

ROLE OF GEOGRAPHIC INFORMATION SYSTEMS (GIS) IN DISASTER MANAGEMENT

The Ugandan Case

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Introduction

- Effective and realistic emergency management programs depend on data from various sources which should be collected, analyzed, displayed, disseminated and used in an organized manner.
- It is therefore desirable to have the right data in the right place at the right time. The data should be organized in a usable format for stakeholders to respond and take action in case of an emergency.
- Most of the emergency data requirements are of spatial nature hence a need for a Geographic Information System (GIS).

Definition of terms

Emergency:	Is a course of events that endangers people, property and the environment, or a deviation from planned or expected behavior.
Hazard:	Refers to the physical characteristics that may cause an emergency.
Risk:	Potential or likelihood that an emergency might occur.
Disaster:	Is an emergency that cannot be managed by the local resources.
Assessment:	Analysis of the situation or event.

Types of Disasters

- **Natural:** Result from natural processes. These include; earthquakes, drought, flooding, landslides, volcanic activity, typhoon, hurricane and torrential rains.
- **Human induced:** Result from human activity: These include fires, spills utility and construction failures, epidemics, crashes and explosions, accidents, internal disturbances, - riots, rebel activities, violent strikes, displacement and evictions
- Some disasters are cross-cutting, both natural and human

Managing Disasters

There are five interrelated phases in the management of disasters namely;

- Planning: Analyze and document the possibility of an emergency or disaster to occur.
- Mitigation: Activities that actually eliminate the probability of an emergency to occur - policies and by-laws
- Preparedness: Plans and activities to handle the emergency where mitigation has failed - early warning systems, stockpiling
- Response Activities following an emergency or disaster - evacuation, shelter, relief supply
- Recovery long-term and re- Returning all systems to normal or better; short or term - resettlement, repatriation, re-tooling integration

Role of GIS in Disaster Risk Assessment

- Disaster management starts with locating and identifying potential emergency problems and how they relate to the existing environment.
- What facilities exist in impact zones, location of mitigation facilities such as fire stations, potential refugee and IDP camps, spread of spills, location of medical facilities, extent of damage and infestation, water sources and any humanitarian intervention.
- GIS provides a mechanism to integrate data from a variety of sources, analyze it and present it to planners and decision makers in a time and reliable manner.

Disaster Risk Zoning

The following disasters have been used in the risk zoning criteria

Man-made

- Banditry, Refugees, Neighborhood tension, Tribal conflict

Natural

- Drought, Earthquake, Flooding, Landslides, Volcanic activity

Man Made Disasters

Banditry: Areas affected by rebel activities such as Allied Democratic Forces (ADF) in Western Uganda, People's Redemption Army (PRA) in Western Uganda and West Nile and The Lord's Resistance Army (LRA) in the North and parts of Eastern Uganda.

Refugees: These are immigrant populations from neighboring countries due to insecurity within their motherland. They normally settle in areas within the neighborhood of their countries of origin or in gazetted settlements in Uganda.

Neighborhood tension: This often results from conflicts with the neighboring countries due political differences or resource usage. This is common on the borders of Uganda and DRC, Rwanda, Sudan, Tanzania and the Lake Victoria region.

Tribal Conflict: This often results from historical differences within the different tribes in the country or inherent cultural practices such as cattle resulting among the Karimojong or tribal conflicts between the

Natural Disasters

Drought: These are areas that fall within the cattle corridor characterized by dry acacia vegetation and receiving less than 800 mm of annual rainfall.

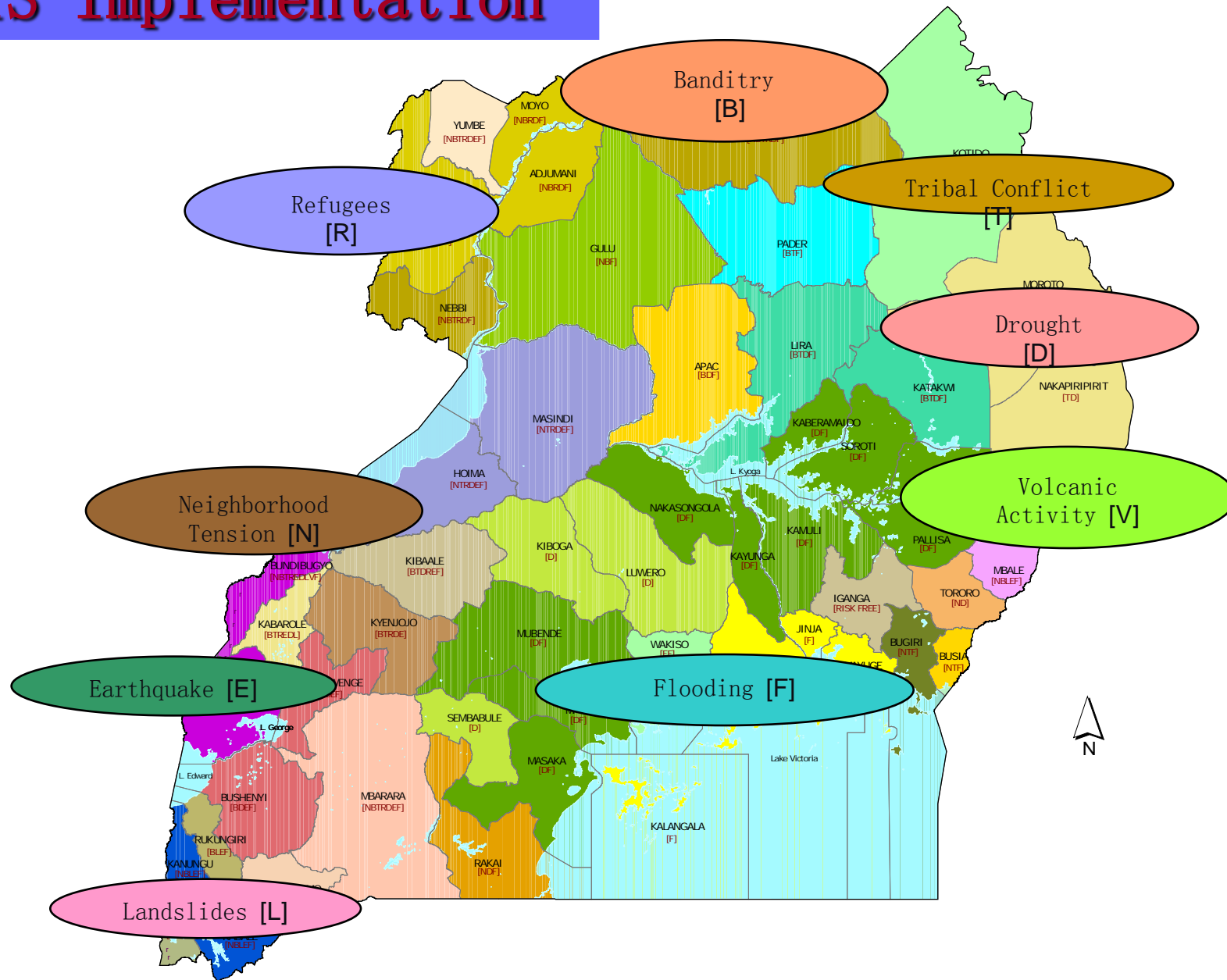
Earthquake: Are areas that fall within the western rift valley and those that have experienced incidences of earthquakes in the rest past.

Flooding: These are areas within the neighborhood of water bodies such as lakes and rivers. They are at a risk of flooding in case of any disturbance in the hydrology of such water bodies. Depending on the magnitude the disturbance, it is assumed that the effect of flooding could affect areas within 2 km from the water body

Landslides: These are areas located near steep hill slopes and mountainous areas of Mt. Rwenzori, Mt. Elgon, Kisoro and Kigezi hills.

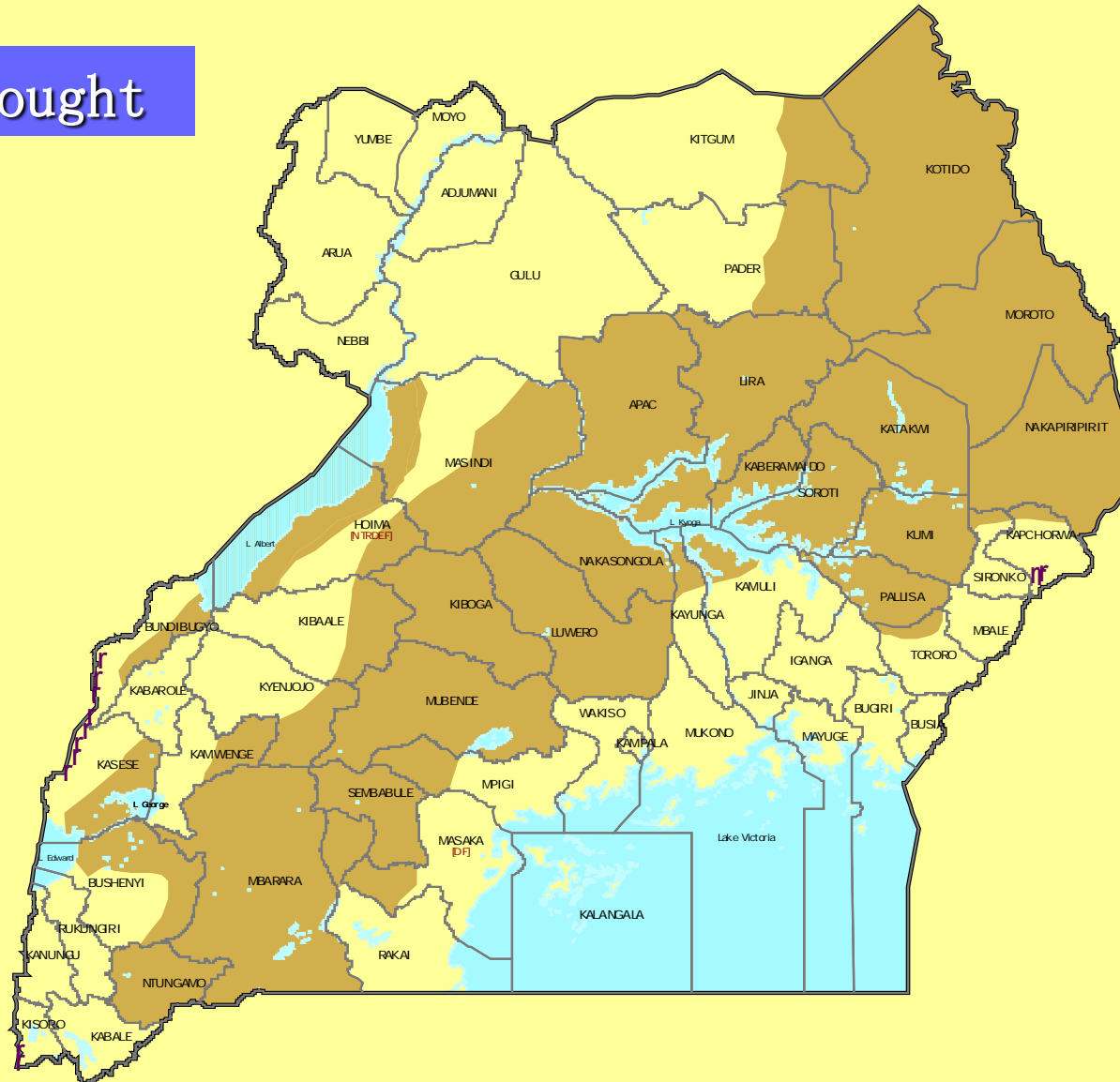
Volcanic Activity: This is due to the presence of both active and dormant volcanic areas such as the caldera area of Mt. Elgon, hot spring areas in the western

GIS Implementation

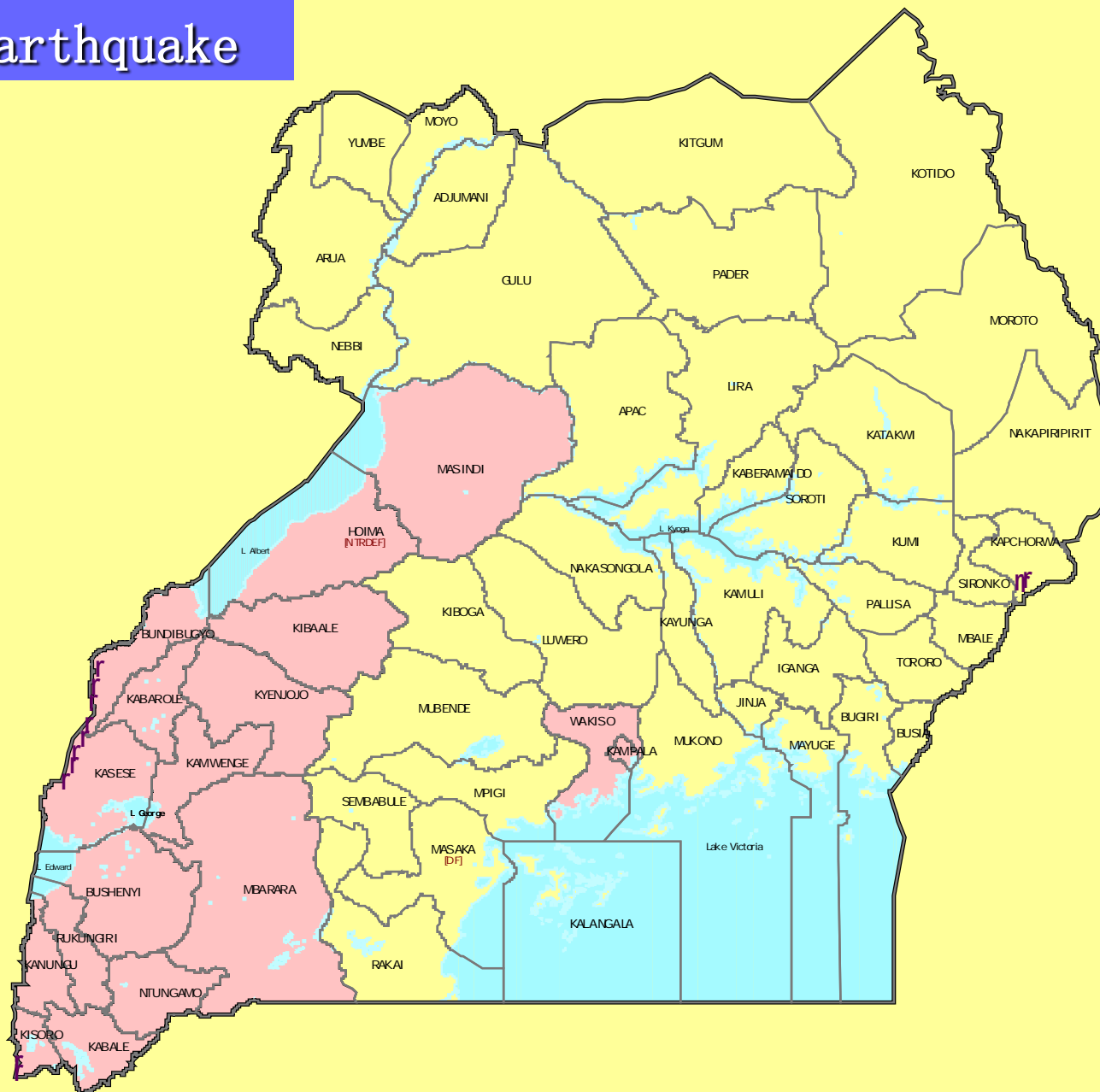


Thematic Layers

Drought



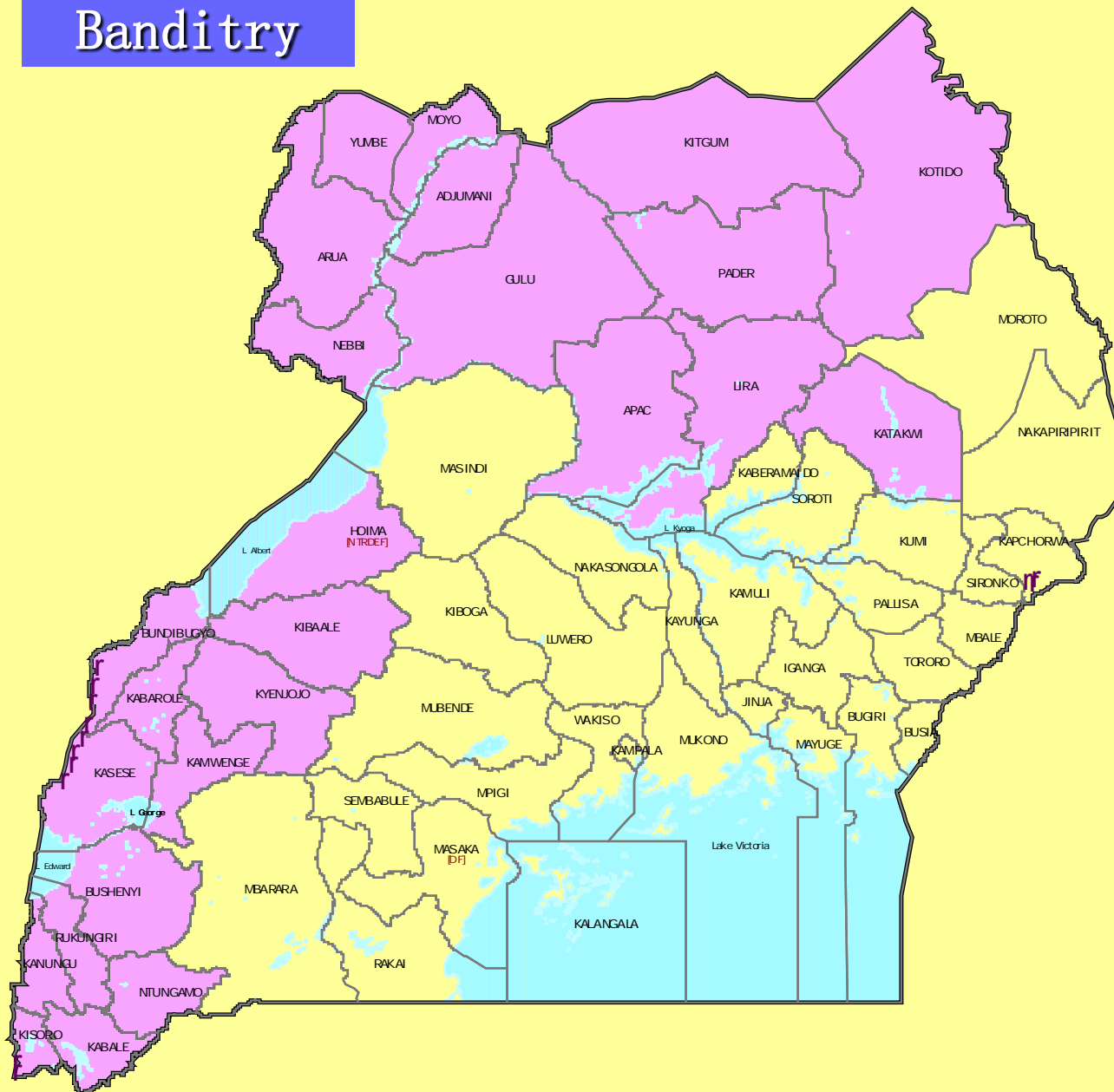
Earthquake



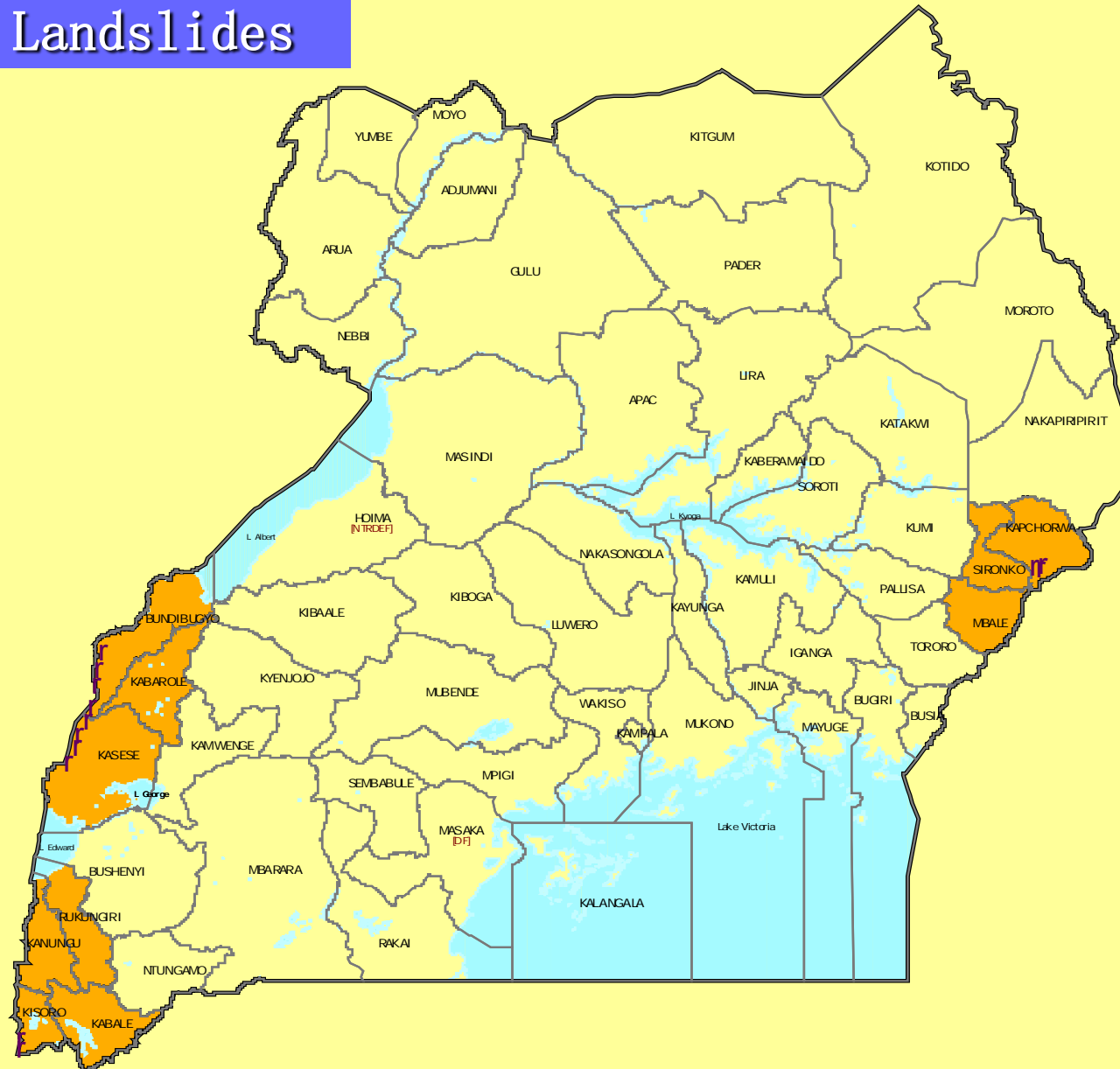
Flooding Risk



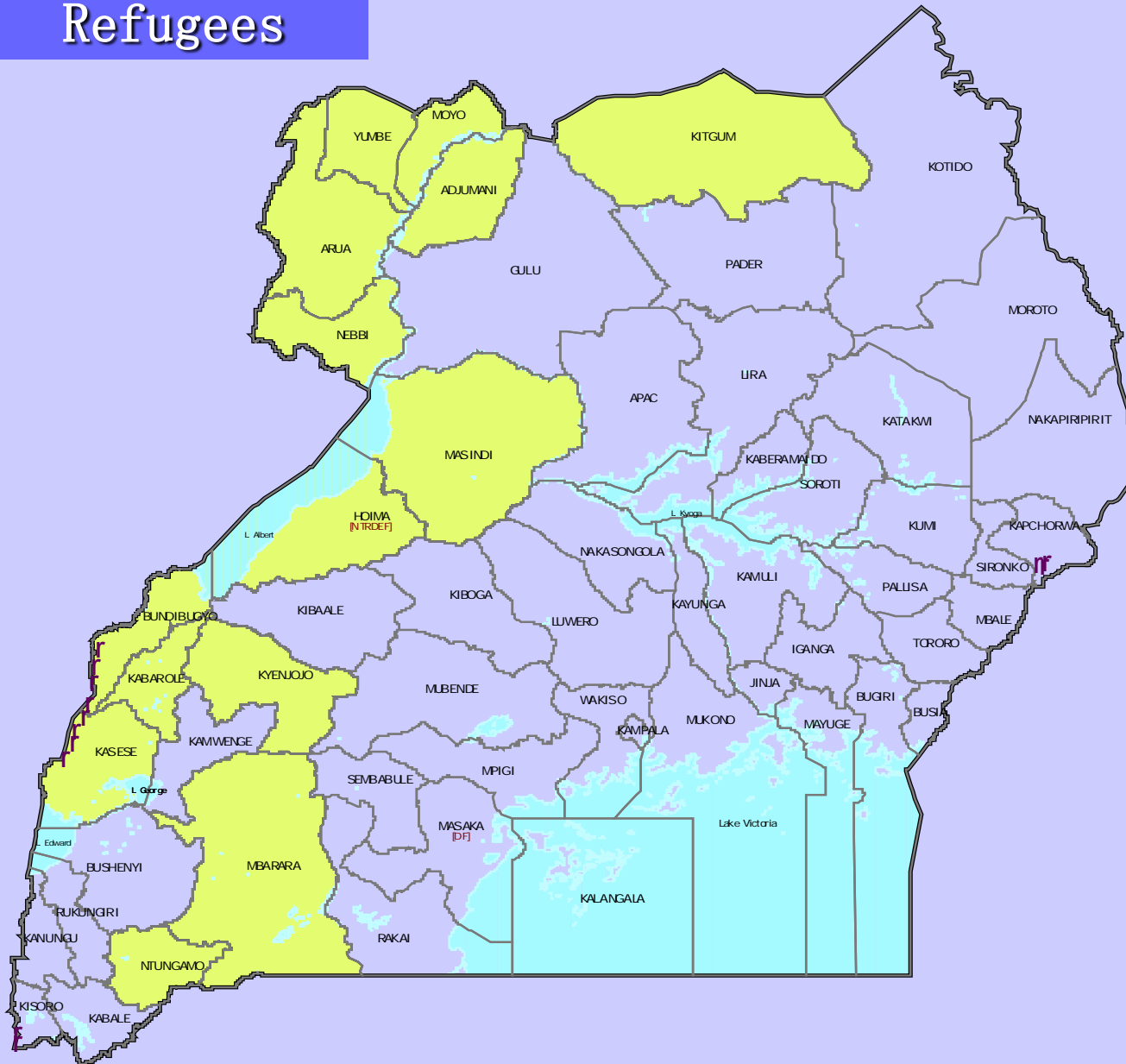
Banditry



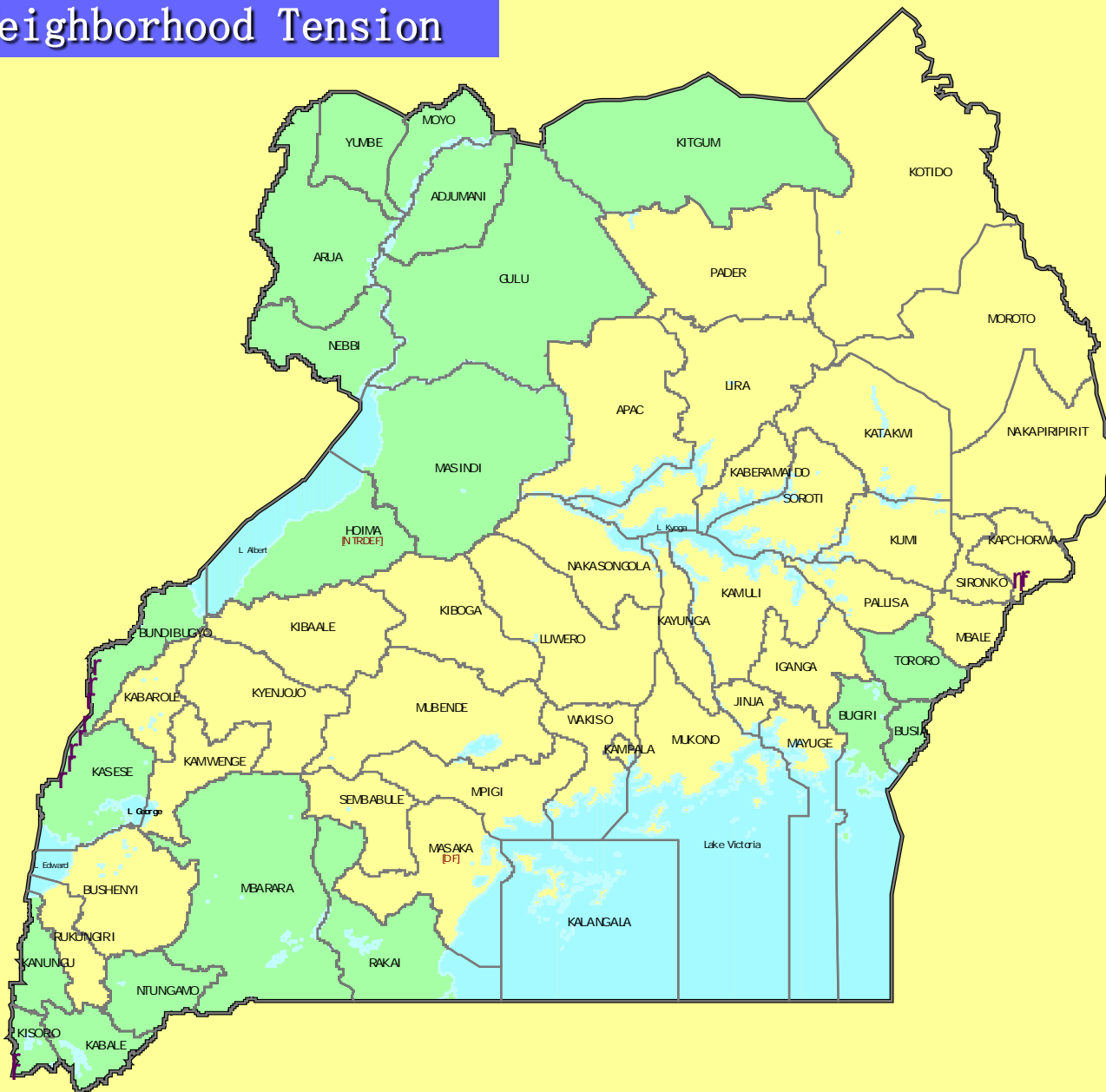
Landslides



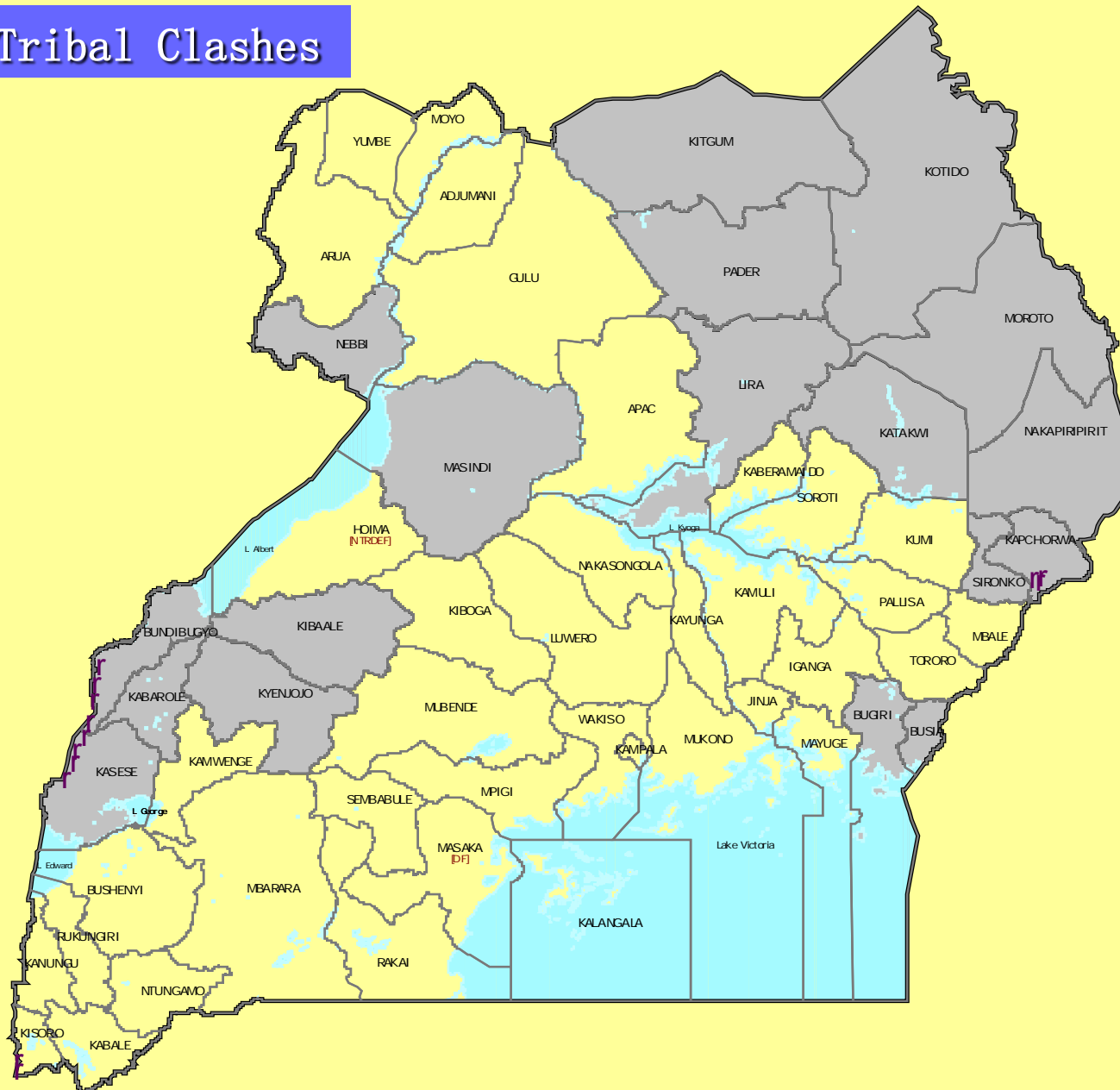
Refugees



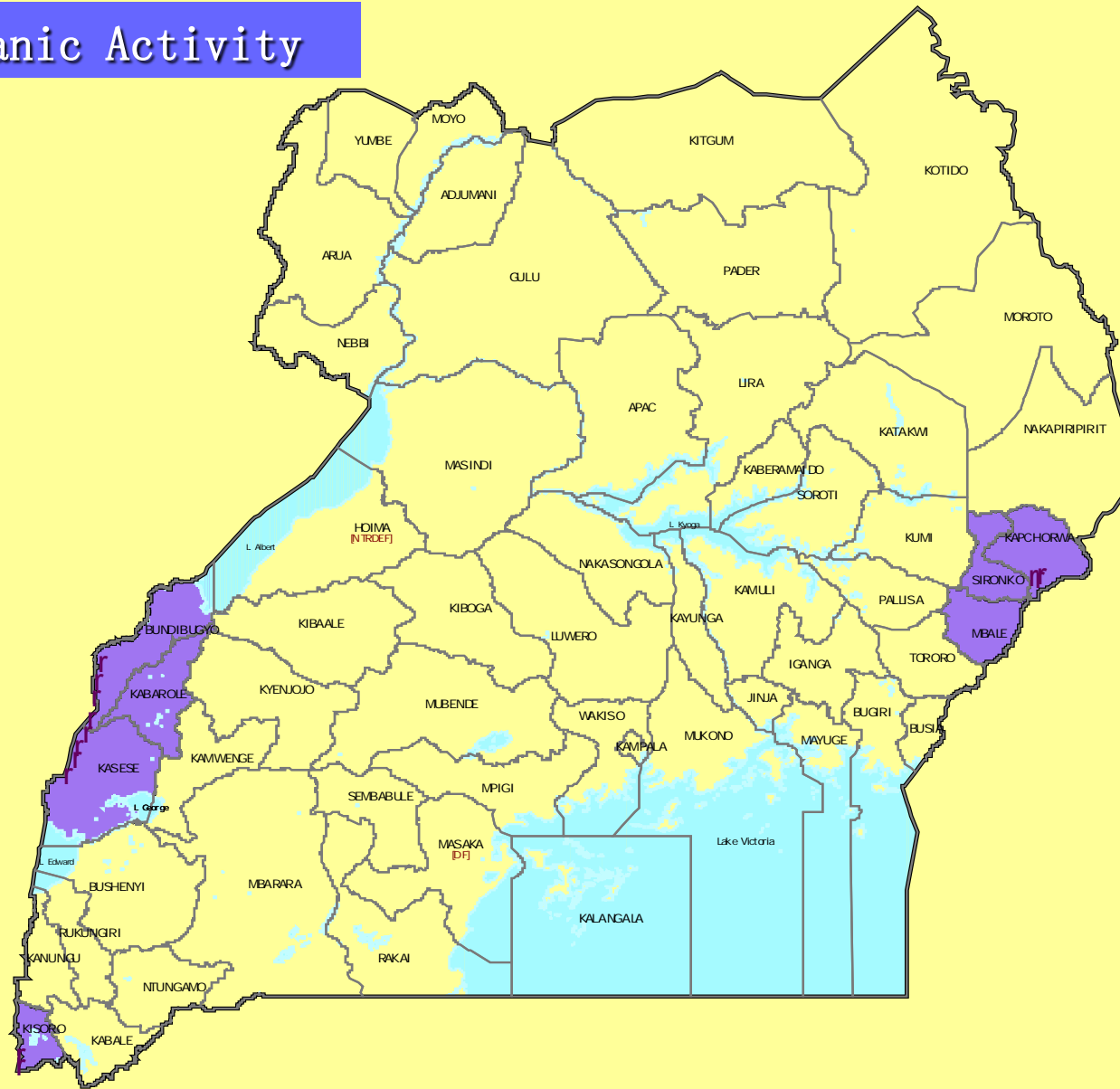
Neighborhood Tension



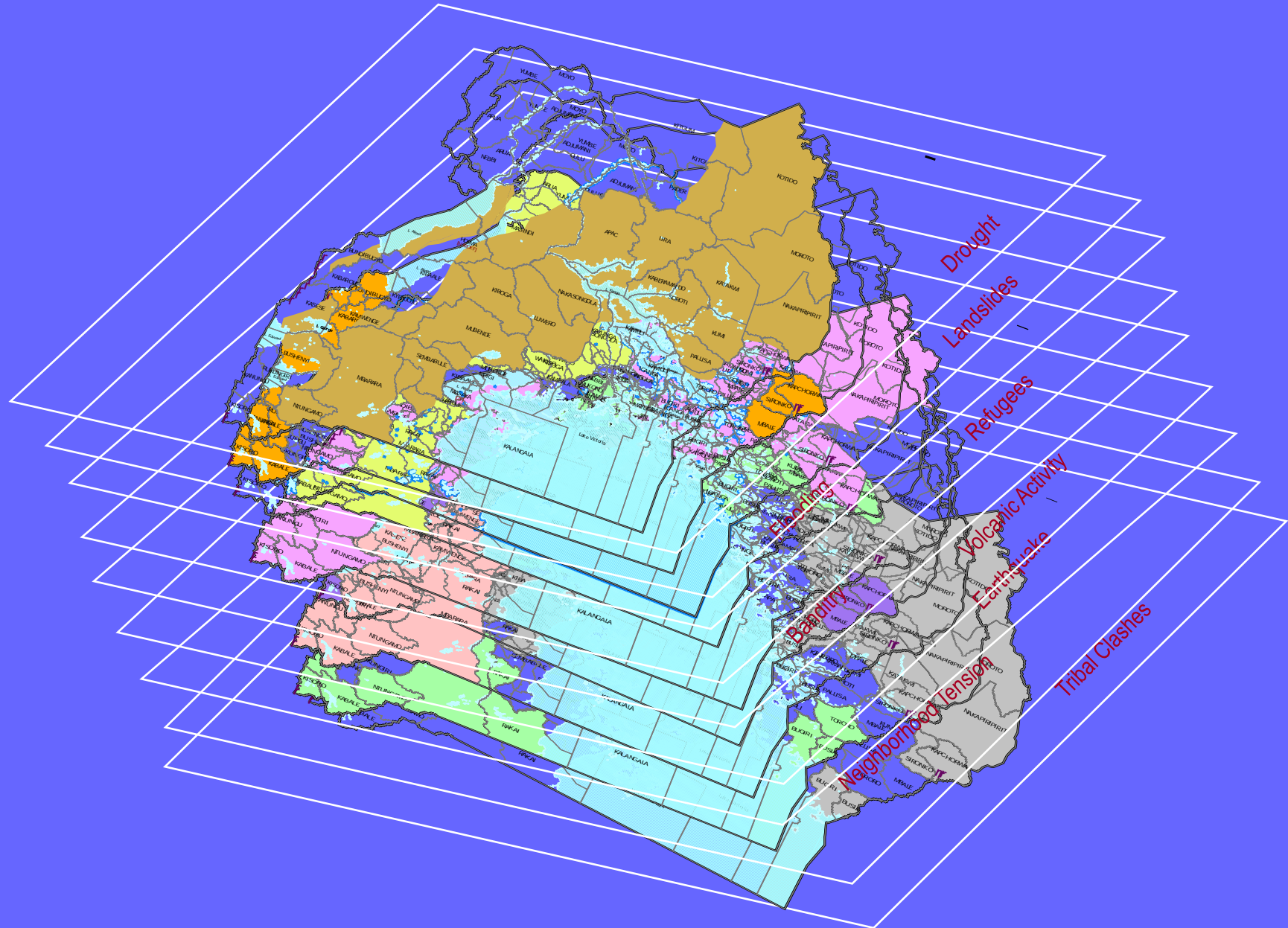
Tribal Clashes



Volcanic Activity



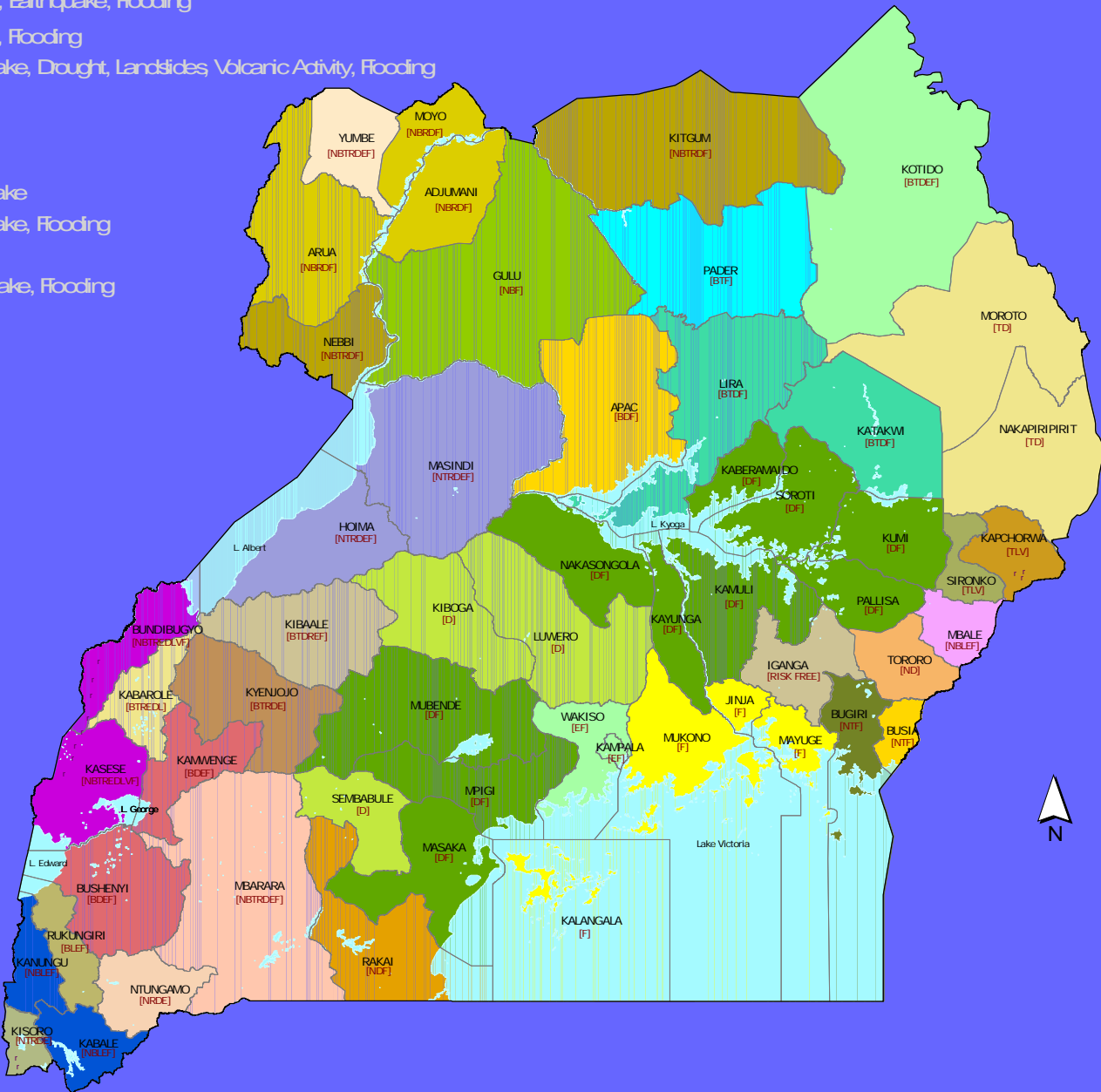
Overlaying Disaster themes



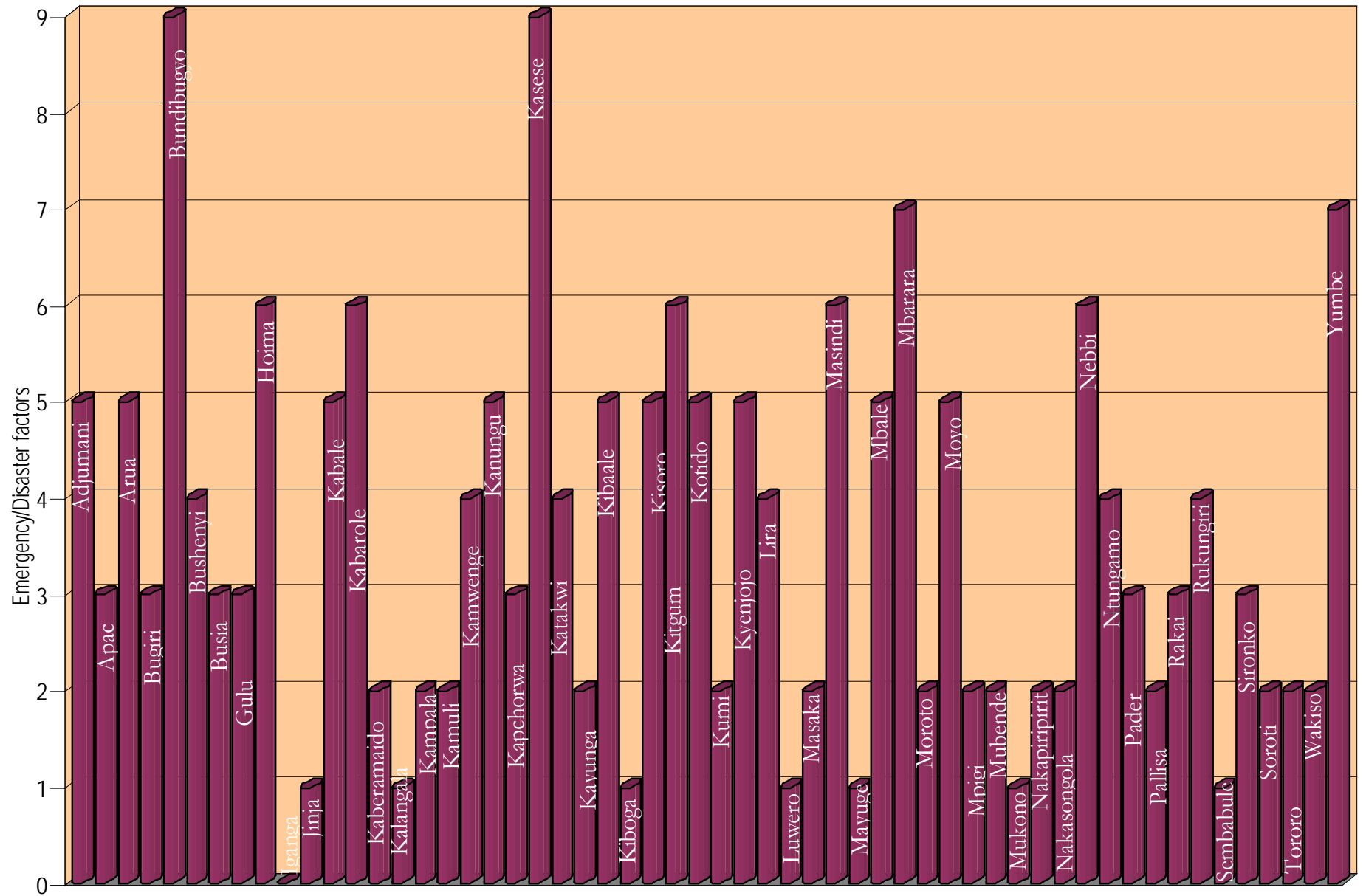
Emergency factors

- Neighbourhood Tension, Banditry, Refugees, Drought, Flooding
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- Neighbourhood Tension, Tribal Conflict, Flooding
- Neighbourhood Tension, Tribal Conflict, Refugees, Drought, Earthquake
- Neighbourhood Tension, Tribal Conflict, Refugees, Drought, Earthquake, Flooding
- Neighbourhood Tension, Tribal Conflicts, Flooding
- Neighbourhood Tension, Tribal Conflict, Refugees, Drought, Earthquake, Flooding
- Neighbourhood Tension, Drought
- No Risk
- Tribal Conflict, Landslides, Volcanic Activity
- Tribal Conflicts, Drought
- Tribal Conflicts, Landslides, Volcanic Activity
- Open Water
- Banditry, Drought, Earthquake, Flooding
- Banditry, Drought, Flooding
- Banditry, Landslides, Earthquake, Flooding
- Banditry, Tribal Conflicts, Drought
- Banditry, Tribal Conflict, Drought, Earthquake, Flooding
- Banditry, Tribal Conflict, Drought, Flooding
- Banditry, Tribal Conflict, Earthquake, Refugees, Drought, Landslides
- Banditry, Tribal Conflict, Flooding
- Banditry, Tribal Conflicts, Refugees, Drought, Earthquake
- Drought
- Drought, Flooding
- Earthquake, Flooding
- Flooding
- Landslides, Volcanic Activity
- Neighbourhood Tension, Banditry, Flooding
- Neighbourhood Tension, Banditry, Landslides, Earthquake, Flooding
- Neighbourhood Tension, Banditry, Refugees, Drought, Flooding

UGANDA
DISASTER RISK ZONING



Uganda' s Disaster Risk Index



Capacity Development Needs

- Assessment of Magnitude of Disasters
- Establishment of baseline data with core datasets
- Information Management – data collection, processing, analysis and dissemination
- Development of GIS and Remote Sensing skills
- Stakeholder Participation
- Information Needs Assessment
- Coordination/Institutional framework

I thank you all