

# Participatory Hazard Risk Assessment and Hazard Atlases Project in Kenya



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AUTHOR:

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# Outline

- **About RCMRD**
- **The Hazard Atlas Project**
- **Objective**
- **Methodology**
- **Accomplished Activities**
- **Participatory Mapping**
- **Ground Truthing**
- **Identified Hazard Types**
- **Challenges, Outcome**
- **Conclusion**



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# REGIONAL CENTRE FOR MAPPING OF RESOURCES FOR DEVELOPMENT



## VISION

To be a premier Centre of Excellence in provision of Geo-information services

## MISSION

To promote sustainable development through generation, application and dissemination of Geo-information and allied ICT services and products in the Member States and beyond

## SERVICES

Geographic Information Systems | Surveying & Mapping | Capacity Building: IT, GIS, RS, GPS etc. Remote Sensing | Repair of Surveying Equipment

## APPLICATION

Disaster Management | Health | Energy | Climate Geology | Agriculture Ecosystems | Biodiversity Water



# Participatory Hazard Risk Assessment and Hazard Atlases Project in Kenya

**Title: Hazard Atlases  
Development for 6  
Counties of Kenya**

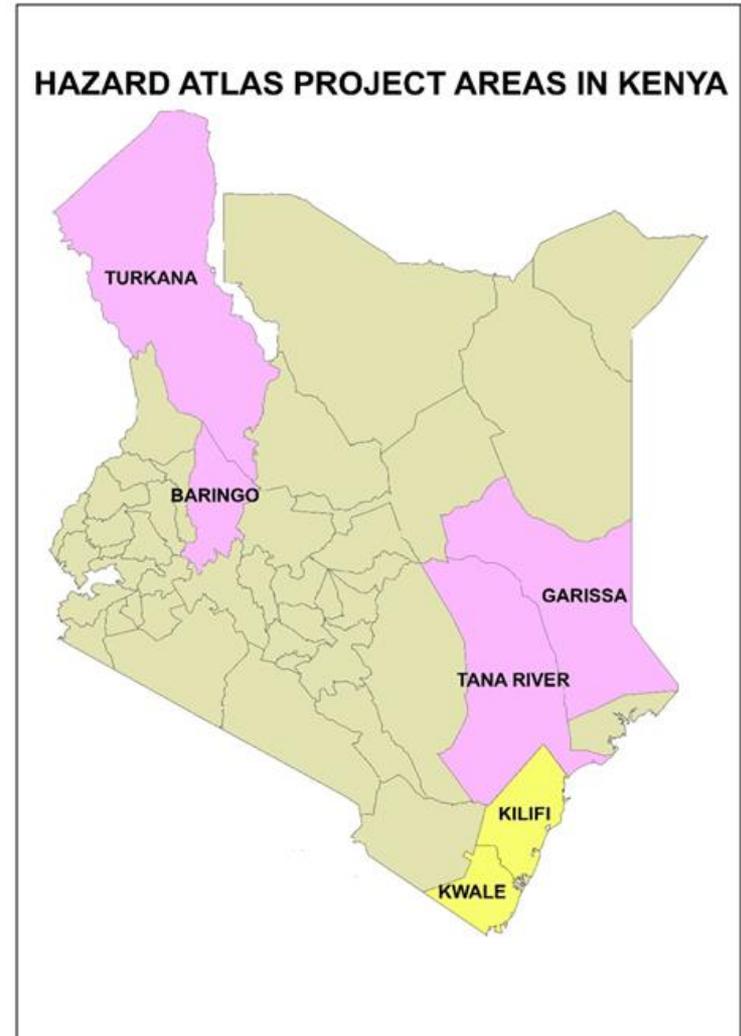
**Client: NDMA/UNDP**

**Consultant: RCMRD**

**Duration: 2 Years  
(2015 and 2016)**



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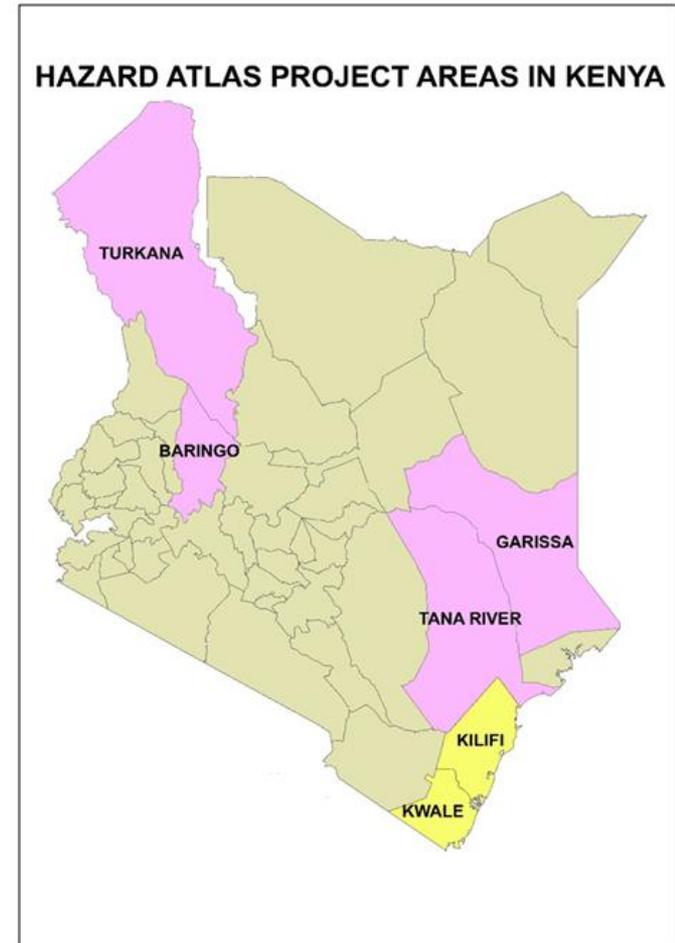
# .....The Project

## Phase 1:

**Turkana, Garissa and  
Tana River**

## Phase 2:

**Baringo, Kilifi and Kwale**



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# Objectives

## Principal Objective:

**To assess the extent and spatial distribution of natural and manmade hazards in the form of maps and Atlases in such a way that the communities and county government can use these for planning and decision making purposes**

## Specific Objectives

- **To develop county multi-hazard and vulnerability maps using GIS techniques**
- **To prepare of Hazard and Climate Risk Atlas for each country**
- **To participate the community on hot spots identification and mapping process**
- **To prepare of training manual for the analysis of the output maps and the Atlas**
- **To facilitate the training for groups on how to use for planning and budgeting.**
- **To develop Interactive maps for the website to be accessed by the public.**



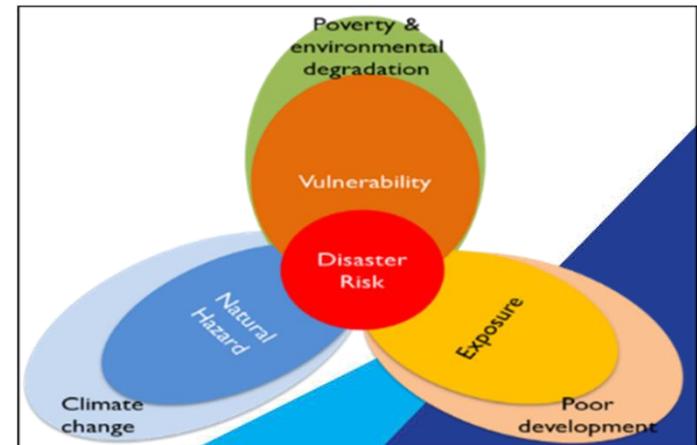
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# Methods

- Identification and collection of relevant dataset from different sources
- Organizing analysis, correction and editing of the existing datasets
- Mapping Socio-economic infrastructure and hazard types of the project counties
- Participatory Mapping
- Field data collection and verification
- Multiple sources data integration and analysis
- Validation workshop



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# Major Activities

- **Developing the TOR**
- **Project proposal preparation**
- **Literature review**
- **Identifying major hazard types of each county**
- **Organizing a training workshop on the Participatory mapping**
- **Ground truthing**
- **Map designing and cartographic layout presentation**
- **Training Manual preparation**
- **Participatory Mapping practice**
- **Atlas Designing and Printing**
- **Hazard Map Validation**
- **Web Designing and launching**



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# Participatory Mapping

## Objective:

- Training stakeholders how to identify the hazard hot spots and indicate on the maps
- Stakeholders to participate on the identification of hazard types in the county:
- Participate on the mapping of the hot spots
- Owning the Hazards and maps

## Participants:

- County government officials
- Community representatives
- NGO Representatives and the likes



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# Participatory Mapping



Turkana



Tana River



Garissa



Klifi



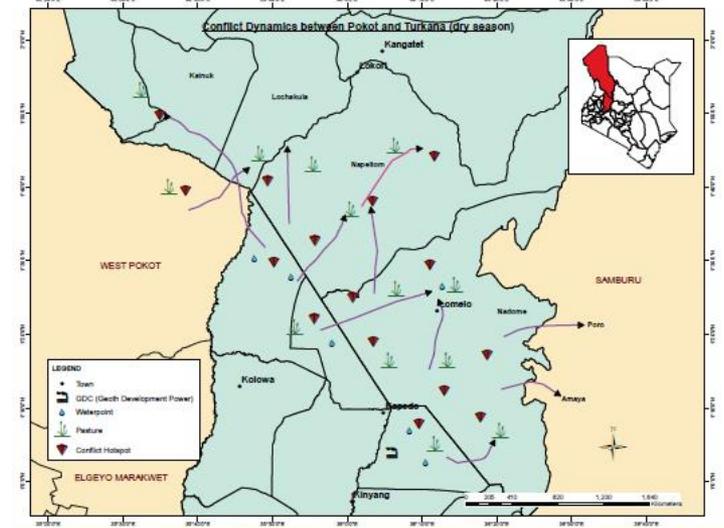
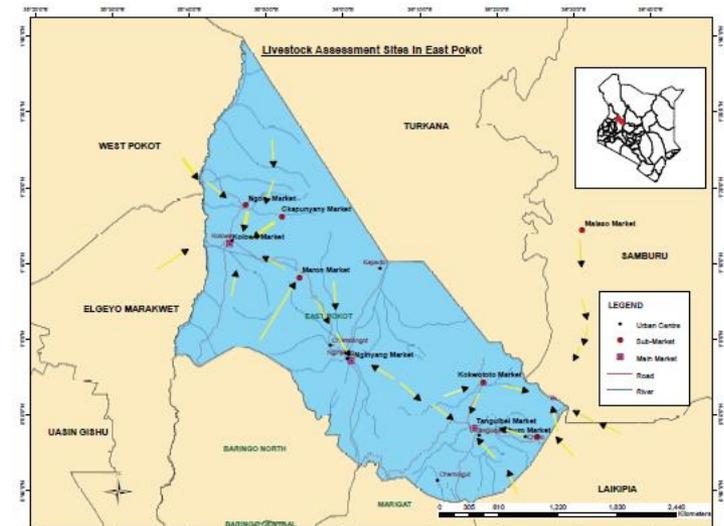
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# Participatory Mapping

## Hazard Ranking in County Level Baringo

HAZARD	RANKING
Drought	1
Natural Resource based Conflict	2
Human Diseases	3
Livestock Diseases	4
Crop Diseases	5
Floods	6
Wildlife conflicts	7
Land Degradation	8
Fire	9
Accidents	10
Landslides	11

### Human Conflict



# Hazard ranking in Sub-County Level Kilifi

Sub-County	Flood	Drought	Land Degradation	Human Conflict	Human-Wildlife Conflict	Total	Scale Aggregation
<b>Ganze</b>	2	5	5	4	4	20	4
<b>Kaloleni</b>	1	2	3	2	2	10	2
<b>Kilifi North</b>	1	1	1	1	4	8	1
<b>Kilifi South</b>	3	1	1	1	1	7	1
<b>Magarini</b>	5	4	4	5	5	23	5
<b>Malindi</b>	4	3	2	3	3	15	3
<b>Rabai</b>	1	2	2	2	1	8	1

# Ground Truthing

## Participants:

- RCMRD staff
- NDMA staff
- County government representatives
- Community Representatives

**Flood Occurrence  
in Kilifi County**



**All identified hot spots were visited using GPS.**



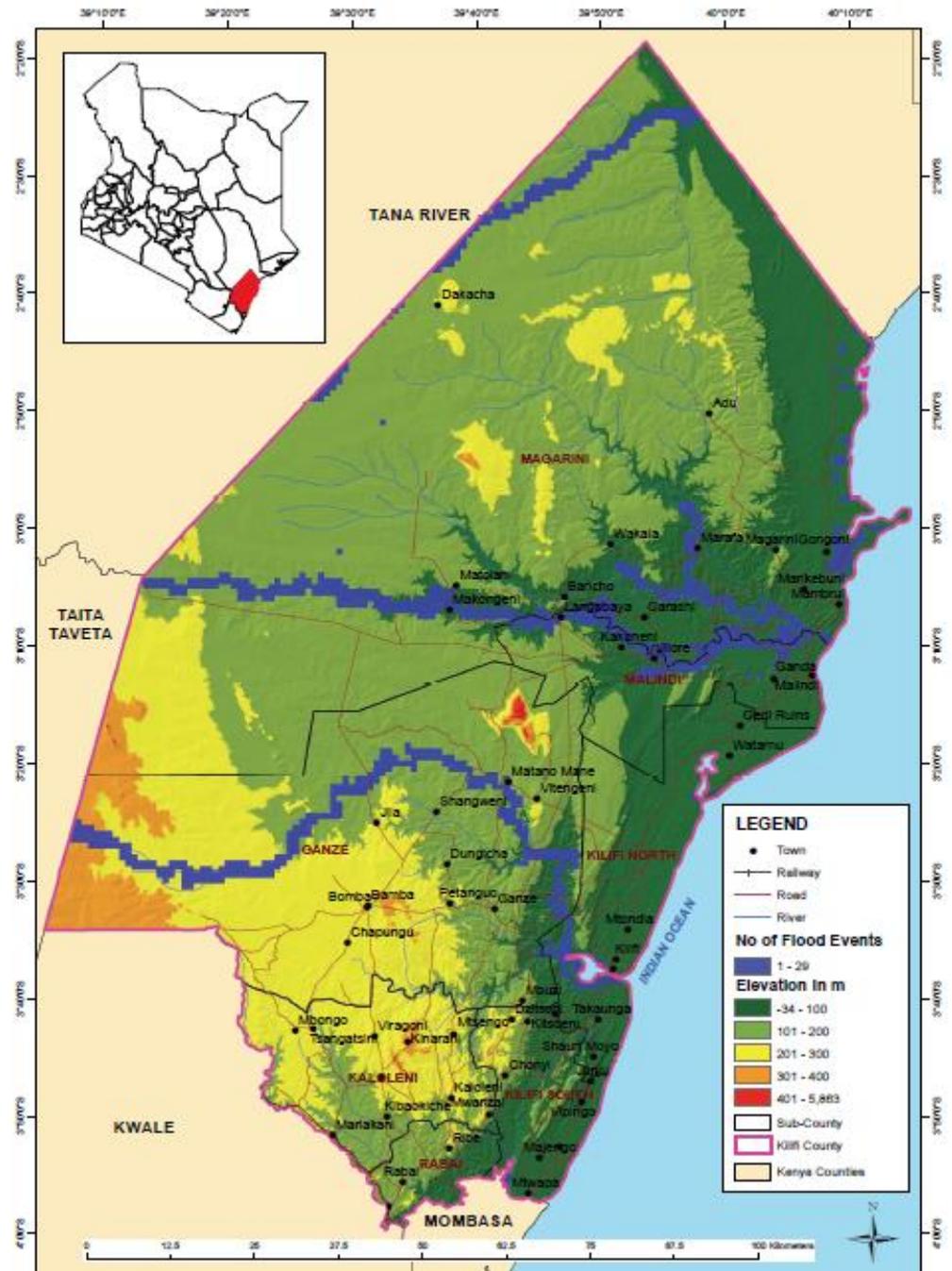
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# .....Ground Truthing Discussion with Communities in Klifi County



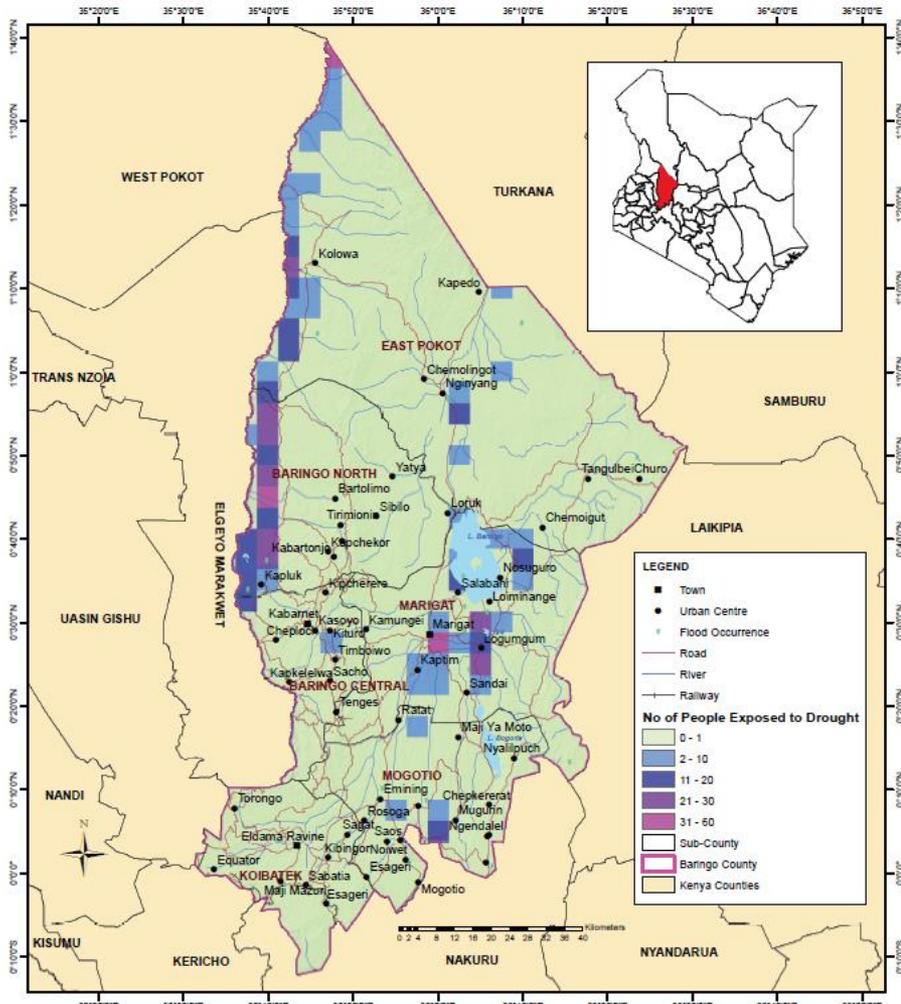
# Hazard Mapping

## Flood areas in Kilifi

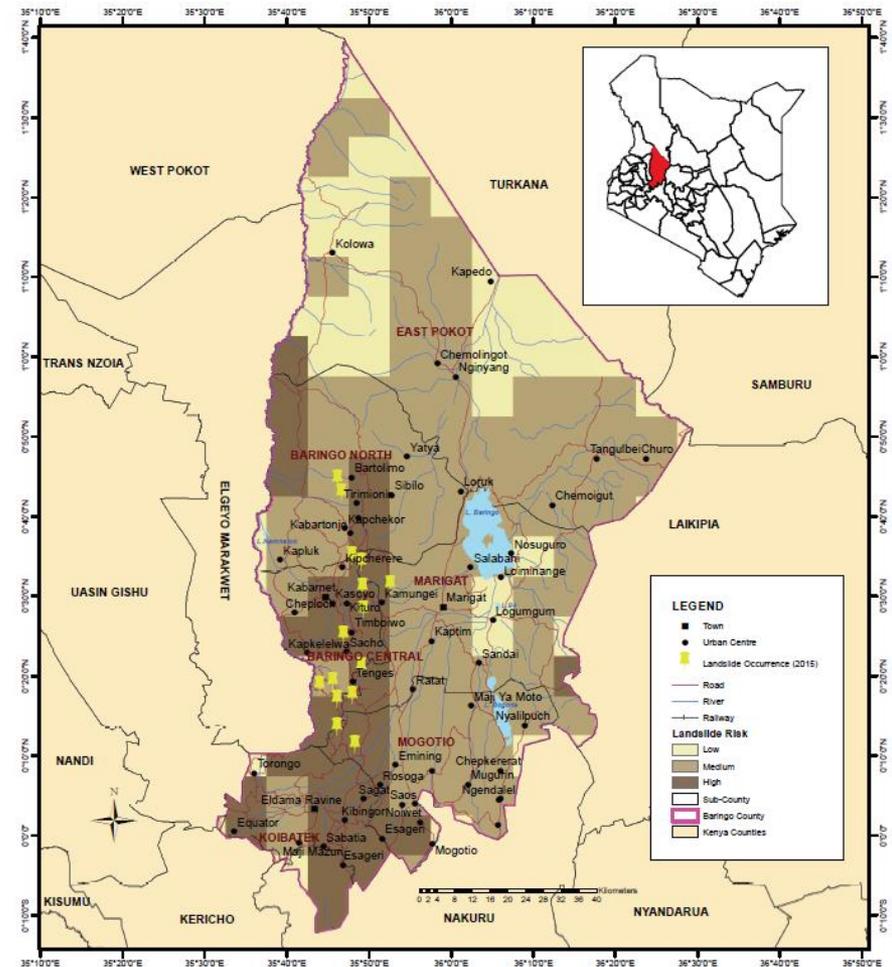


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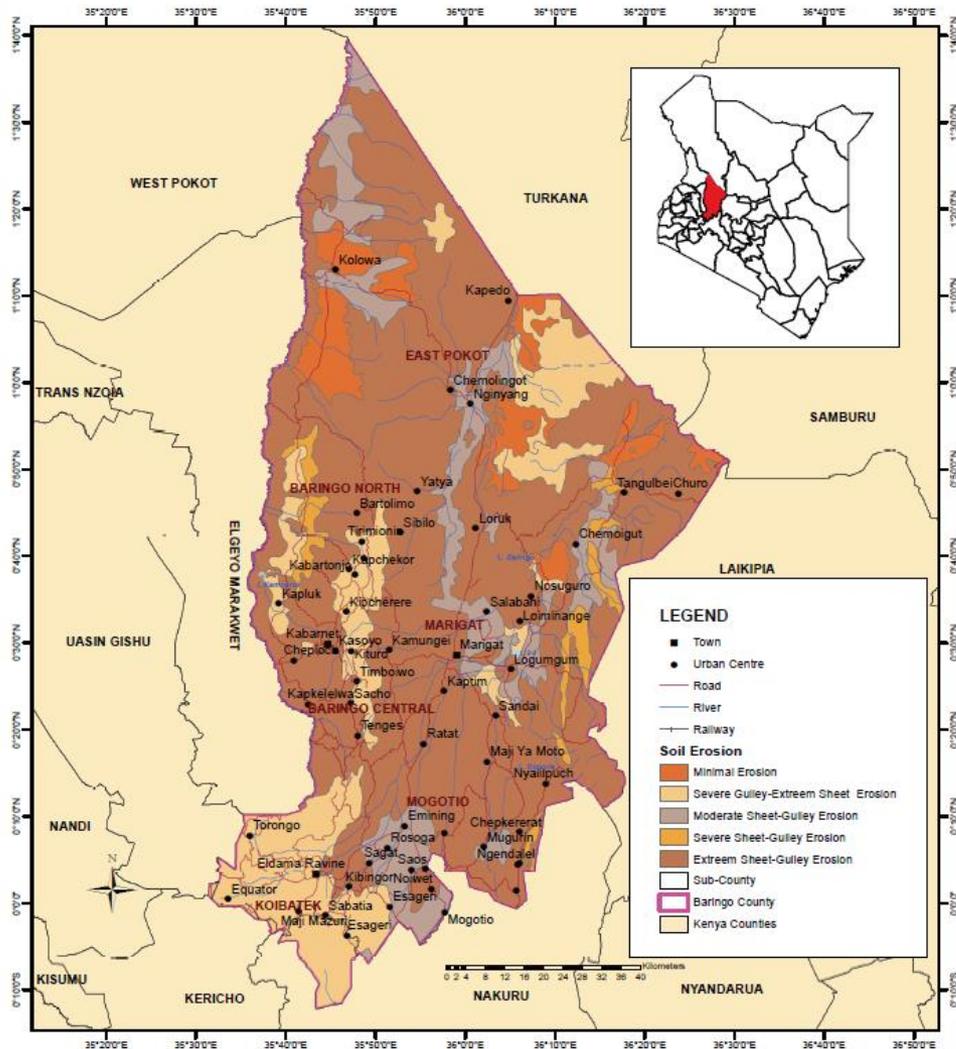
# Flood Physical Exposure/ Baringo



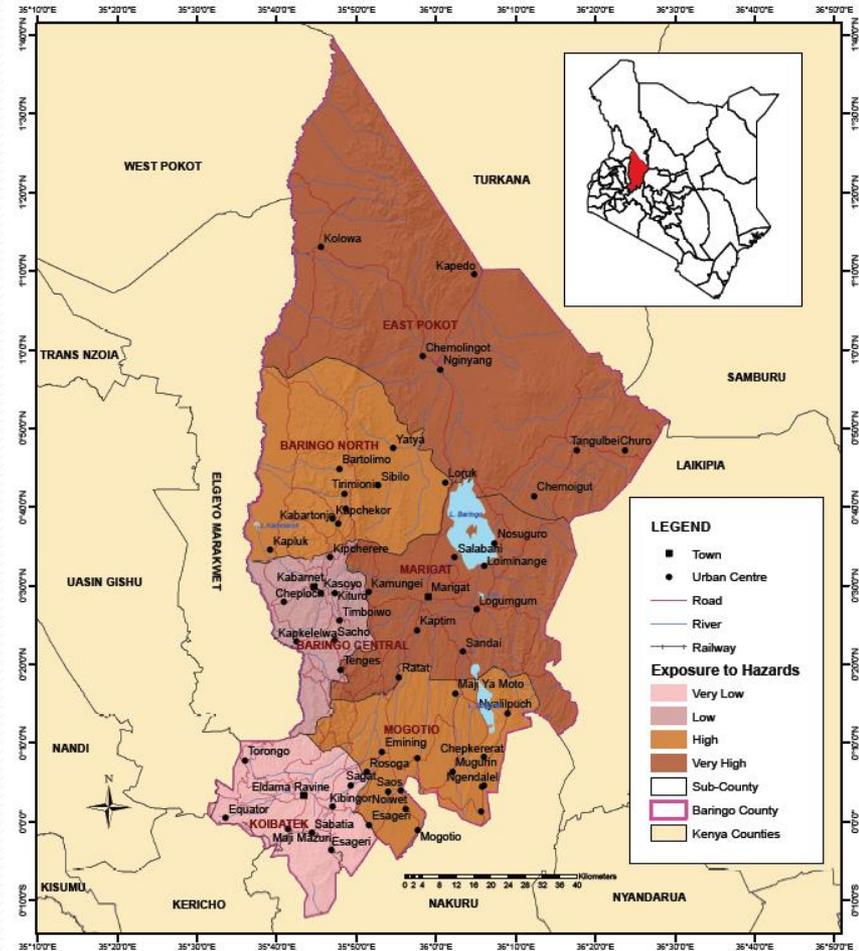
# Landslide Hot Spots/ Baringo



# Spoil Erosion Exposure/ Baringo

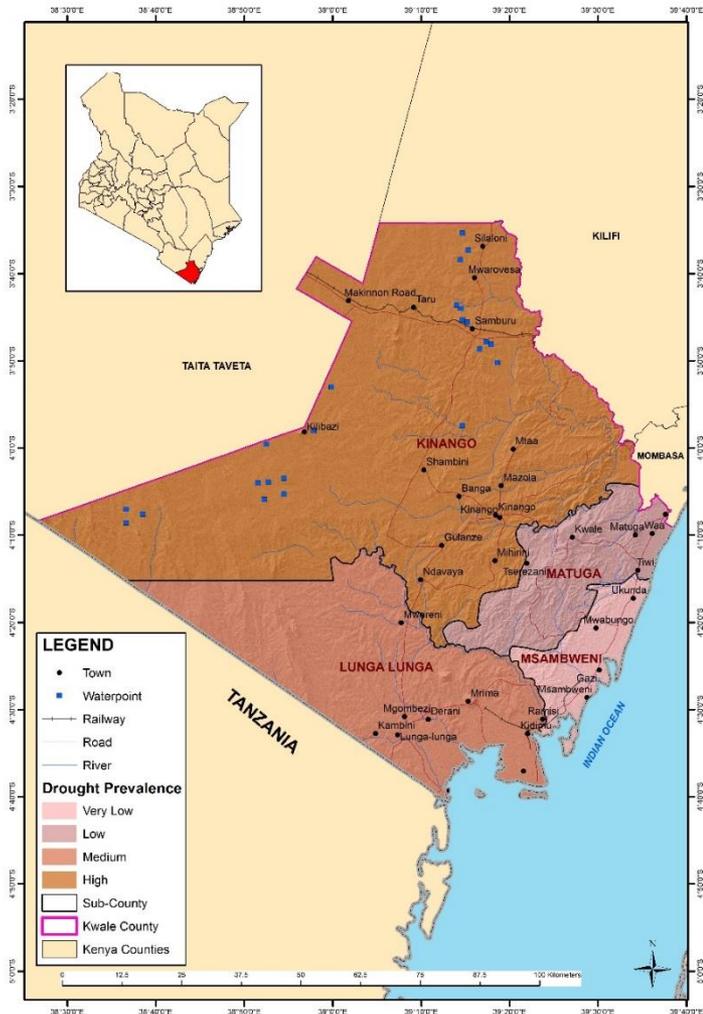


# Exposure to Vulnerability in Sub County level

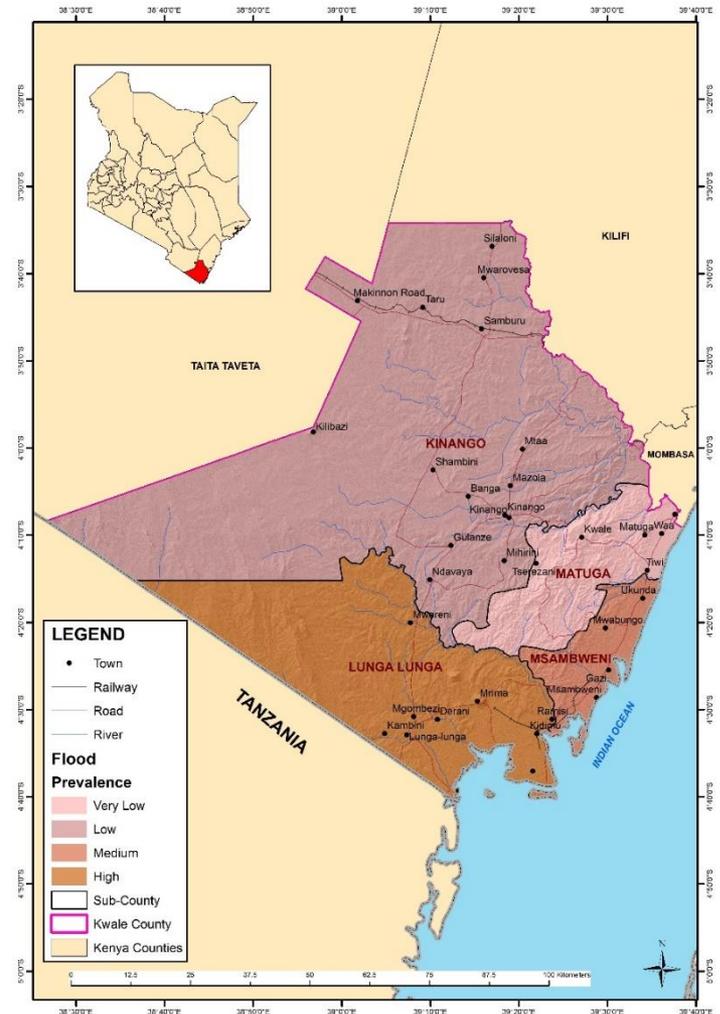


# Hazard Mapping

## Drought in Kwale

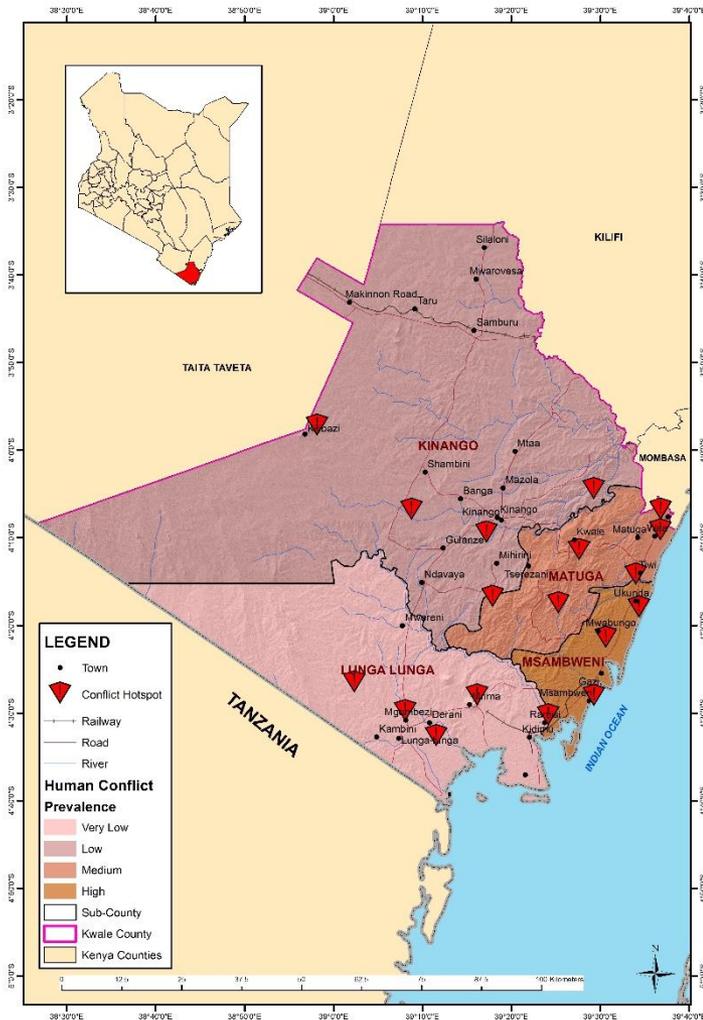


## Floods Kwale

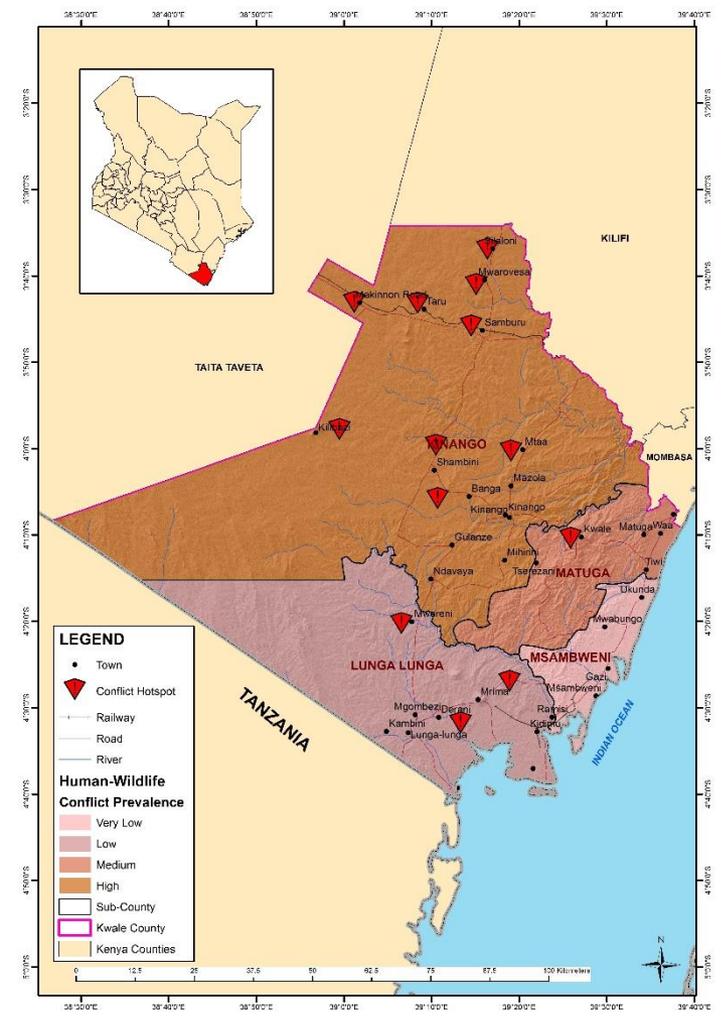


# Hazard Mapping

## Human Conflict in Kwale



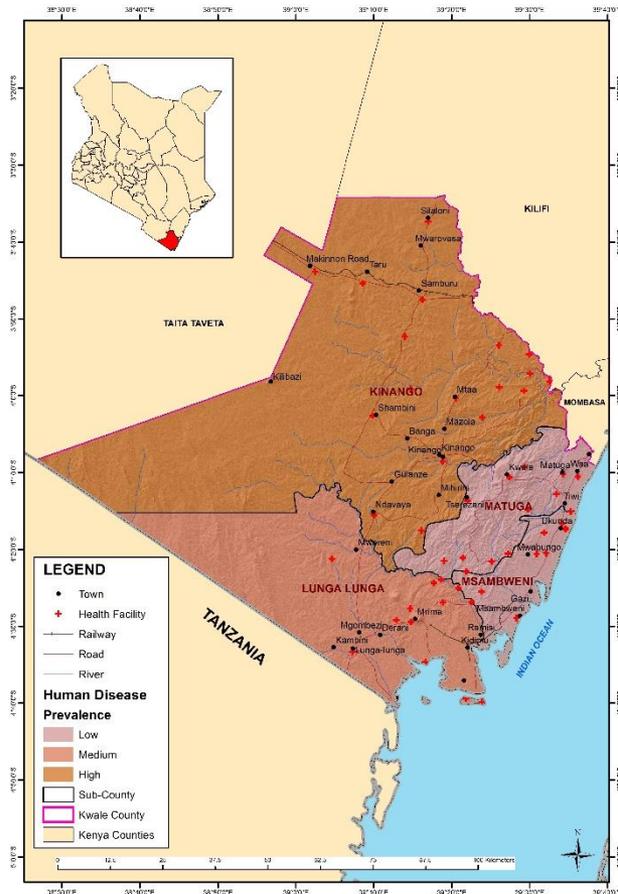
## Human – Wildlife Conflict in Kwale



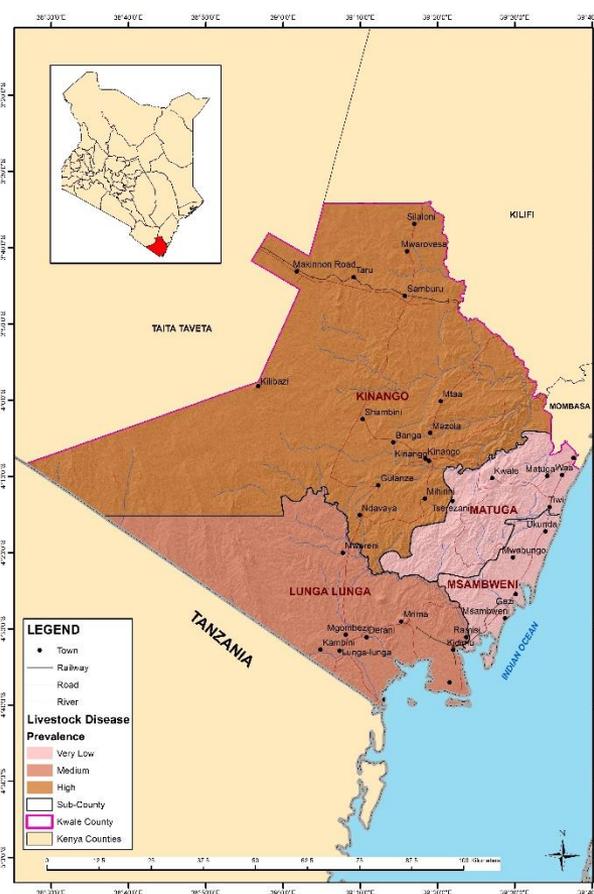
# Hazard Mapping

## Human, Livestock and Crop Disease Prevalence in Kwale

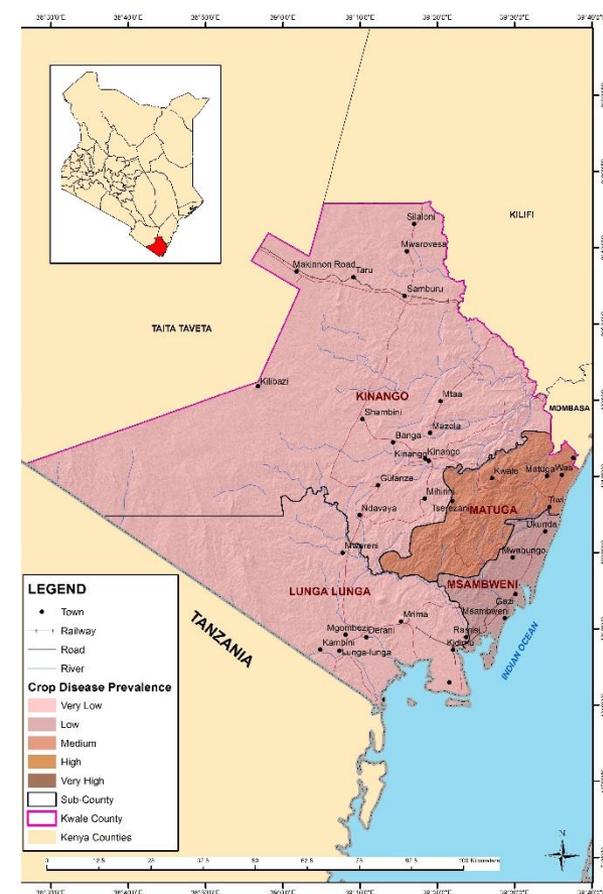
### Human



### Livestock

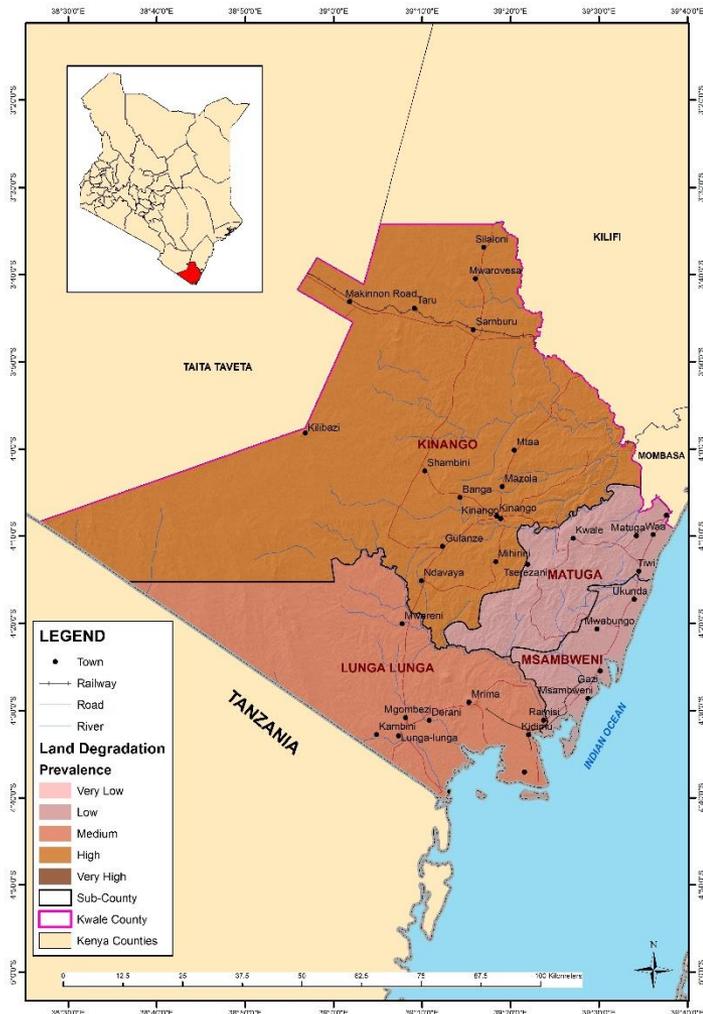


### Crop

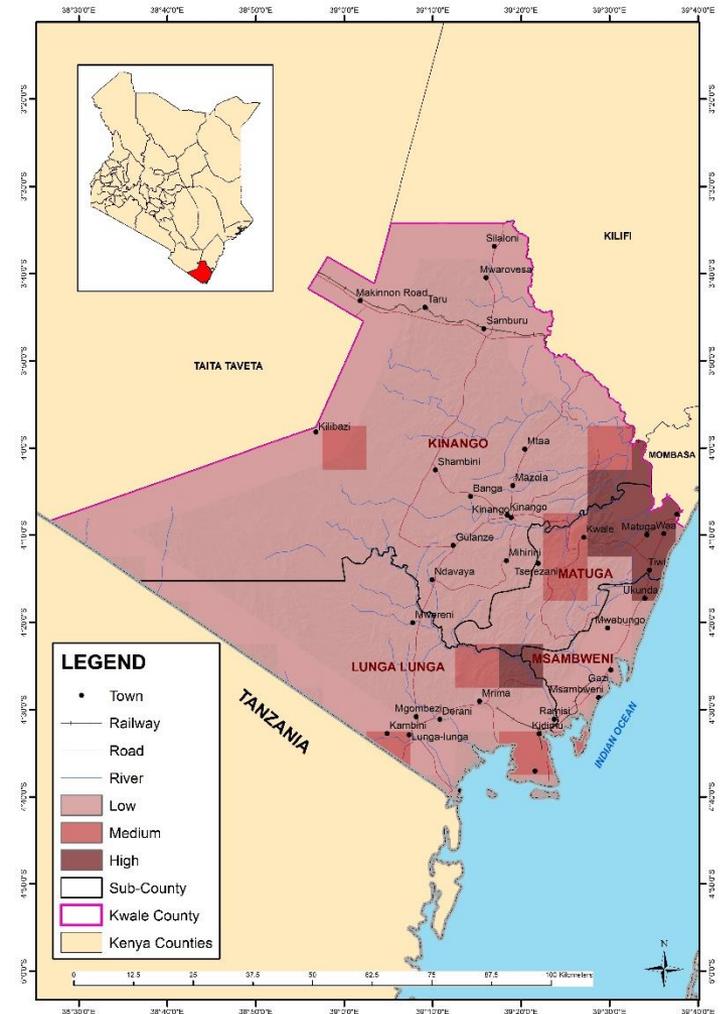


# Hazard Prevalence in Kwale County

## Land Degradation

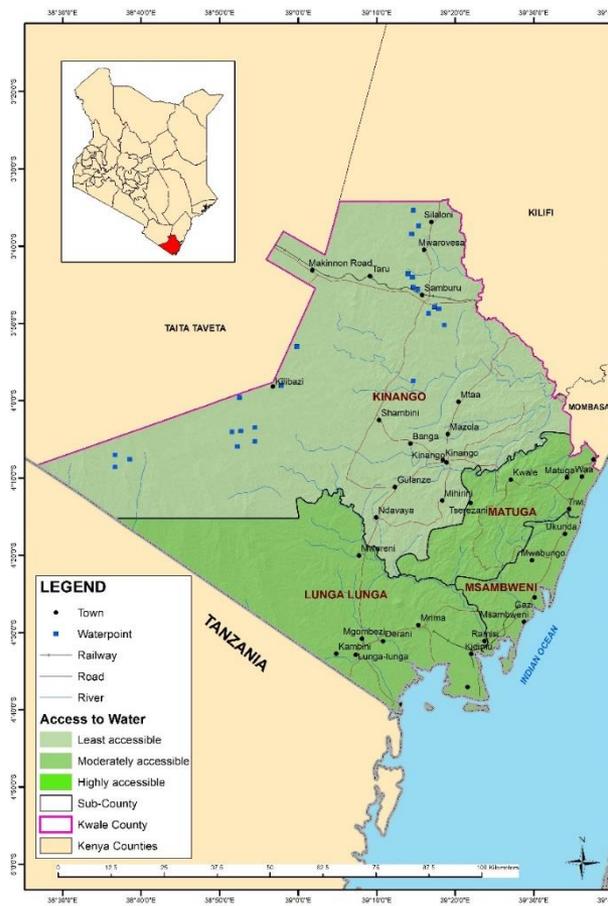


## Landslide Risk

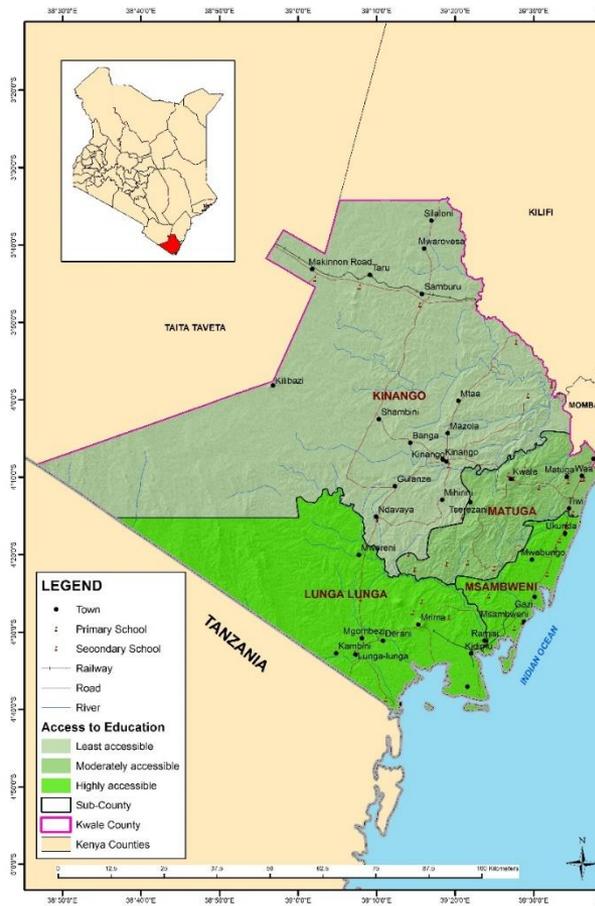


# Vulnerability Indicators in Kwale County

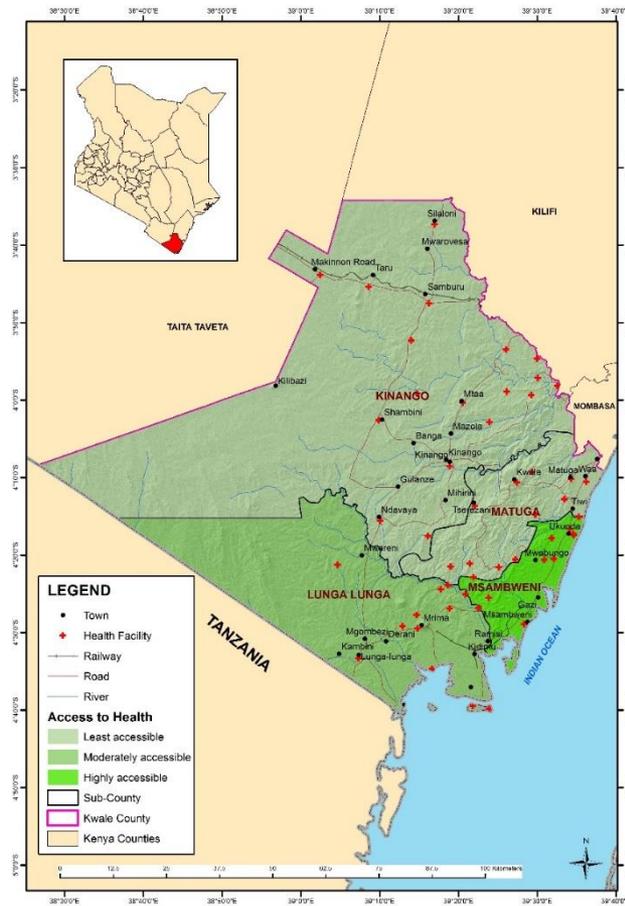
## Access to Clean Water



## Access to Education

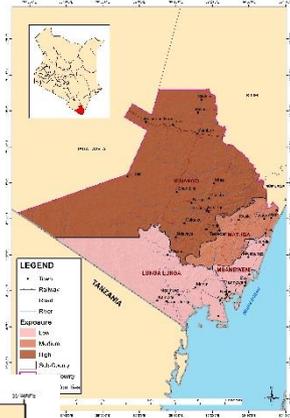


## Access to Health

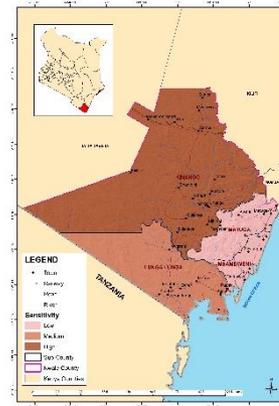


# Vulnerability Mapping in Kwale County

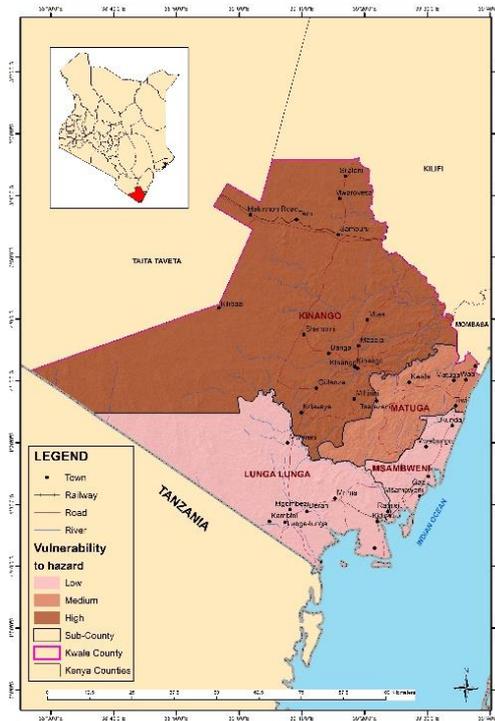
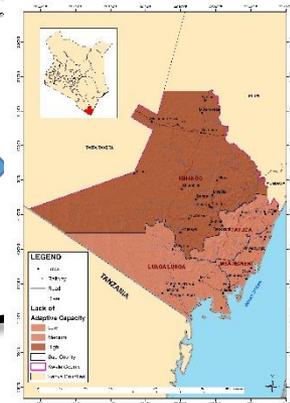
## EXPOSURE



## SENSITIVITY



## LACK OF ADAPTIVE CAPACITY



# Validation workshop

## Objective:

- To check whether the hot spots mapping were addressed properly
- To evaluate and enrich the document

## Participants:

- RCMRD staff
- NDMA staff
- Community representatives
- The community

All identified hot spots were visited and relevant data were collected.



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# Training County Government staff on the use of Atlases

## Acheivements:

- Developing the training manual
- Taining staff of the county:
- Baringo at Marigat 35 trainees 3 days
- Garissa at Mwingi 35 trainees 3 days
- Kilifi at Malindi 35 trainees 5 days
- Turkana at Eliye Springs 28 trainees 5 days

## On Plan

Tana River and Kwale



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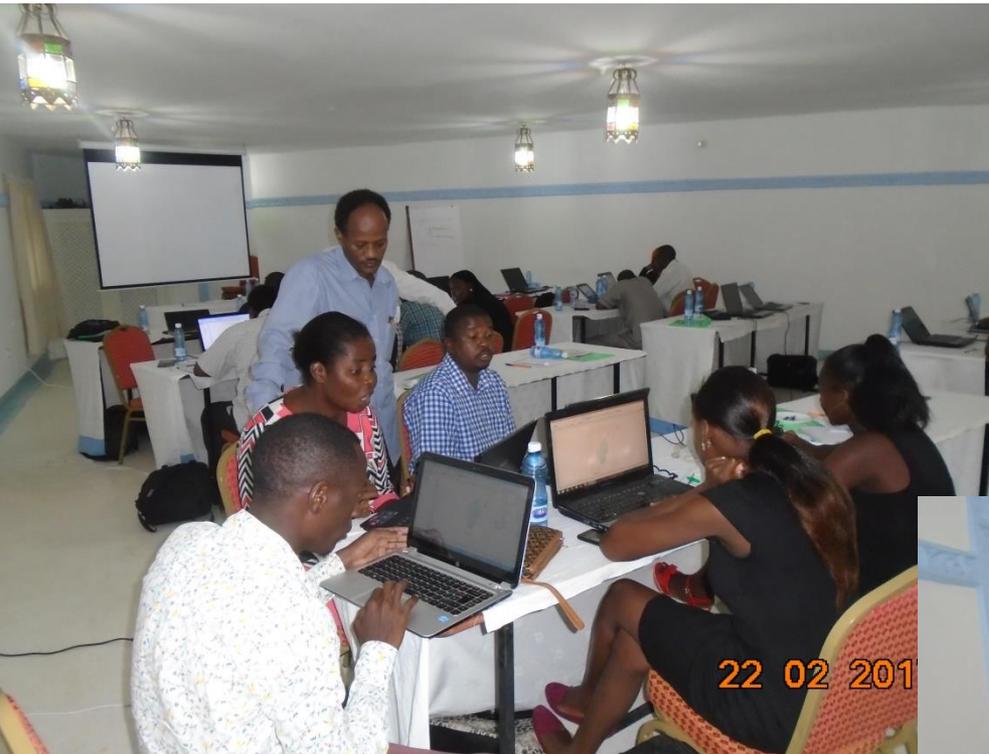
# Identified Hazard types

- **Drought**
- **Resources Conflict**
- **Human wildlife conflict**
- **Floods**
- **Diseases**
  - **Human**
  - **Livestock**
  - **Crop**
- **Climate change**
- **Volcanic, Seismic and Tectonic activities**
- **Land degradation and more**



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# Training County Staff...



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# The Hazard Atlases

## GARISSA COUNTY Hazard Atlas



## TANA RIVER COUNTY Hazard Atlas



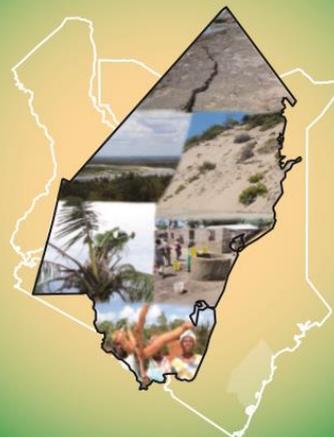
## TURKANA COUNTY Hazard Atlas



## BARINGO COUNTY Hazard Atlas



## KILIFI COUNTY Hazard Atlas



## KWALE COUNTY Hazard Atlas



# Challenges

- **Limited budget specially for the first phase like in the areas of participatory mapping, validation and training.**
- **Variation on the types of hazards from county to county.**
- **The first TOR was only for specified types and after ground truthing and participatory mapping workshop some more are added**



# Outcome

- **Communities are aware of the hazards and mitigation in their environment.**
- **Planners and decision makers got information on the hazards types, occurrence, frequencies and mitigations**  
**Ex Kilifi**
- **The Hazard Atlases has been becoming an input for sustainable development planning Ex. Baringo CIDP**
- **Interest developed by others Ex. Kakamega by HLA**

# Conclusion

- Hazard Mapping specially in a participatory approach found to be very effective in a county level.
- Planners, decision makers and researchers will be more beneficiary of the output
- The Atlases can also be used for academic and related awareness creation on the local level.
- The approach can also be scaled-up in more refined way for other counties
- The output is availed for the public through the website (NDMA and RCMRD websites)



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# The Way Forward

Scaling up the approach in the National level for other counties

Ex. Lakipia and Marsabit, Samburu...



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# Acknowledgement

- **RCMRD**
  - **Management**
  - **Staff of Remote Sensing Section**
  - **GeoIT Thematic Team**
- **NDMA Management and Staff**
- **UNDP Program Team**
- **County Government Departments**
- **Communities Respective Counties**



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# Thank You!



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