



# APPLICATION OF GIS TO DETERMINE EXTENT OF THE FLOOD HAZARD IN ZIMBABWE

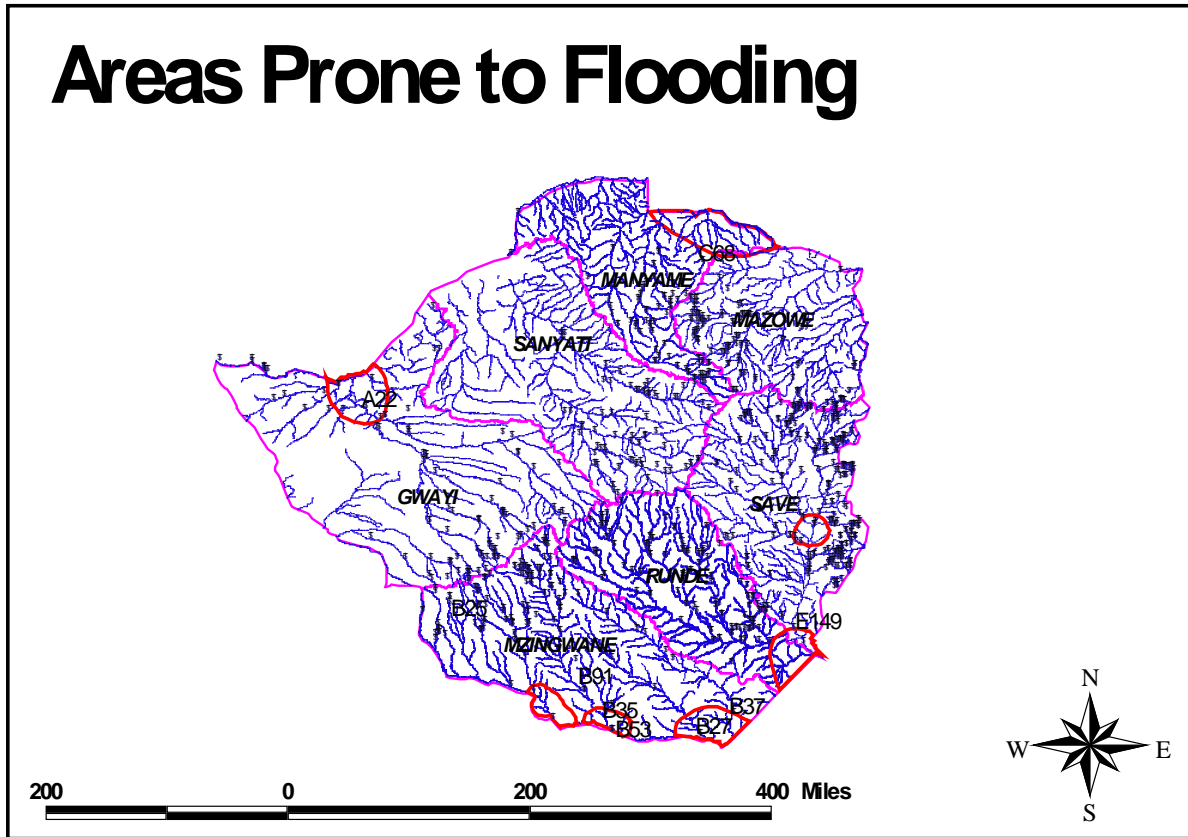
Beijing, China 23-25 October 2017

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# Introduction

## Traditional Flood Profile

### Areas Prone to Flooding



# Area flooded

The need for the development of a national flood plain management framework



# Flooded homesteads



Flooded homesteads

Land cover/use

Area of farmland affected/number of  
settlements affected

# Introduction

- The need for the development of a national flood plain management framework came about as a result of the lessons gleaned from Tokwe Murkosi dam flood disaster of February 2014 and other flooding incidents that occurred in the past years.
- In 2015, the Department of Civil Protection under the auspices of United Nations Development Programme (UNDP) embarked on a project to bankroll the development of the National Flood Plain Management Framework.
- The first step was to define the problem of flooding and a consultant was hired to carry out the study.
- The consultant undertook a systematic study of flood hazard in Zimbabwe determining populations, ecosystems and infrastructure at risk..

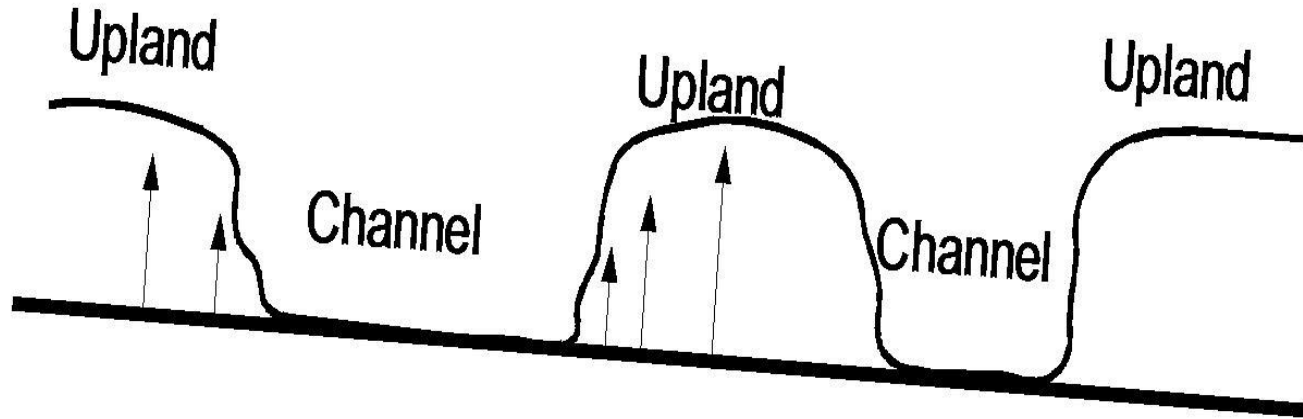
# Main purpose of the framework

- To ensure that flood plain management measures are integrated within the broader sustainable development and land use planning.

# Understanding the flood hazard

- Flood hazard defines the likelihood of flooding at a particular place in the event of rainfall or other water related operations and dam failure
- Flood hazard mapping is an integral part of a flood warning system since it is only through a flood hazard map that we can determine flood safe areas and areas that are vulnerable to flooding.
- A flood hazard map is also the basis of sustainable flood plain management.
- Flood hazard studies undertaken in show that height above the river channel base of a place is the main determinant of flood hazard
- The framework for flood analysis was therefore based on height above channel base as illustrated below

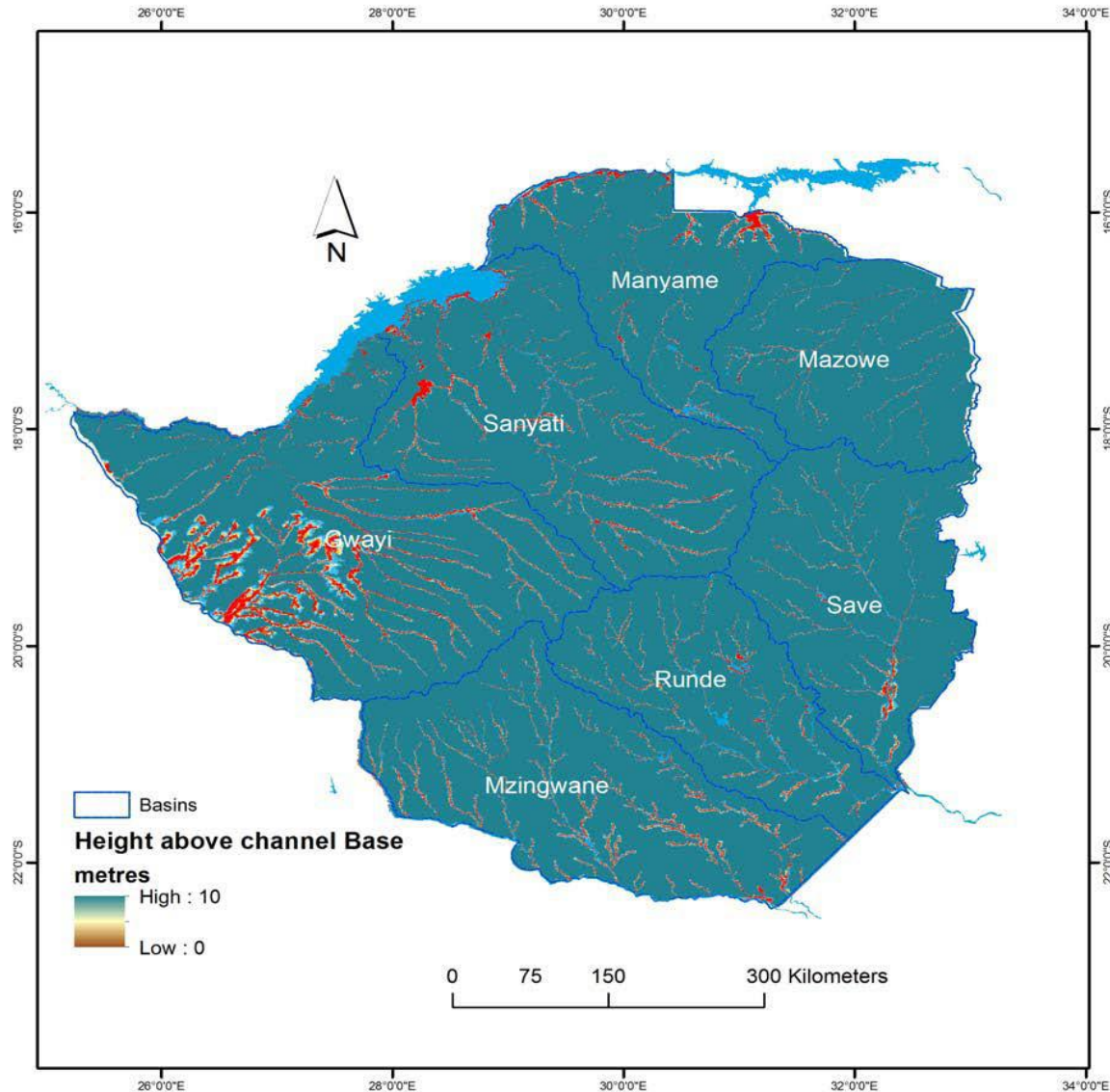
# Height above channel Base



- The lower the difference in height with the closest stream of an area, the higher the probability is that area will be flooded
- In other words, places on or closer to the river bed tend to flood first before places further above the river bed.

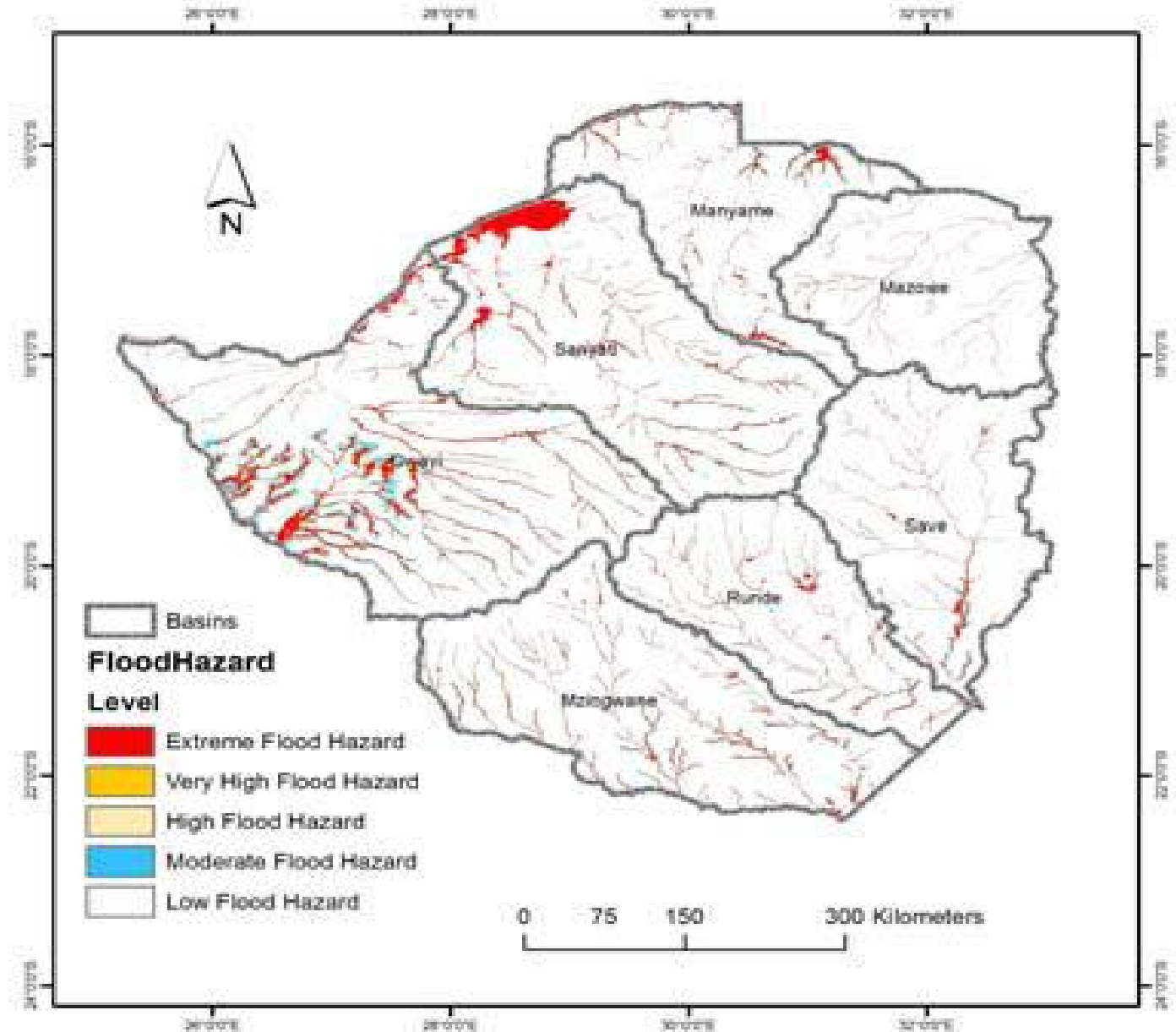


# *Flood Hazard in Zimbabwe*

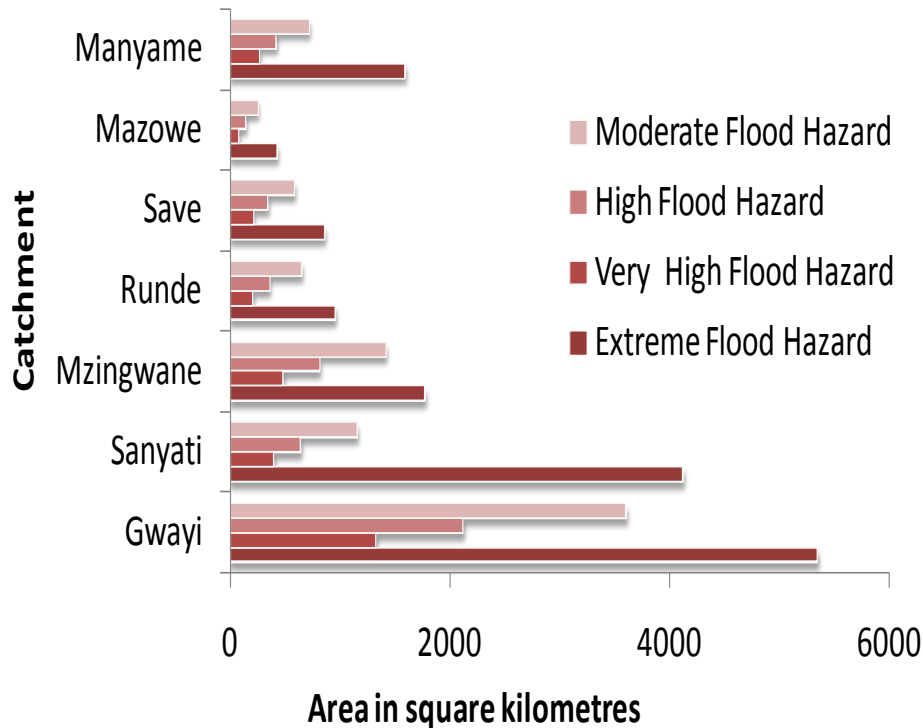


- The map shows the geographic variations in the height above river channel base for Zimbabwe.
- It can be observed that red areas are areas where height above river channel base is low and this is where the flood hazard is high while blue areas show places where height above channel base is high and flood hazard is low.

# Flood Hazard by Catchment

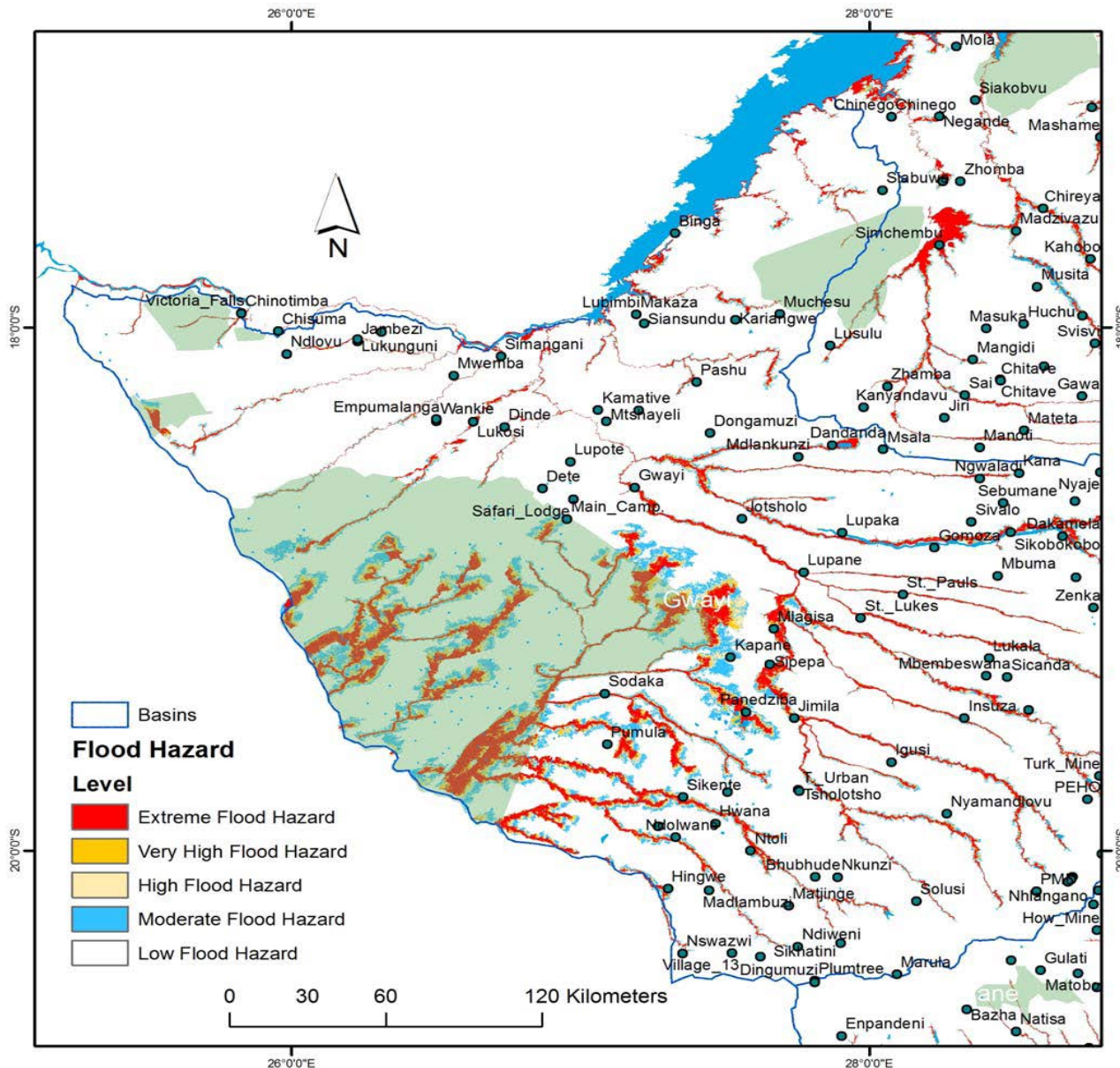


# Flood Hazard by Catchment cont..



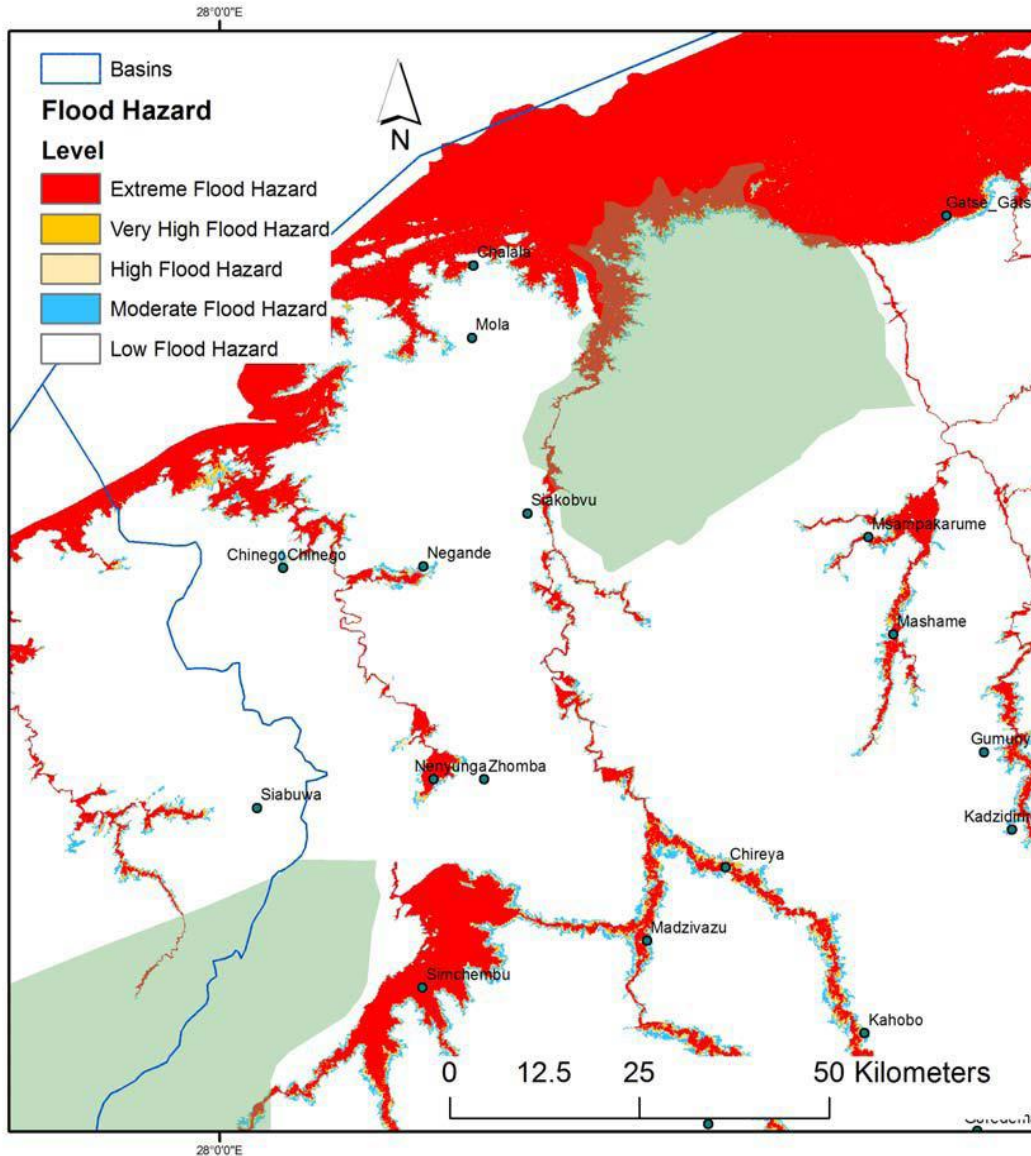
- It can be observed that Gwayi has the largest share of extreme flood hazard followed by Sanyati, Mzingwane and Manyame respectively.
- In Runde, Save and Mazowe, there are also areas with extreme flood hazard.

# Flood hazard hotspot in the Gwayi catchment



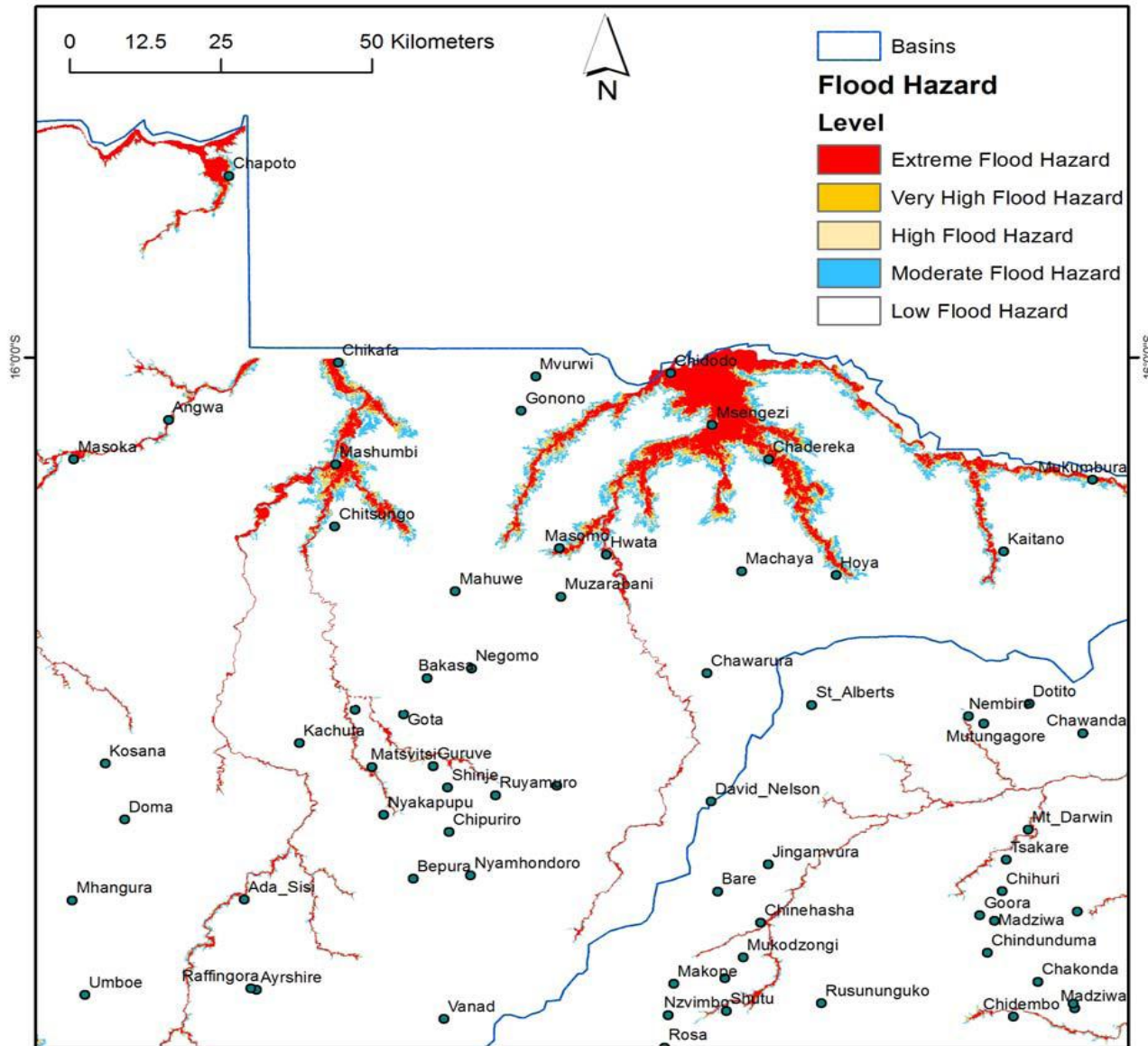
- Flood hazard hotspot in the Gwayi catchment in Zimbabwe. The points represent the location of clinics.
- Areas in green are National parks.

# Flood hazard hotspot in the Sanyati catchment



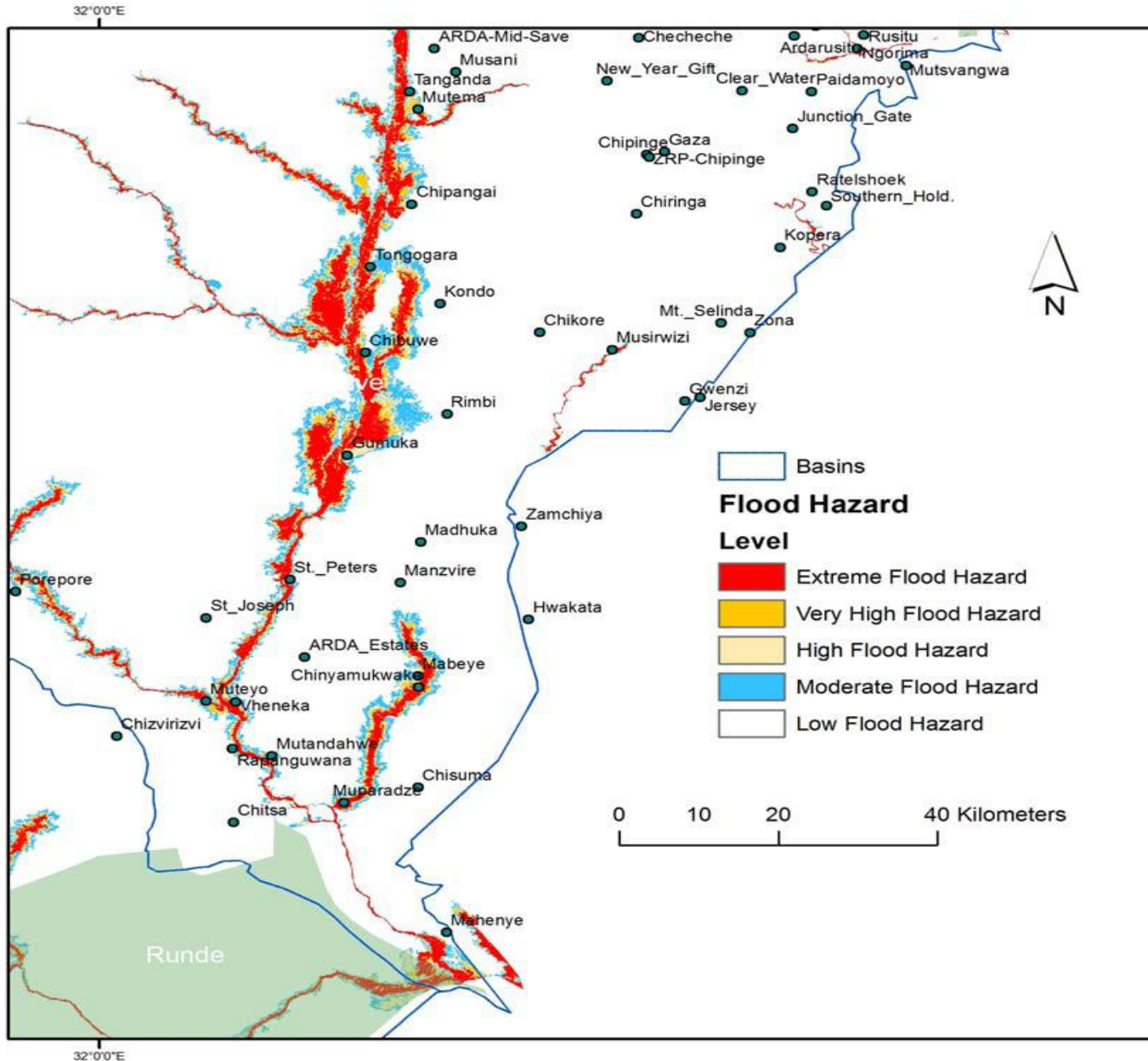
- The points represent the location of clinics.
- Areas in green are National parks.

# Flood hazard hotspot in the Manyame catchment



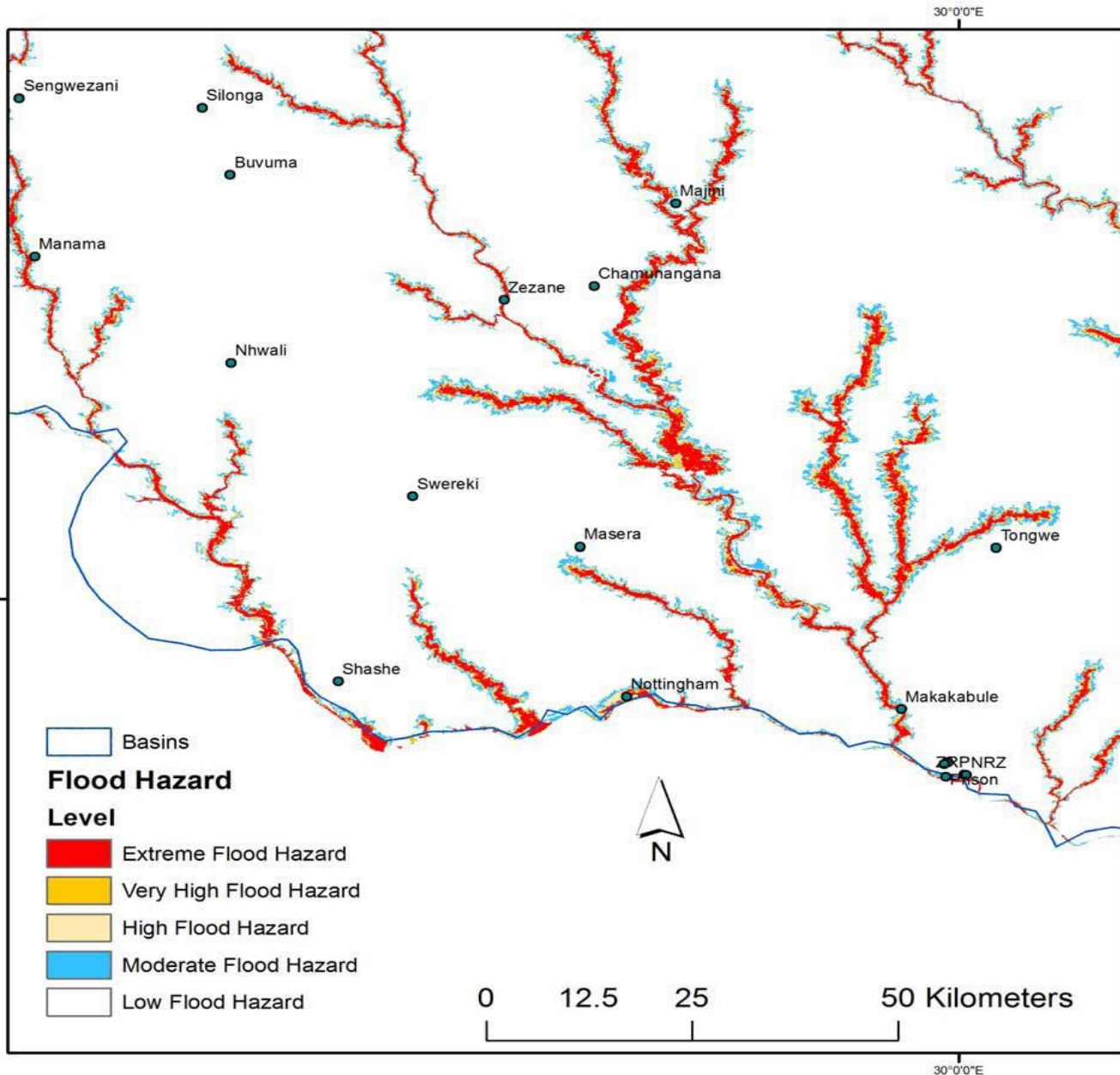
- The points represent the location of clinics.

# Flood hazard hotspot in the Save catchment



- The points represent the location of clinics.
- Areas in green are National parks.

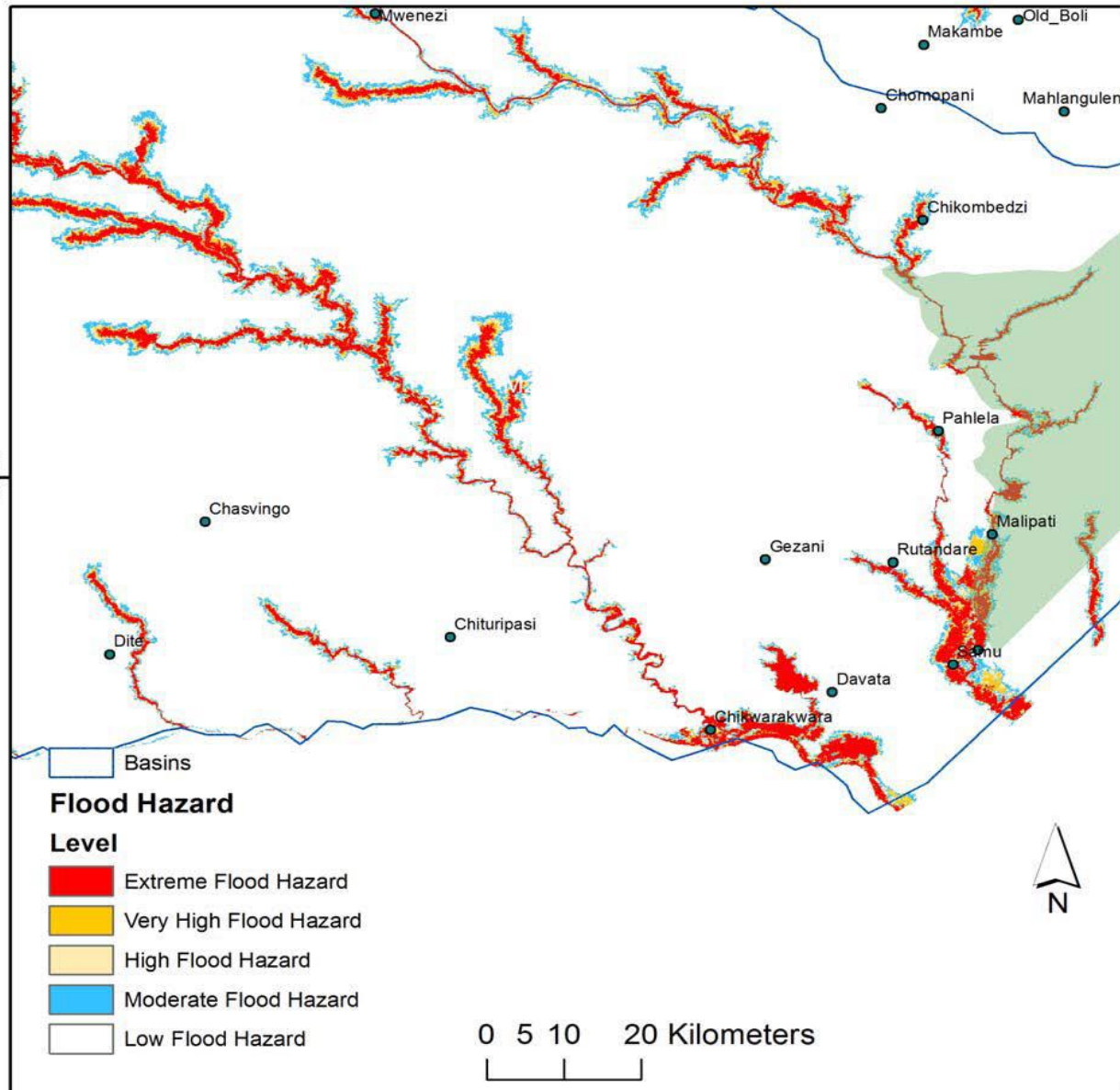
# Flood hazard hotspot in the Tuli part of the Mzingwane



- The points represent the location of clinics.



# Flood hazard hotspot in the Bubi and Mwenezi part of the Mzingwane catchment



- The points represent the location of clinics. Areas in green are National parks.

# Extend of flood problem in Zimbabwe

- The table below shows that about 4% of the landmass in Zimbabwe is at risk of extreme flooding events with 10year return period. These areas are less than 3m above channel base and about 92% of landmass is safe from flooding.

## *Extent of the problem*

Flood Hazard	Description	Severity	km <sup>2</sup>	% Zim
Extreme	<3m above channel	10yr	15317	3.92
Very High	3-4m above channel	20yr	3020	0.77
High Flood	4- 5m above channel	50yr	4911	1.26
Moderate	5-9 m above channel	100yr	8504	2.18
Low Flood	>9 m above channel	Safe	358885	91.87

# Categorisation of flood problems by number of homesteads

Hazard label	Number of rural Homes	% Rural Homes
Extreme	12430	0.84
Very High	5257	0.36
High	10358	0.70
Moderate	21859	1.48
Low/Safe	1428368	96.62

- The analysis above shows that close to 2 % of Zimbabwe's rural homesteads accounting for close to 30 000 homesteads are in extreme to high flood hazard areas.

# Conclusion

- The development of the Flood Plain Management Framework document should be premised on Mitigation, Preparedness and Response
- There is need to conduct further analysis to determine the actual number of people or households who are prone to flooding.
- The current analysis is limited to homesteads and square kilometres of land that is prone to different categories of flooding.

# Recommendations and Way forward

- Zone of extreme flood hazard can be used for recreational and non agricultural activities such as grazing areas which are more resilient to flooding.
- Infrastructure should be built in low flood hazard zones in order to save lives and property,
- Policies should be realigned with the intention of ensuring sustainable utilisation of flood plains to enhance livelihoods ensuring the protection of life and infrastructure.