



# GIS Applications in Assessment of Flood Hazard

Supervisor

**Dr. Baqer Al-Ramadan**

Presented by

Ahmed Alareeq

# Outline:

- **Introduction**
- **Objective**
- **Assessment of Flood Hazard of Jeddah**
- **Assessment of Flood Hazard of Northern region of Ghana**
- **Results and Discussion**
- **Conclusion**

# INTRODUCTION

- ▶ Flood hazards is a massive challenge



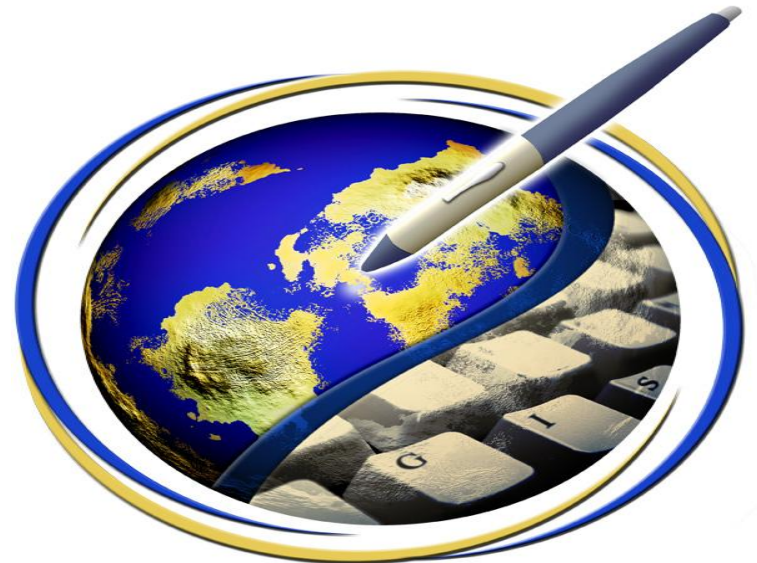
# INTRODUCTION (cont.)

- ▶ How to
  - ✓ Forecast
  - ✓ assess
  - ✓ manage the flood hazard

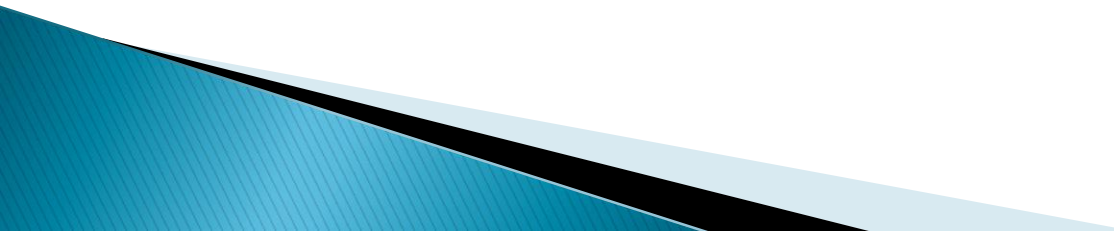


# INTRODUCTION (cont.)

- ▶ GIS technology
- ✓ Forecast
- ✓ assess
- ✓ manage the flood hazard



# OBJECTIVE

- ▶ Evaluate the hazard of flood
  - ▶ Identify the zones subjected to flood.
  - ▶ looking for better solutions
- 

# Assessment of Flood Hazard of Jeddah Area (2009) – case study (1)

- ▶ *Study area*



# *The Causes of Flooding in Jeddah*

- ▶ Natural Causes
  - ❑ Heavy rain
  - ❑ Topography
  
- ▶ manmade Causes
  - ❑ Lack of hydraulic structures
  - ❑ A lack of disaster warning devices
  - ❑ Corruption



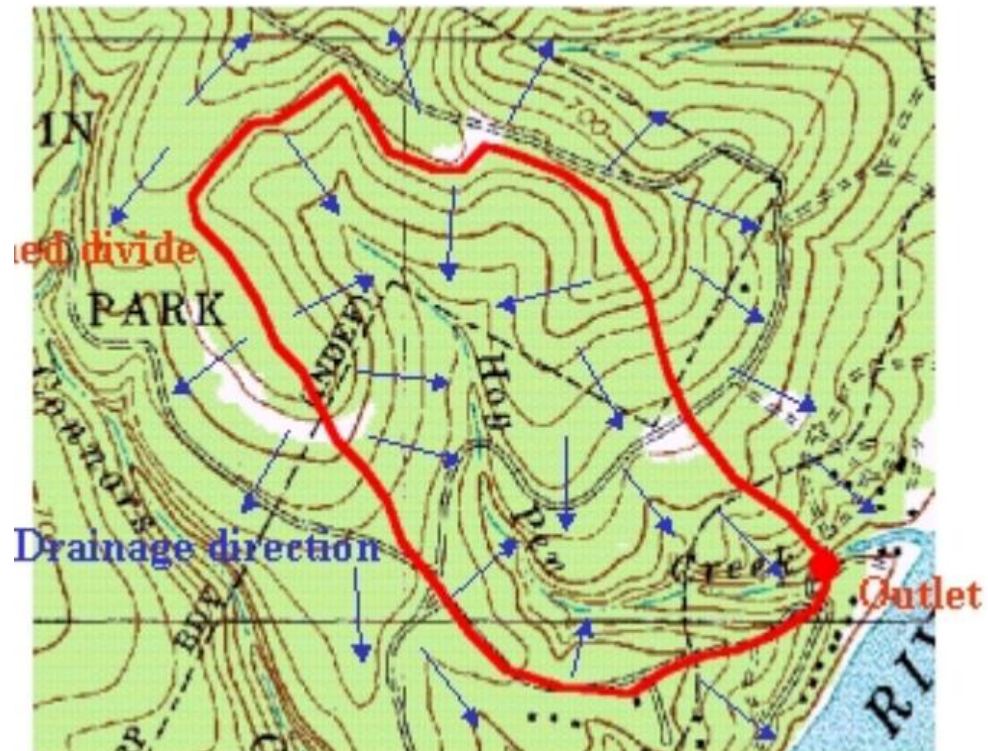


# *The Effects of Flooding in Jeddah*

- ▶ Effects on human life
  - ❑ People and livestock die
  - ❑ Disease
  
- ▶ Economic costs
  - ❑ Infrastructure damage
  - ❑ Rebuilding costs

# *Method*

## ▶ *Delineation of Drainage System*



# *Method*

- ▶ *Images Processing*

- IKONOS satellite
- ENVI 4.3 and ERDAS

- ▶ *GIS Application*

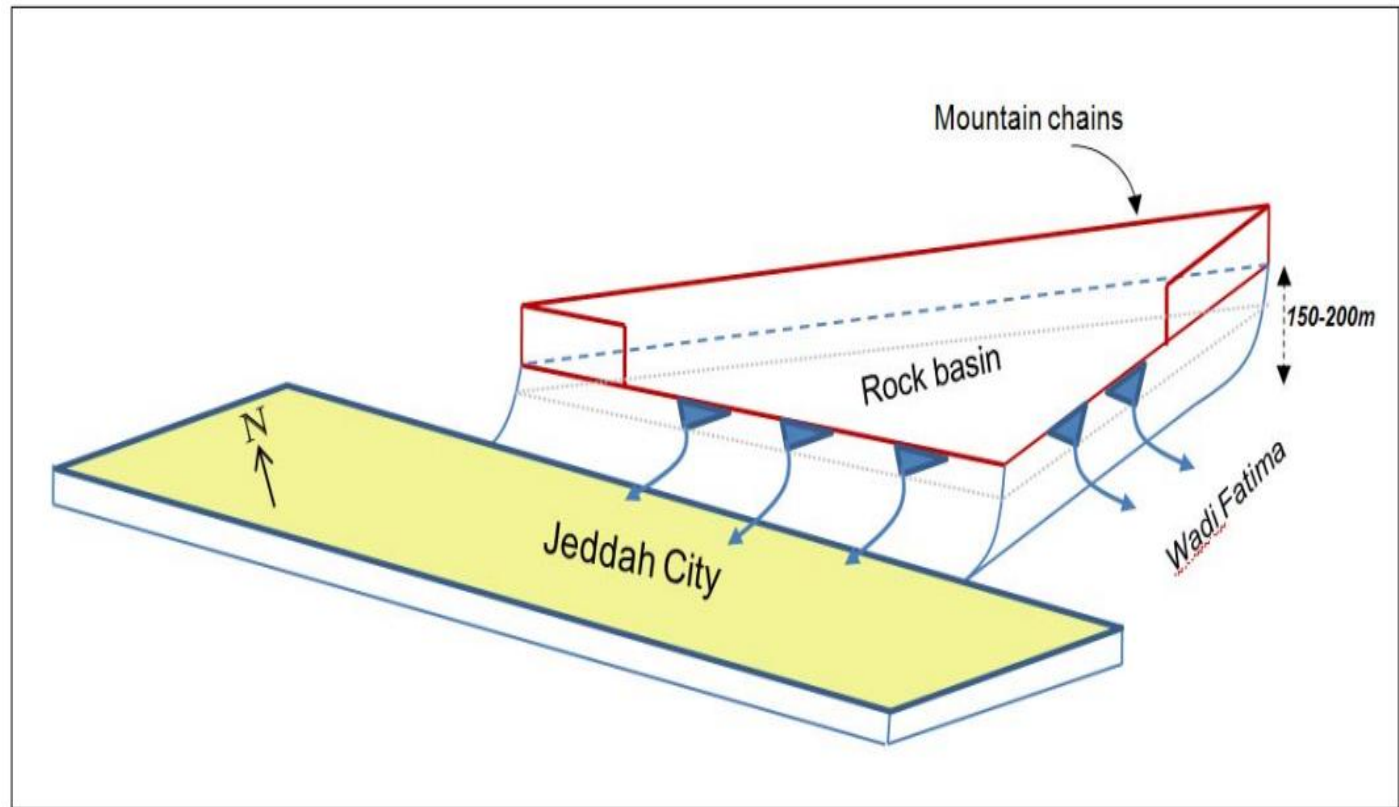
- Arc GIS 9.3.





# *Results* (cont.)

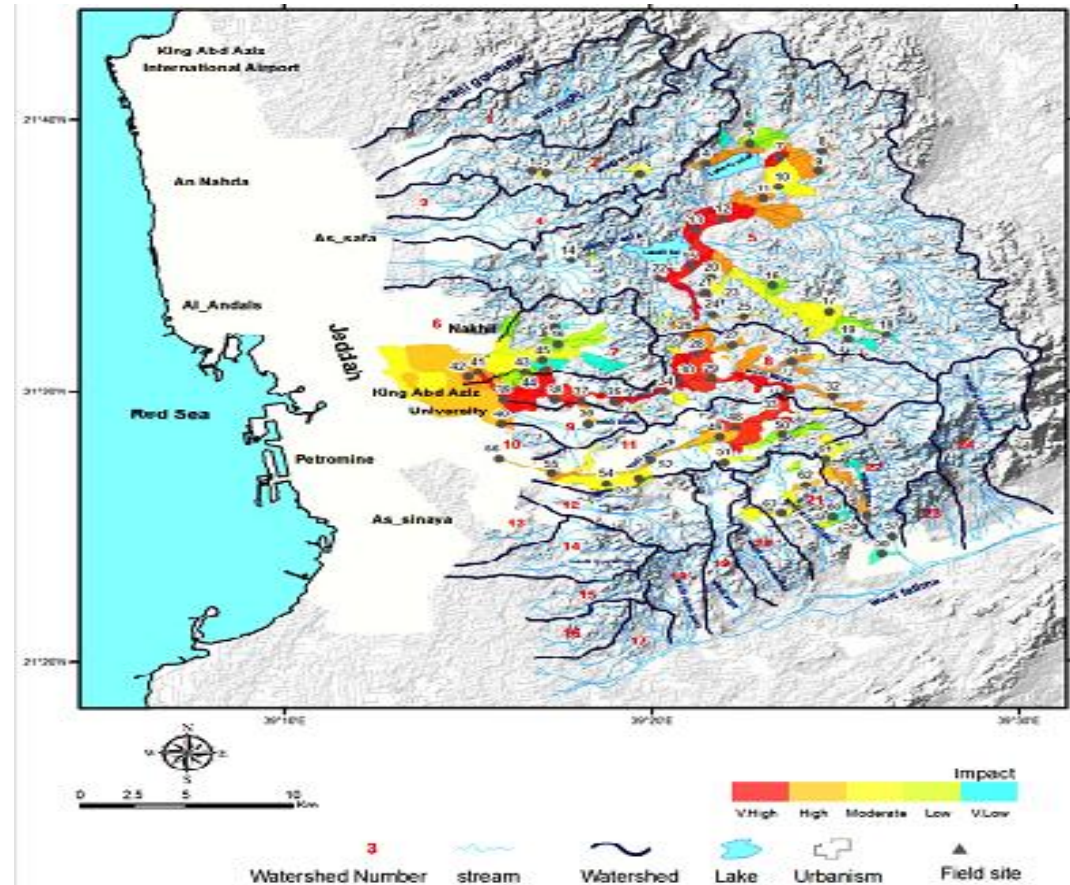
- ▶ huge rocky basin



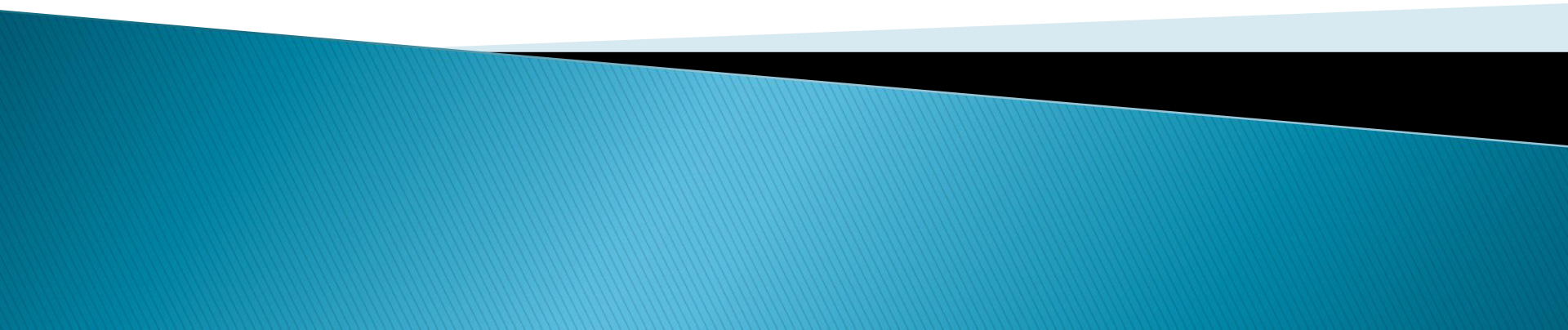
# Results (cont.)

## ▶ Flooded zones

flood hazard map



**Flood Hazard Mapping**  
**(Northern region of Ghana)**  
**Case study (2)**



# STUDY AREA

- ▶ Located in the northern part of Ghana



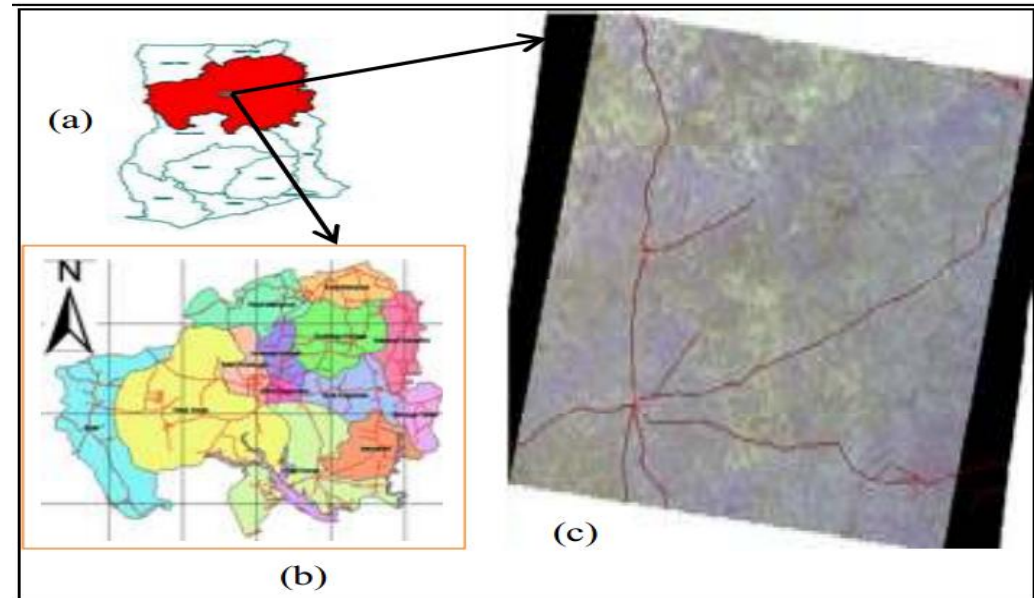
- ▶ The largest area in Ghana of 5810 km<sup>2</sup>.



# Flood Hazard Mapping

## ▶ The data used

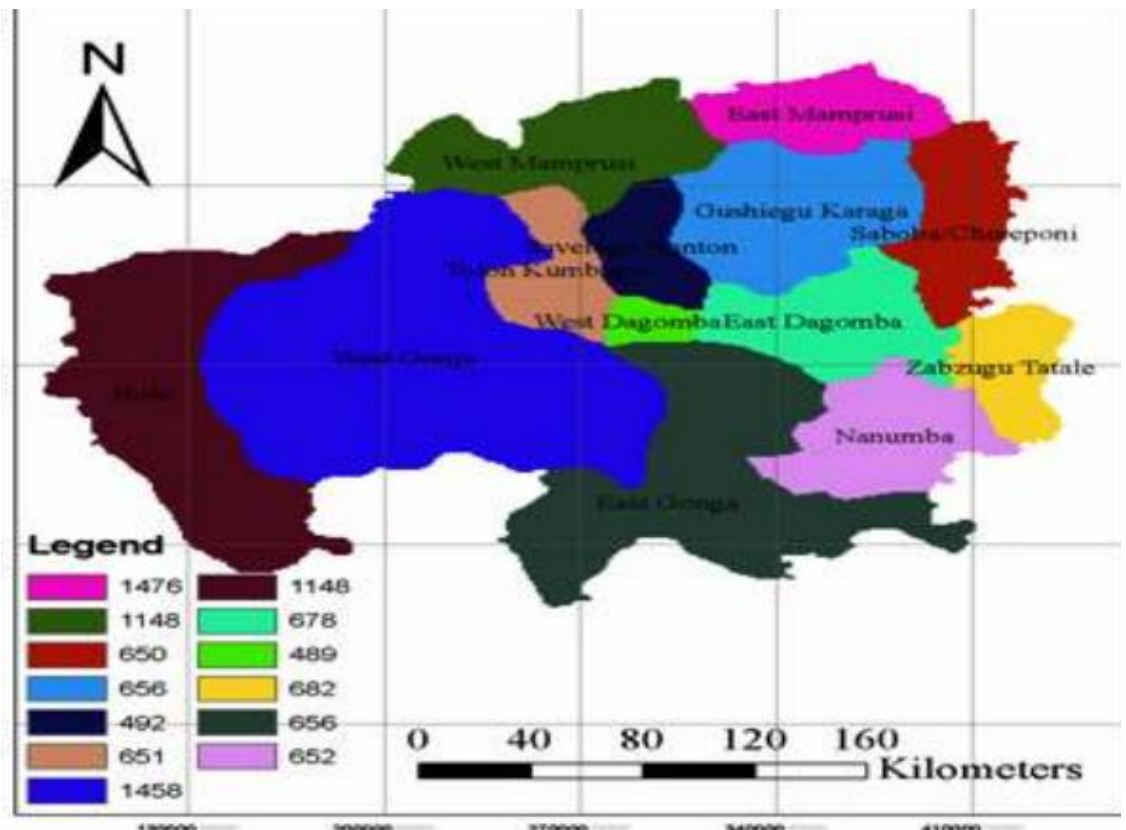
- ❑ Topographic map (b)
- ❑ Level 1b ASTER imagery (c)
- ❑ Contour lines
- ❑ Water bodies
- ❑ Population census data



# Flood Hazard Mapping (cont.)

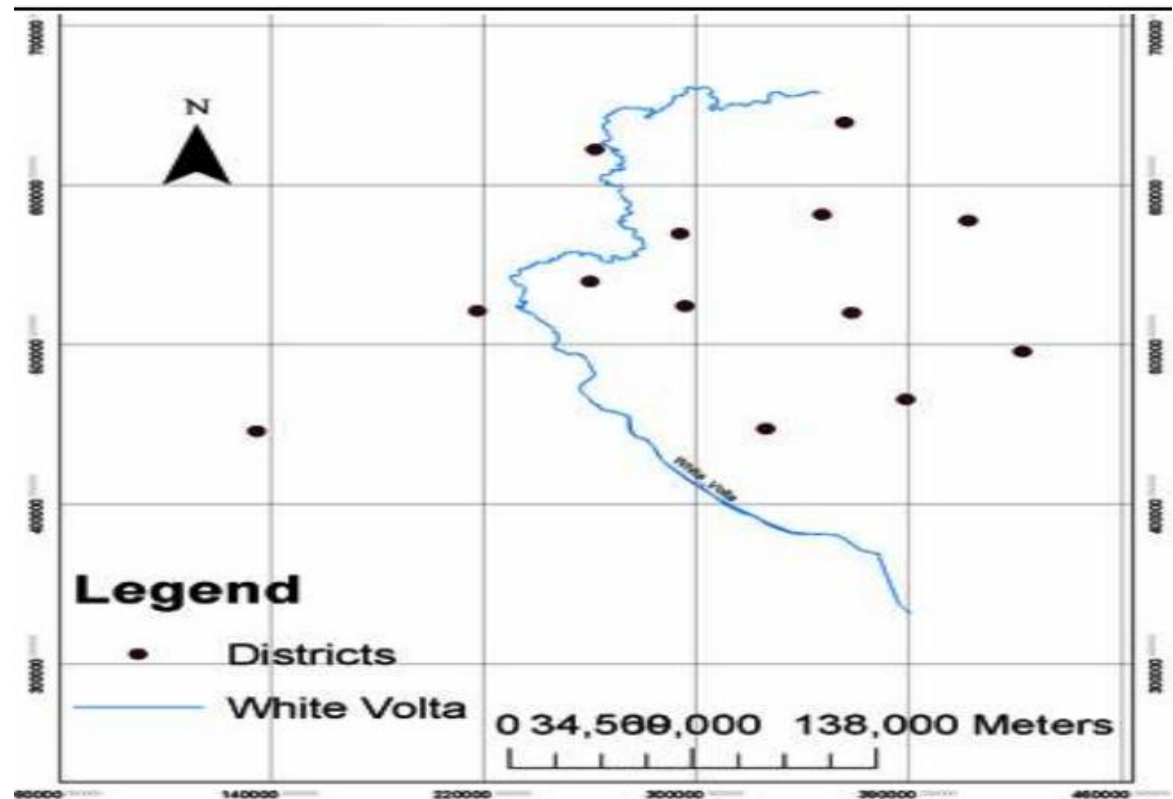
- ▶ **The data used**

- ❖ The highest elevation for 13 districts



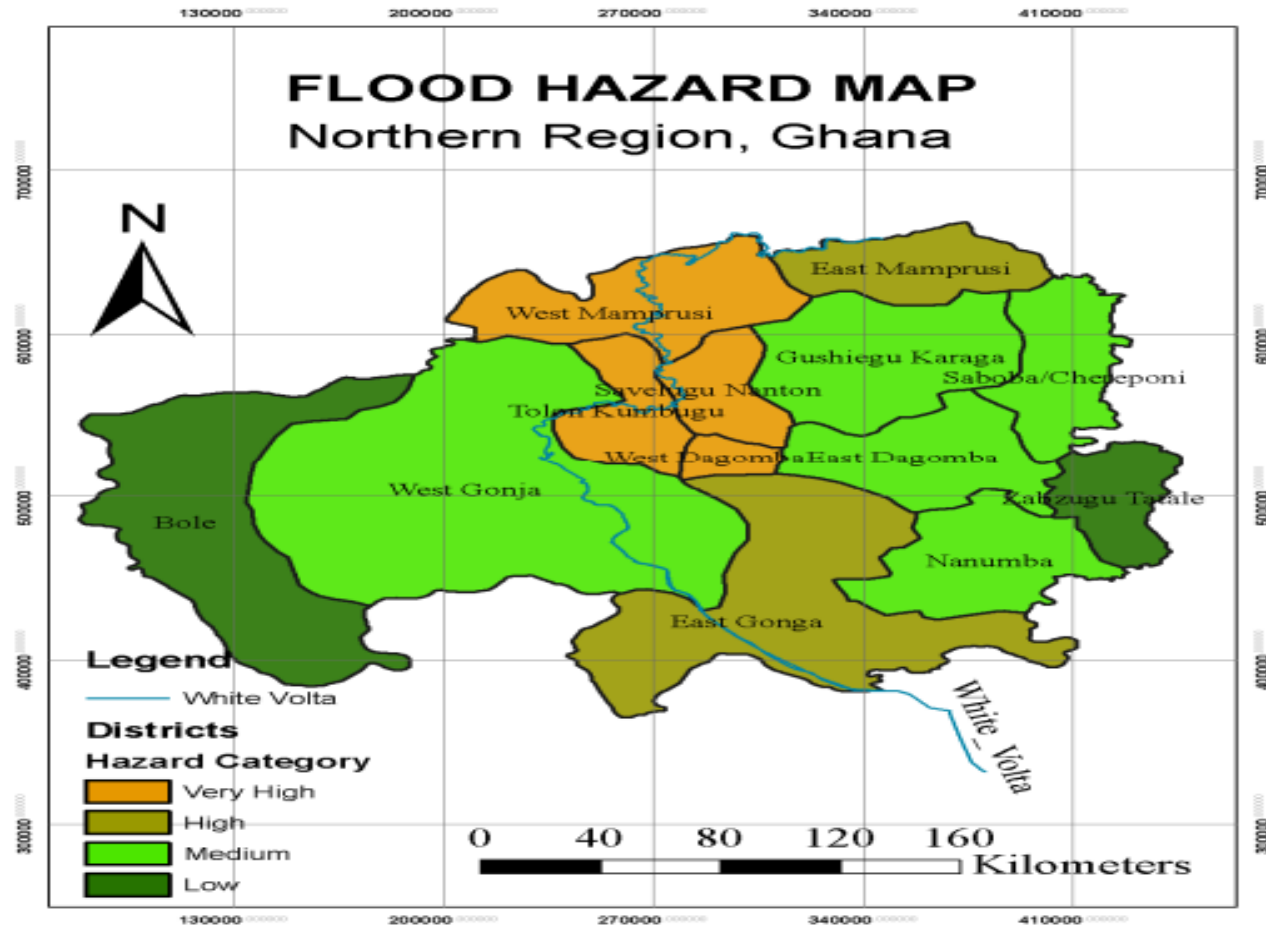
# Flood Hazard Mapping (cont.)

- ▶ District distances from the White Volta River were determined as:
  - ❑ Midpoints
  - ❑ point feature

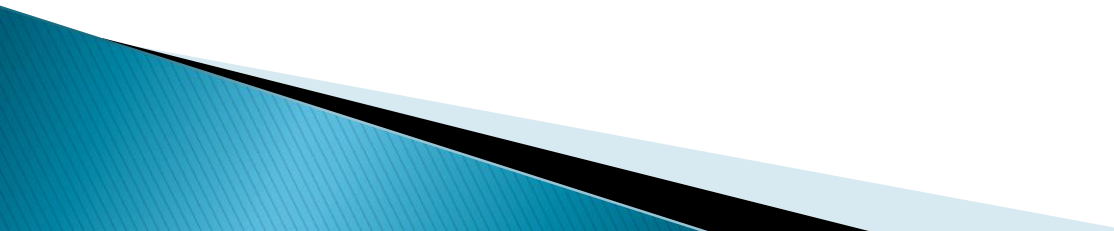


# RESULTS


## ► Flood Hazard Map



# RESULTS and DISCUSSION

- ▶ GIS is an important non-structural flood management technique.
  - ▶ flood is a natural phenomenon, we can't completely stop it; we can minimize its bad effects by better planning.
- 

# CONCLUSIONS and RECOMMENDATIONS

- ▶ GIS technology is a powerful application
  - ▶ Early warning system
  - ▶ Awareness programs
  - ▶ A national anti-corruption organization
  - ▶ Suitable hydraulic structures
- 

A photograph showing a flooded street. In the background, two cars are partially submerged in the murky, brown water. In the middle ground, a group of about seven people are wading through the water, holding hands in a line. In the foreground on the right, a man in a white suit jacket and light-colored trousers stands on a concrete ledge, looking towards the group in the water. The overall scene suggests a rescue or assistance operation during a flood.

*Thank You For listening*