              |                           |                     |                           |                  |               |            |            |                         |             |                    |                                     |                                       |

# Risk Vulnerability

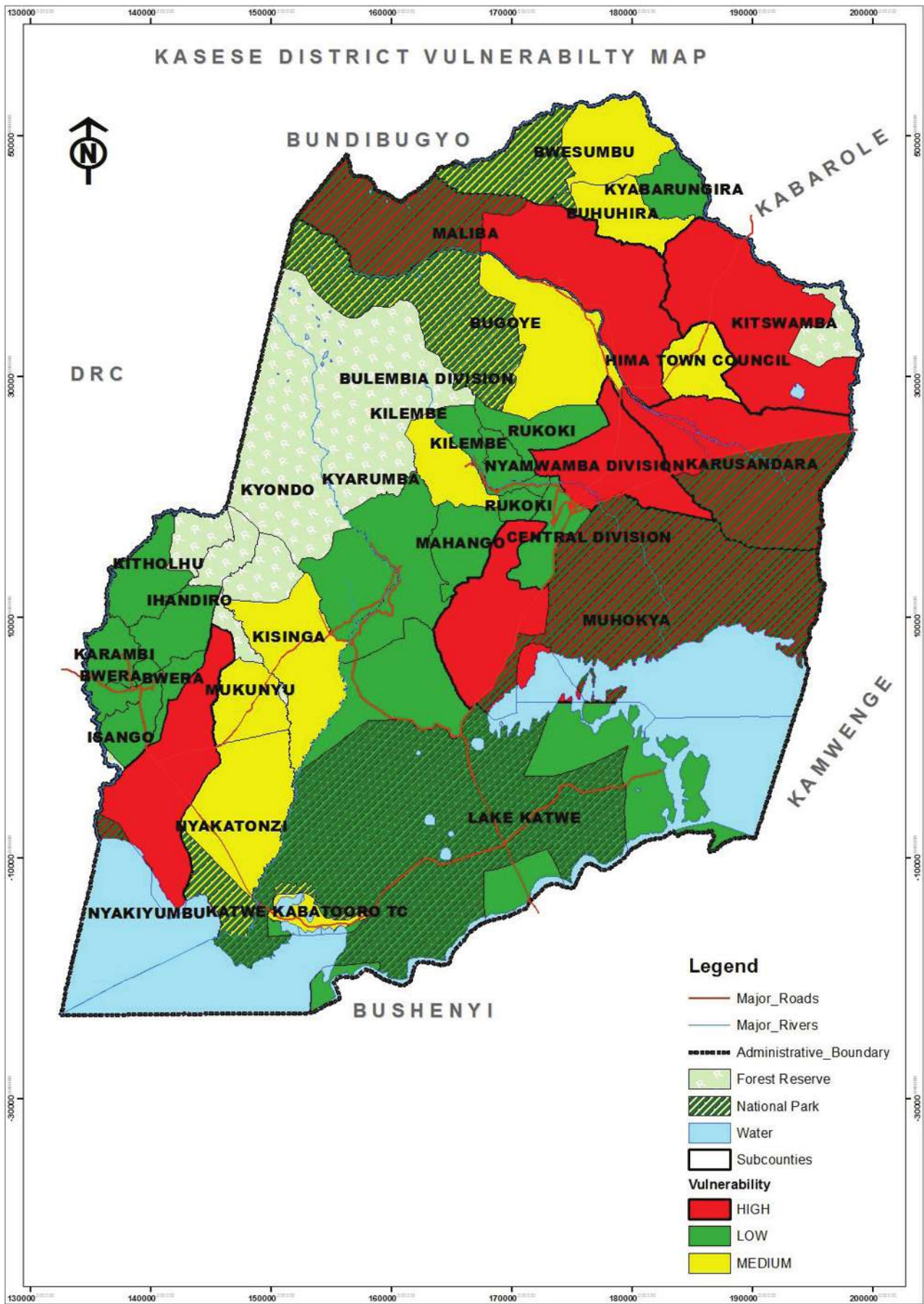


Figure 13 Vulnerability map

The vulnerability map in Figure 13 shows the areas of low, medium and high vulnerability according to the risk and vulnerability table (Table 9) above. In this analysis, the cumulative vulnerability of each sub-county is calculated and then divided by three 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 green, those from 5 to 7 are coded “medium”, termed medium vulnerability areas and are assigned yellow while those whose weighted vulnerabilities are 8 or more are coded “high”, termed high vulnerability areas and are represented by red.

Kasese District is exposed to 12 hazards namely environmental degradation, crop raiding, drought, floods, animal pests and diseases, invasive species, crop pests and diseases, bush fires, internal conflicts, landslides and severe storms arranged in their order of risk from highest to lowest with total risks of 76, 37, 32, 31, 27, 25, 24, 24, 18, 14, 13, and 6 respectively. These are worsened by poor practices that include building houses close to rivers, lack of protective embankments/walls, constructing houses with weak designs, and deforestation of slopes with poor soils.

Karusandara Sub-county reported the highest vulnerability in Kasese District with a cumulative vulnerability of 26 and a weighted vulnerability of 9 which lies at the top (red) of the vulnerability Sub-Countyale. The majority of the Sub-Counties including Hima Town Council, Katwe-kabatooro Town Council, Kilembe, Kitswamba, L. Katwe, Maliba, Muhokya, Nyakatonzi, Nyakiyumbu and Nyamwamba lie at the medium (yellow) level of the vulnerability Sub-Countyale. The rest of Sub-Counties were at the lower level (green) of the vulnerability Sub-Countyale therefore are least vulnerable to the District resident hazards. Bwera, Central Division, Karambi, Mpondwe-Lhubiriha Town Council have the least vulnerability to the hazards with a weighted vulnerability of 1 each.

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

## Conclusion

This multi hazard, risk and vulnerability profile for Kasese 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 Kasese perceive each of the hazards based on the past trends and the predicted likelihood of their occurrences and impact on the communities.

It was established that Kasese District is vulnerable to twelve hazards, in order of decreasing risk: environmental degradation, crop raiding, drought, floods, animal pests and diseases, invasive species, crop pests and diseases, bush fires, internal conflicts, landslides and severe storms

Environmental degradation, crop raiding, drought and floods were ranked as the most widespread and important of the twelve hazards.

The District has a fairly high level of cumulative vulnerability to hazards. Karusandara is the most vulnerable sub-county with a weighted vulnerability of 9. Hima Town Council, Katwe-kabatooro Town Council, Kilembe, Kitswamba, L. Katwe, Maliba, Muhokya, Nyakatonzi, Nyakiyumbu and Nyamwamba Sub-Counties are moderately vulnerable with weighted vulnerability values lying between 5 and 7. The rest of the Sub-Counties are less vulnerable to the resident hazards with weighted vulnerabilities well below 5 but should be fortified against occurrences of new hazards and exacerbation of resident hazards now occurring at lower magnitudes but which may be worsened by climate extremes expected in the near future

Timely early warning systems and other DRR interventions would be able to enhance the resilience of the people of Kasese 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.

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Department of Relief, Disaster  
Preparedness and Management  
Office of the Prime Minister  
P.O.Box 371, Kampala, Uganda

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