

FLOOD RISK MANAGEMENT AND LOCAL DEVELOPMENT IN THE DYONKOTO – BOUBON STRIP IN NIGER: REMOTE SENSING APPROACH

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INTRODUCTION

Floods, droughts, high winds, sandstorms and heat waves are the most tangible extreme weather events that are increasingly affecting people in tropical Africa (Diara, 2013)

The challenge of managing natural risks is therefore a major stake, particularly for extreme events.

The Niger River spans nine countries (Benin, Burkina Faso, Cameroon, Chad, Côte d'Ivoire, Guinea, Mali, Niger and Nigeria) and is the third longest river in the African continent (4,200 km).

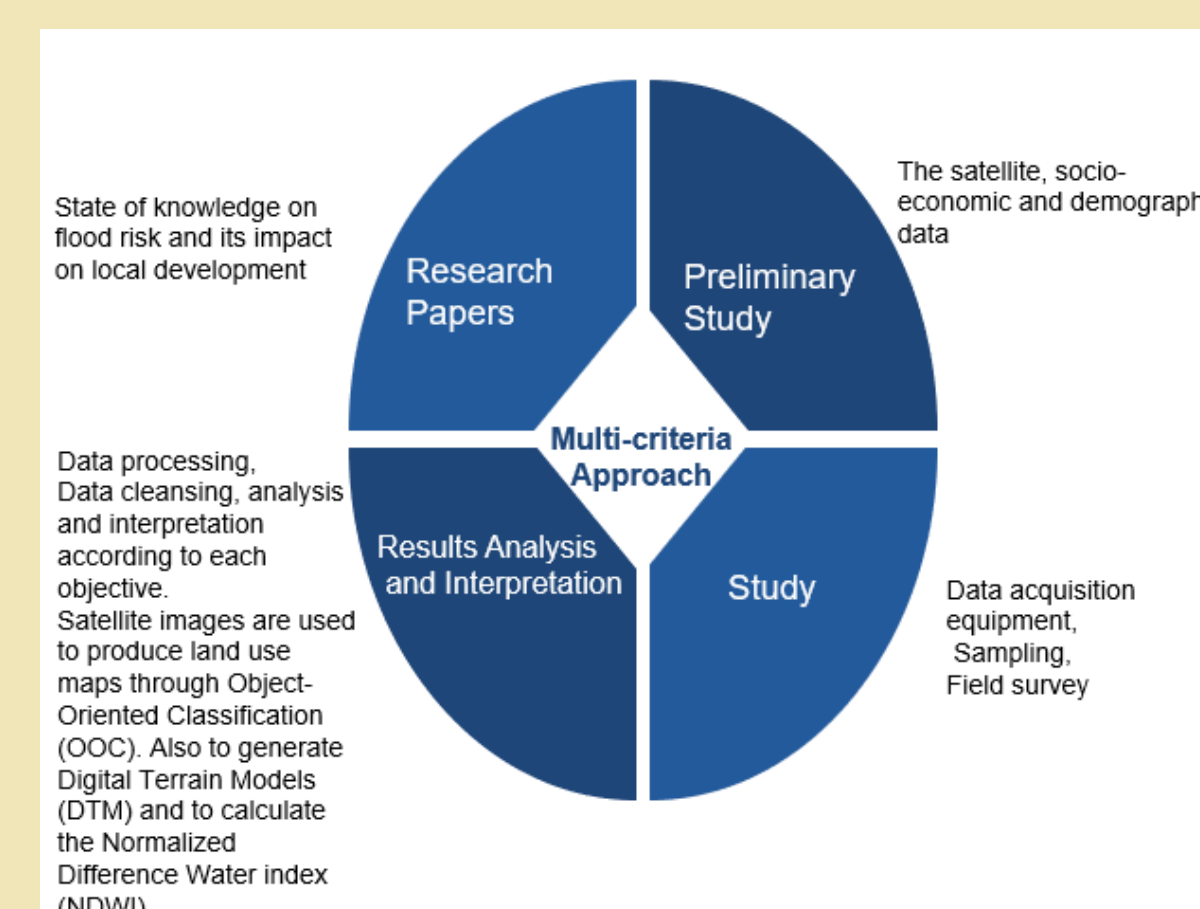
Why this topic ?

- 1- Floods in the Sahel have become annual and the consequences are extremely worrying;
- 2- The study area is located upstream of the capital city of Niamey, and along the Niger River which spans several countries.
- 3- Use mapping to assess the different levels of risk and vulnerability to flooding in a rural context;
- 4- The strategy to be put in place to reduce the risks of flooding in the Dyonkoto-Boubon strip.
- 5- Use integrated approach (engineering and policy) to highlight a decision-making tool for policy makers in flood risk management.

OBJECTIVE

Contribute to a better management of flood risks for a sustainable local development by applying a remote sensing approach in the Dyonkoto - Boubon strip.

METHODOLOGY

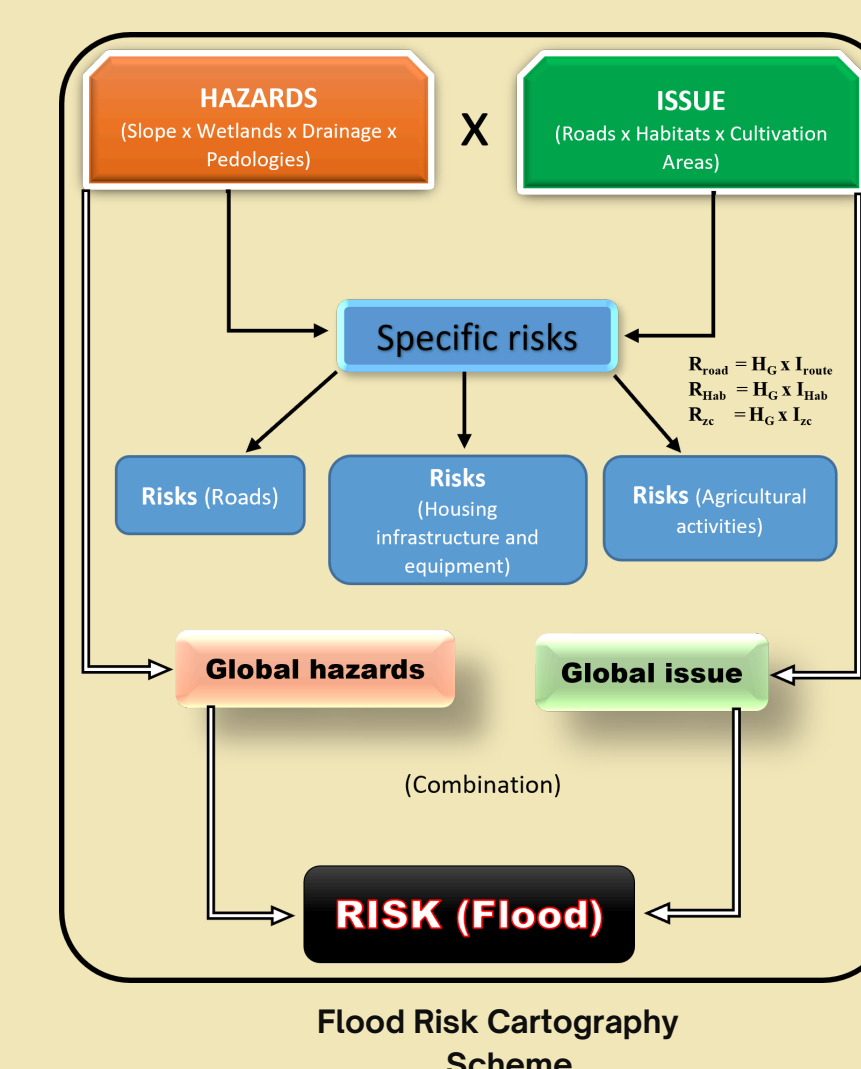


Sampling

The sample was selected randomly according to :

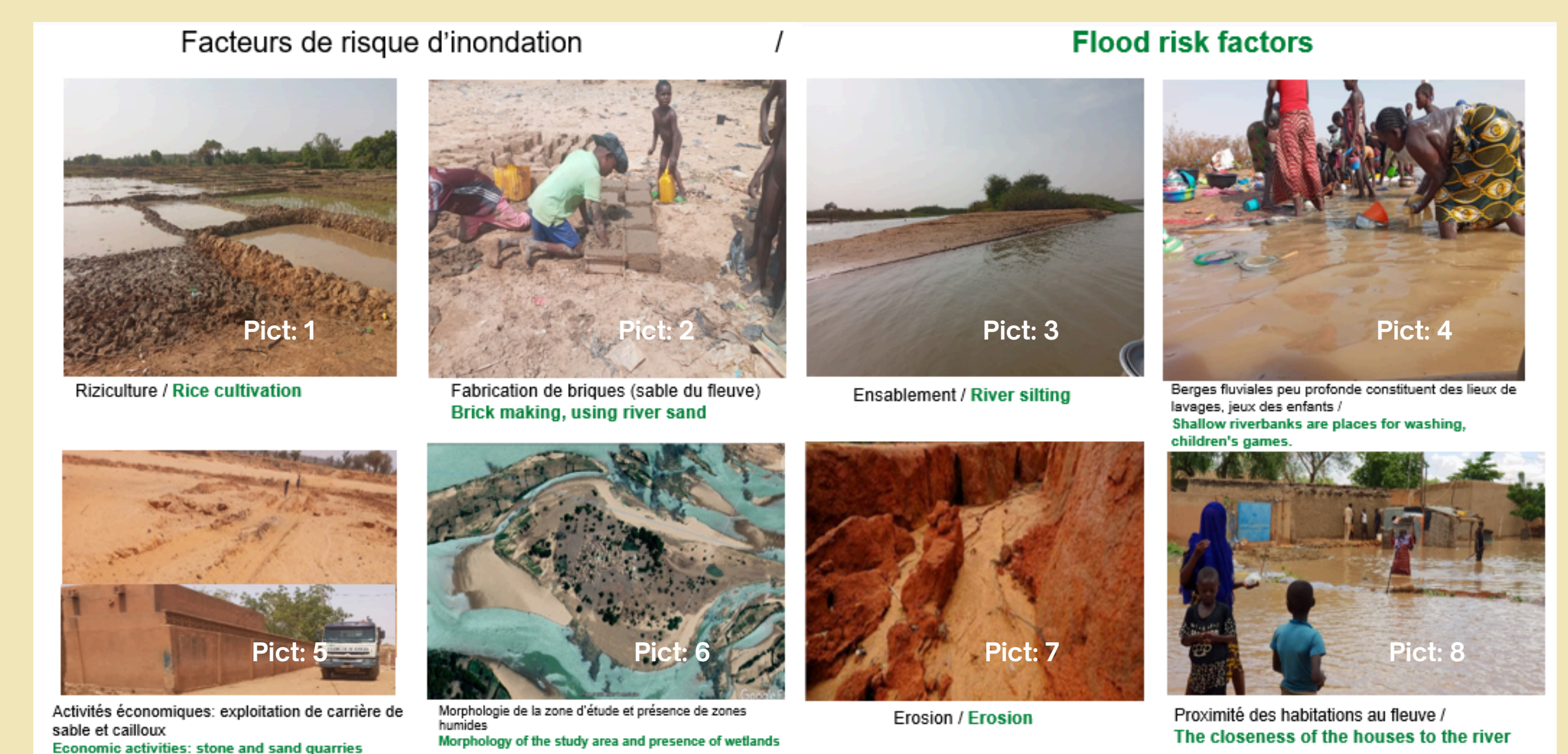
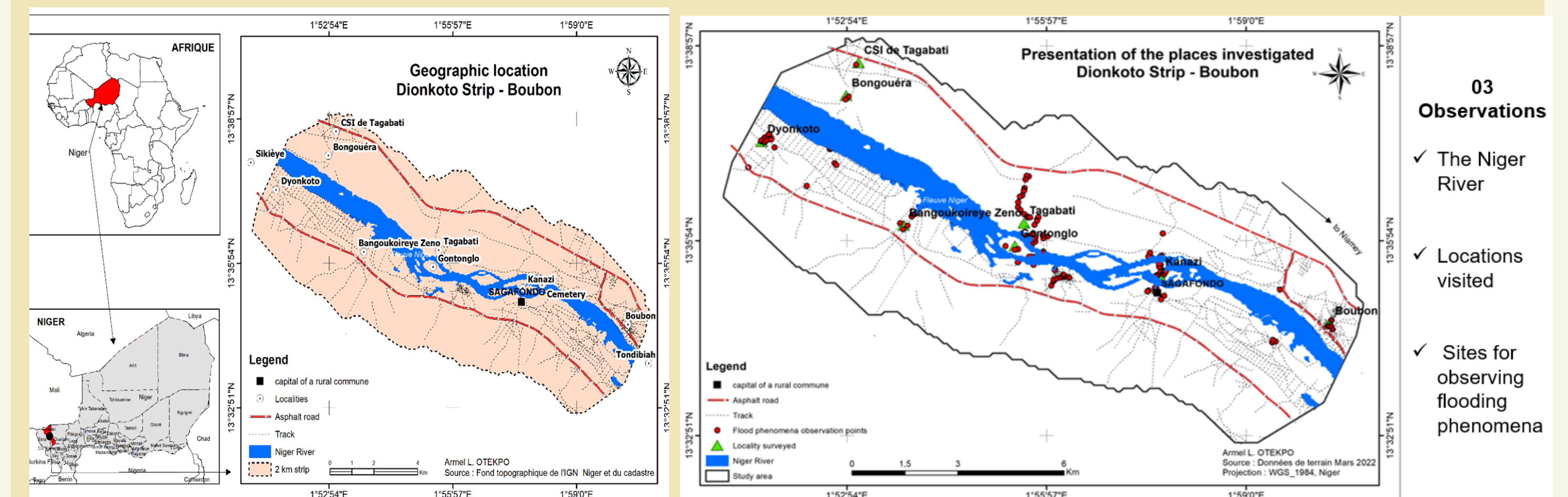
- 1- Accessibility to the survey sites
- 2- Insecurity risks in some areas.

Scale to measure the risk probability



CODES	INTERVALS	DESCRIPTIONS
1	Very Low	It is almost impossible for the risk to become a reality
2	Low	There is little chance of the risk happening
3	Medium	It is possible that the risk may occur
4	High	The risk is high likely to become
5	Very High	The risk is certain to become

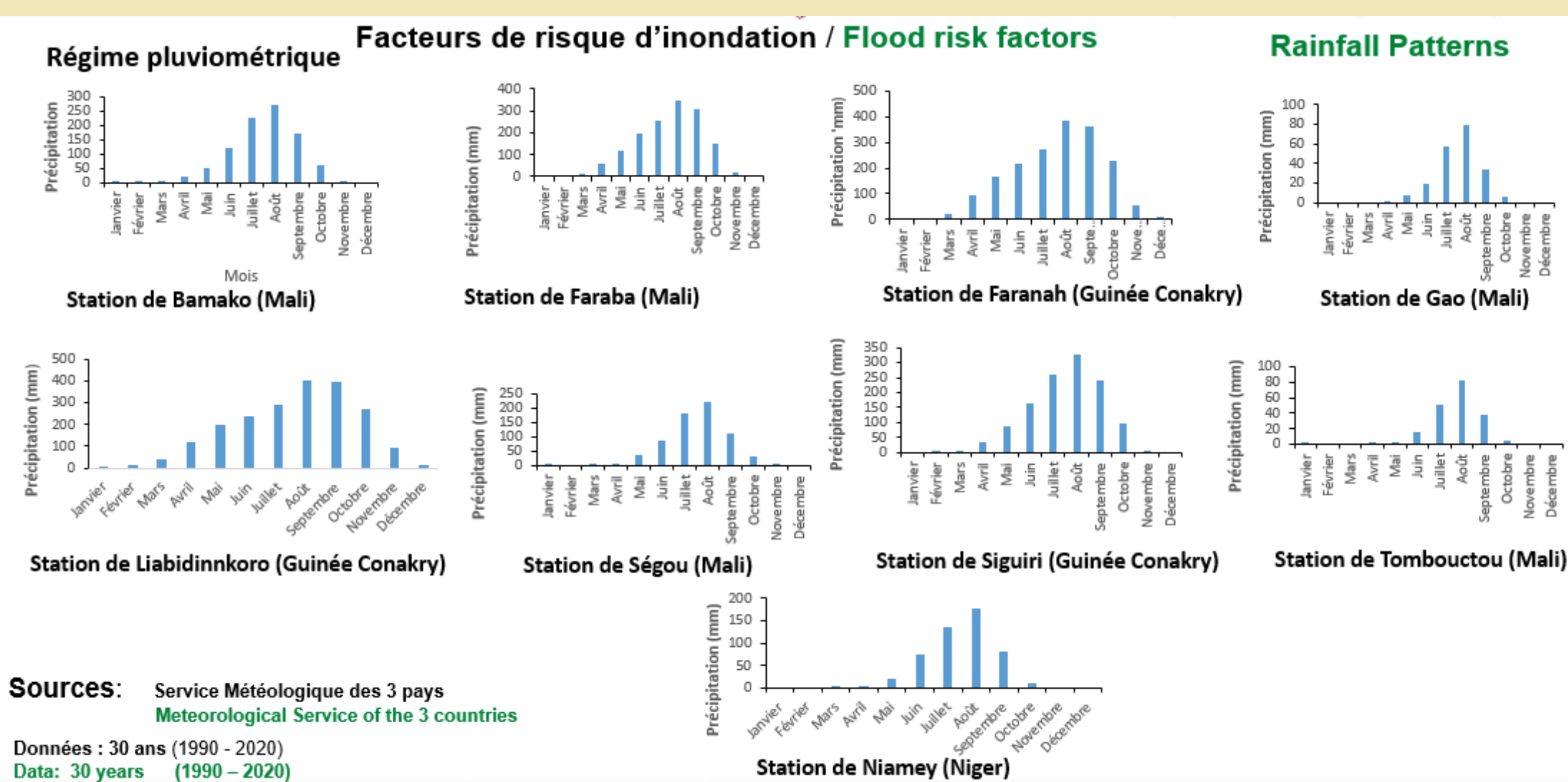
RESULTS



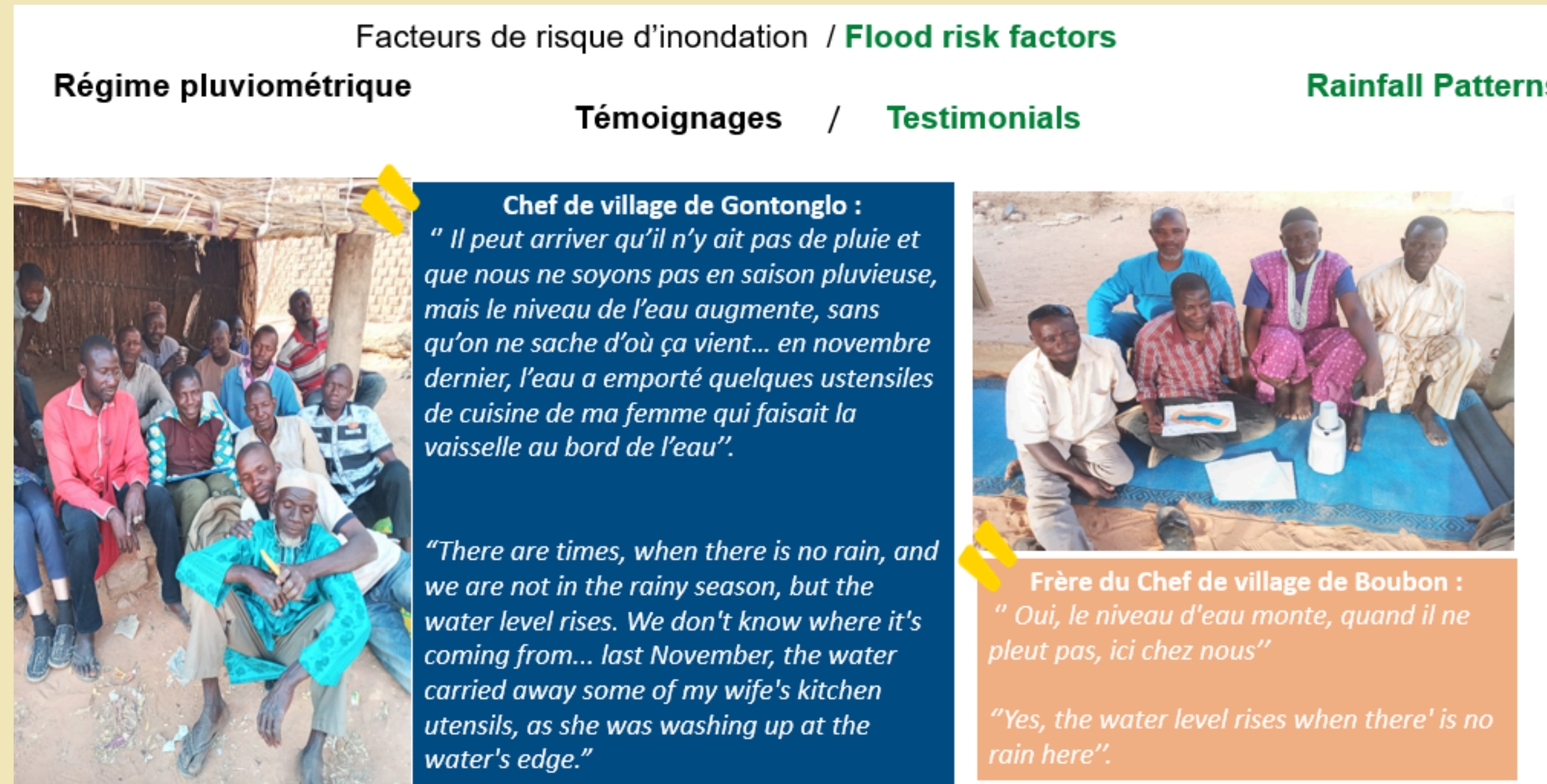
These different images show us the factors mentioned above

- Picture 1: Crop area (such as rice)
Picture 2: Brick-making activities contribute to the degradation of the river banks, causing the progression of the waves during rising water levels.
Picture 3: The height of the sand in the river bed
Picture 4, 5, 6, 7: The various activities, especially agricultural and mining, are damaging the soil and facilitating erosion through the drainage of sand.
Picture 8: The closeness of the houses to the river

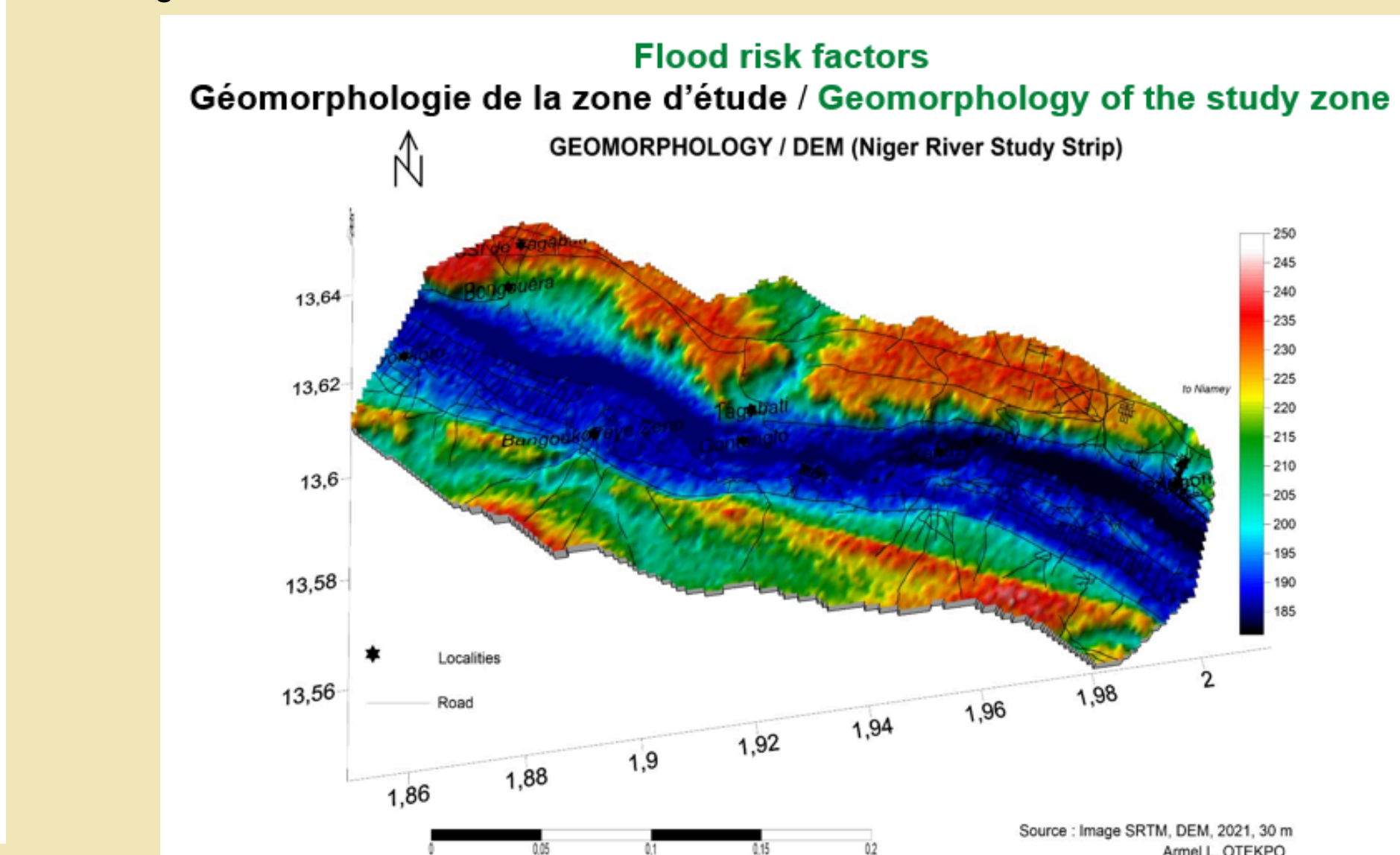
RESULTS



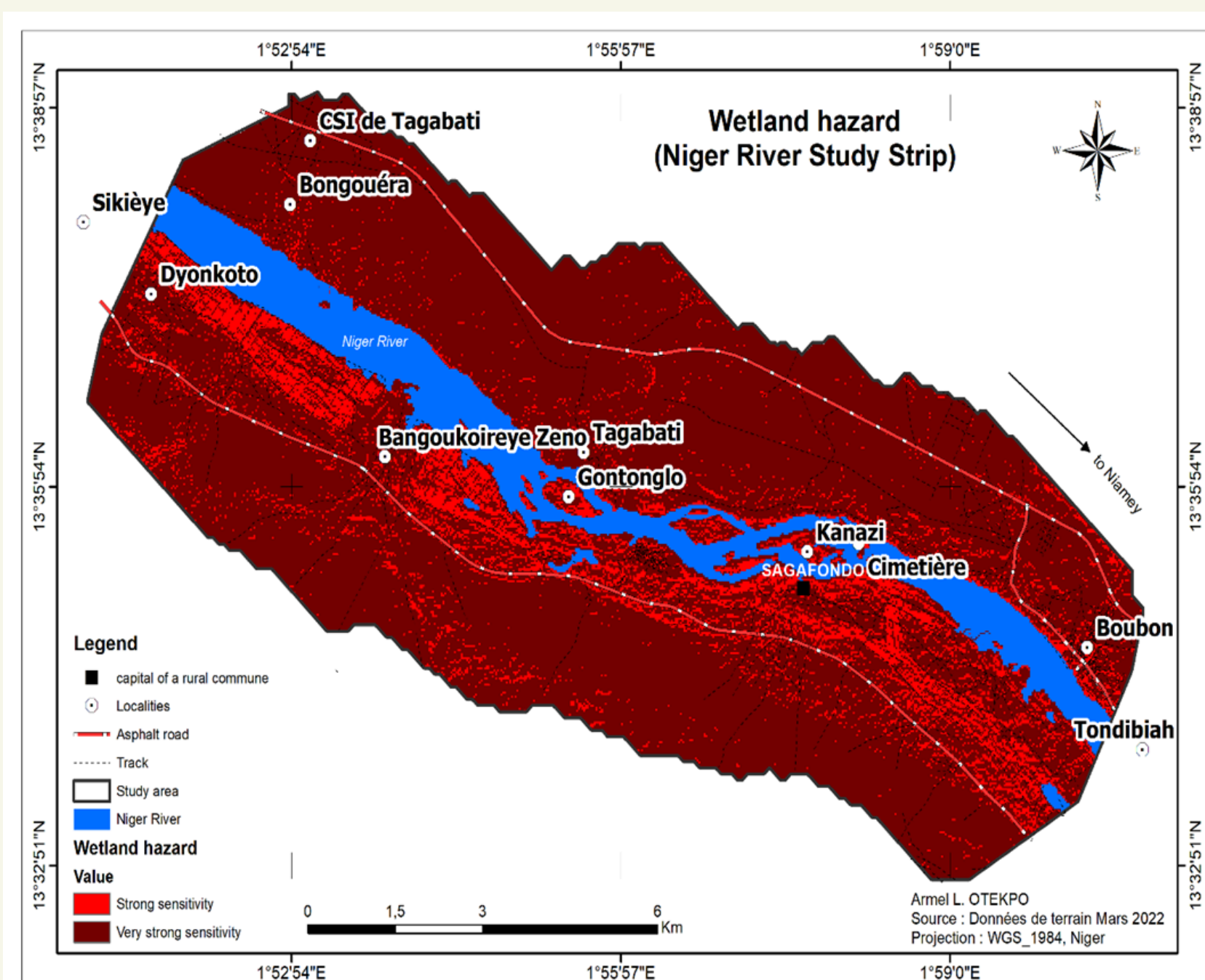
Sources: Service Météorologique des 3 pays
Météorological Service of the 3 countries
Données : 30 ans (1990 - 2020)
Data: 30 years (1990 - 2020)



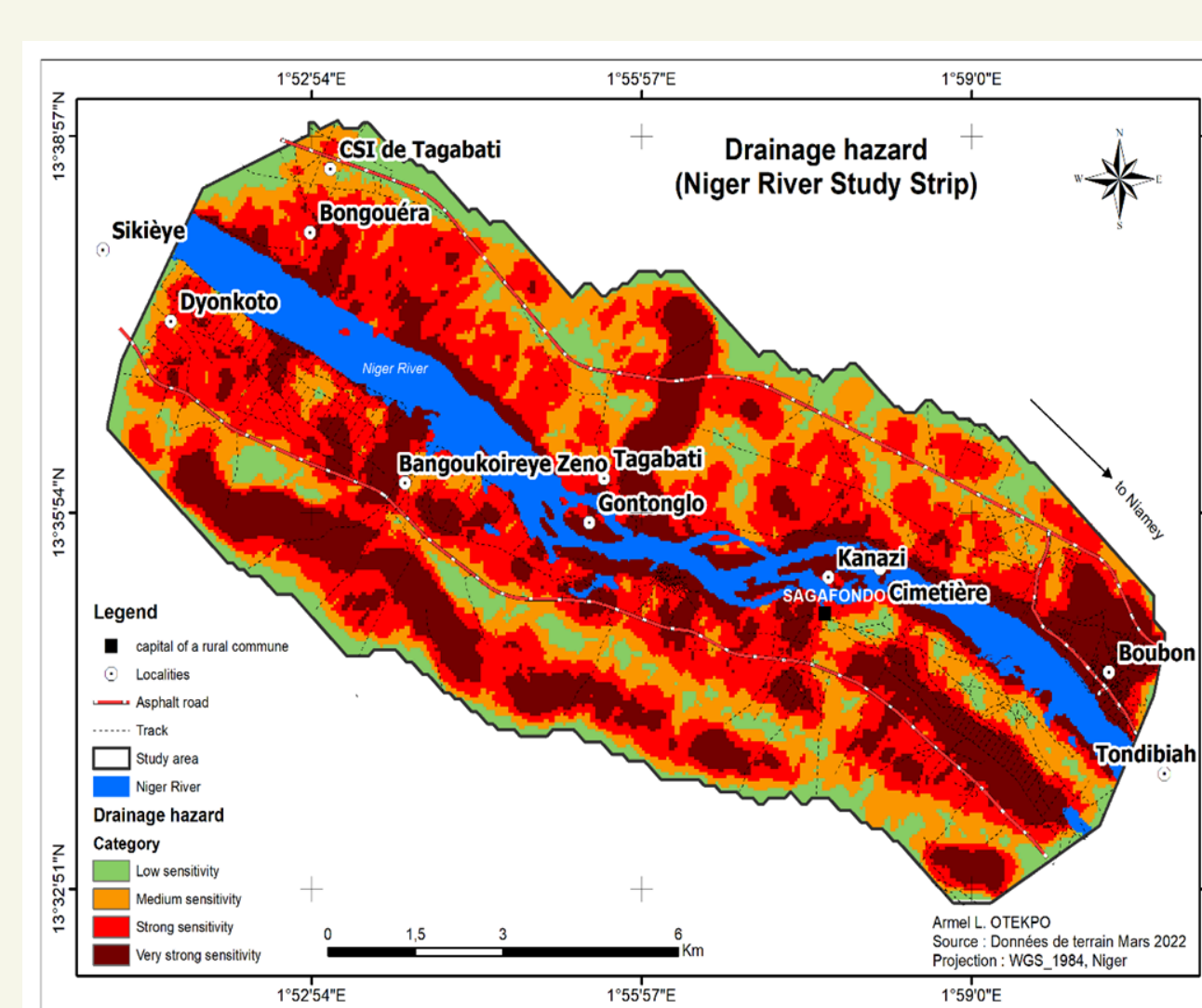
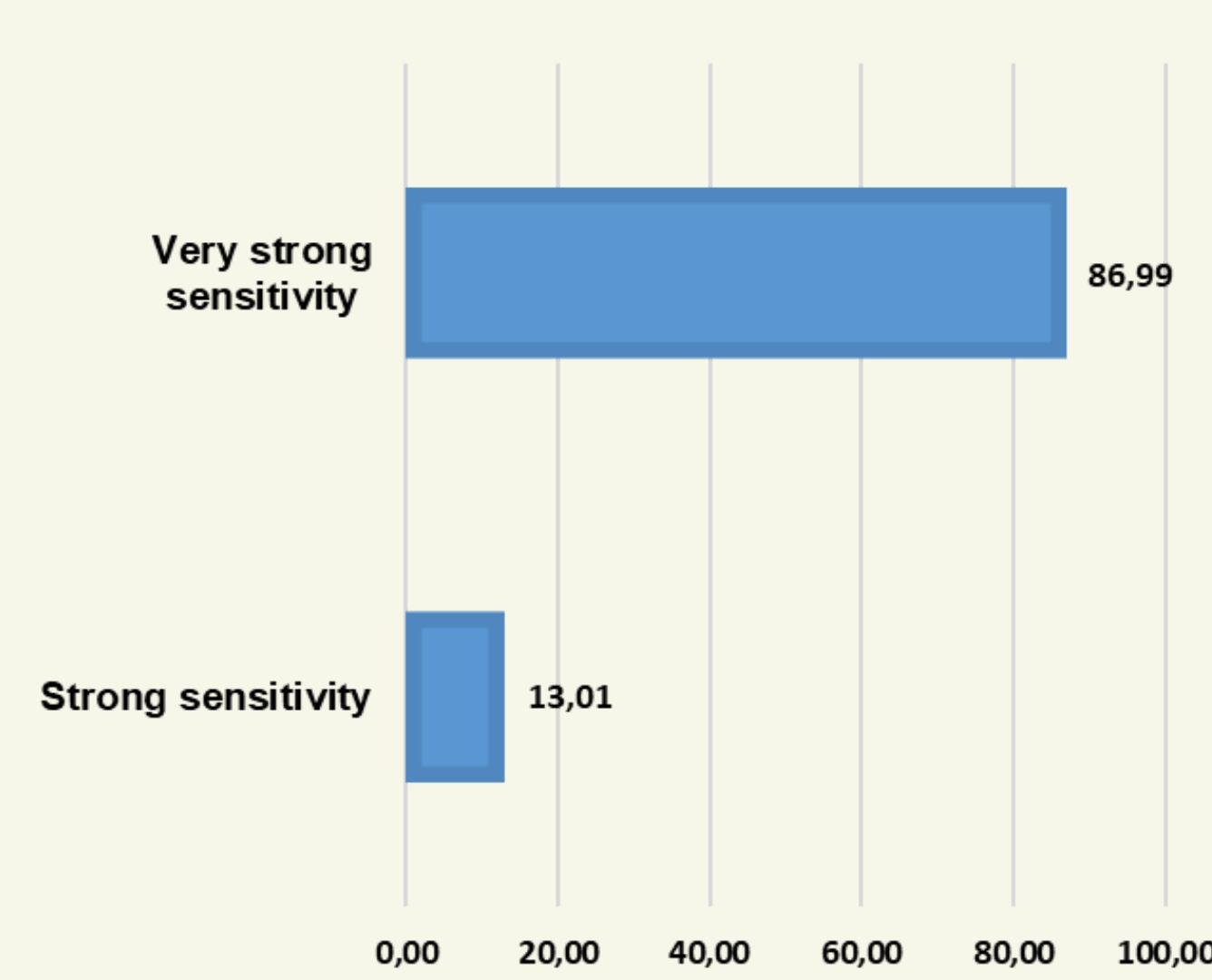
We have the testimony of some investigated persons
The water level will rise without local rainfall, causing damage to the population, depending on the speed of the water's drainage and its direction of flow.
The correlation between data from meteorological stations and the real-life scenarios confirms that: One of the risk factors for flooding is the location of localities downstream of a catchment area.



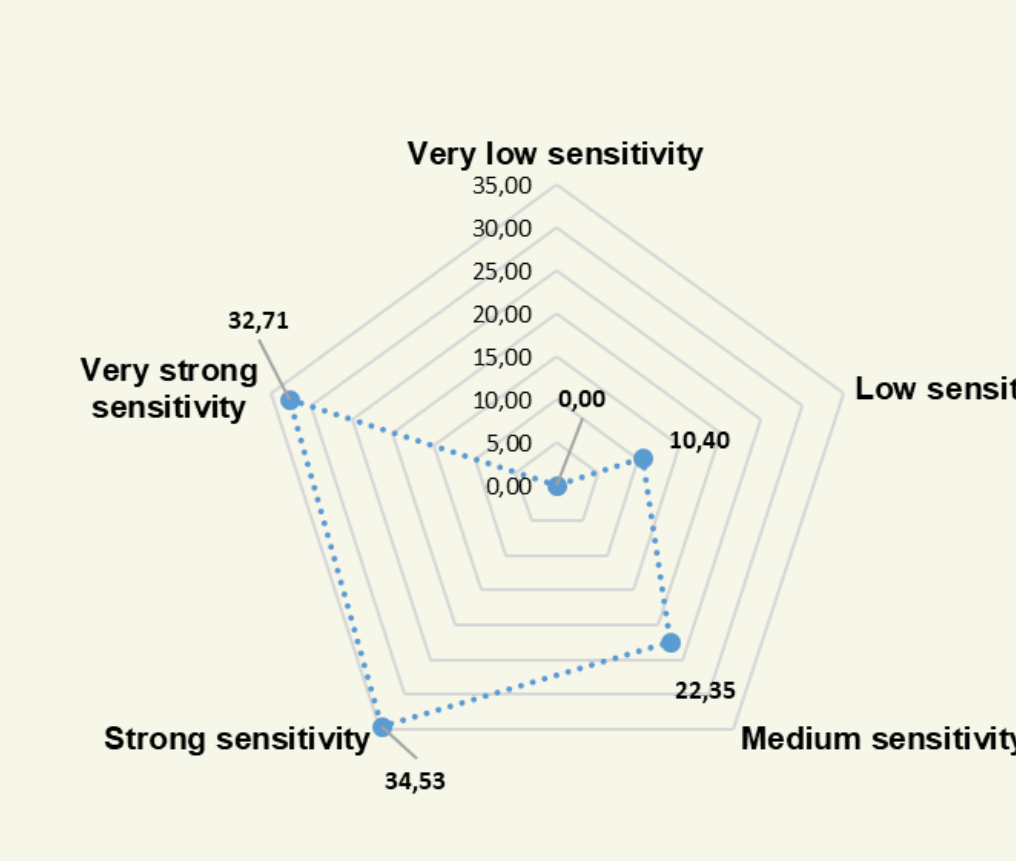
Flood risk maps



WETLAND HAZARD (%)

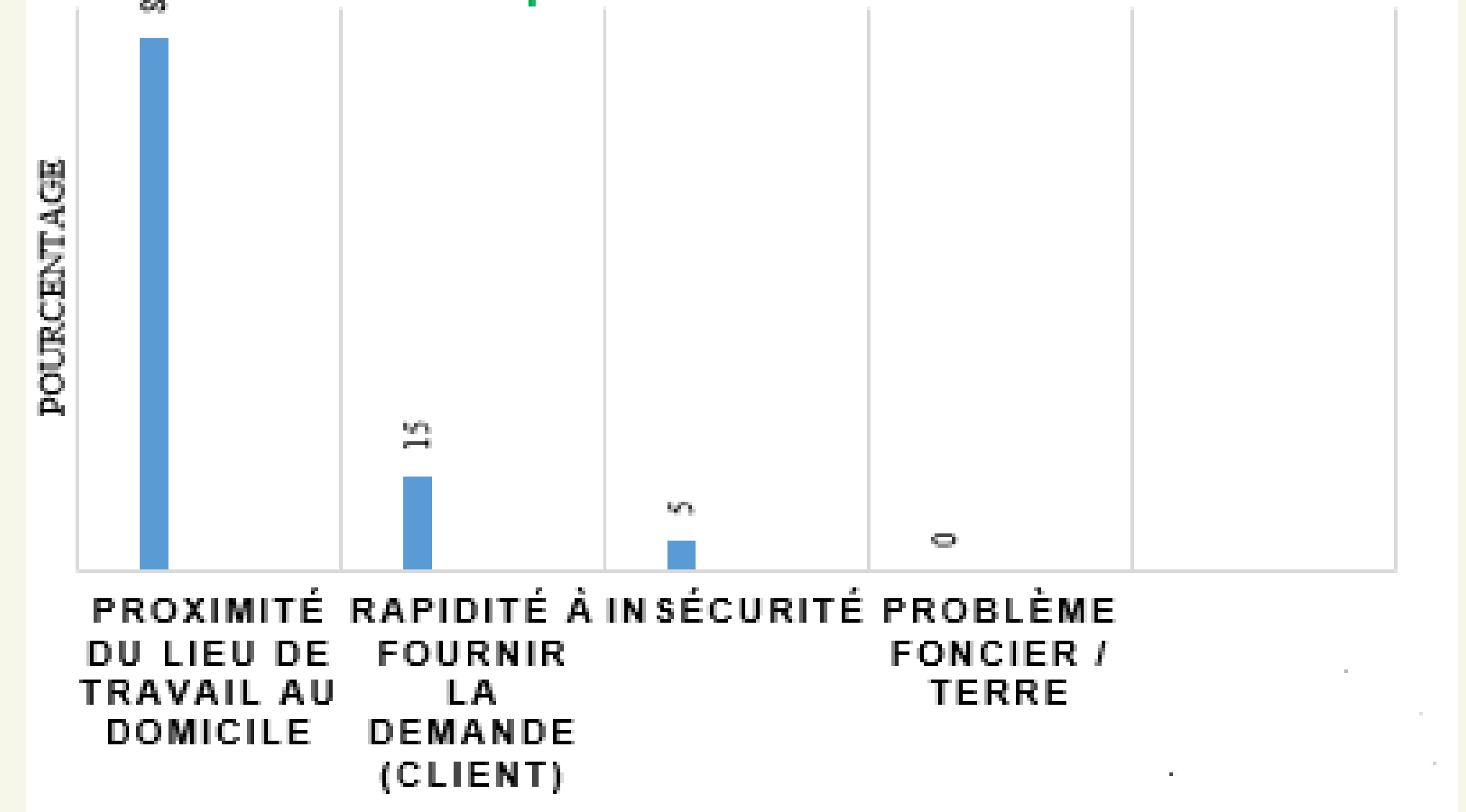


DRAINAGE HAZARD (%)



This map is the synthesis of the hazards: the combination of wetlands, slope, drainage, pedology.
The different natural parameters that cannot be controlled are at the origin of the damages.
We note a dominance of sensitivities: strong and very strong.

Choice of the place of work from the residence



Endogenous perceptions of populations towards floods

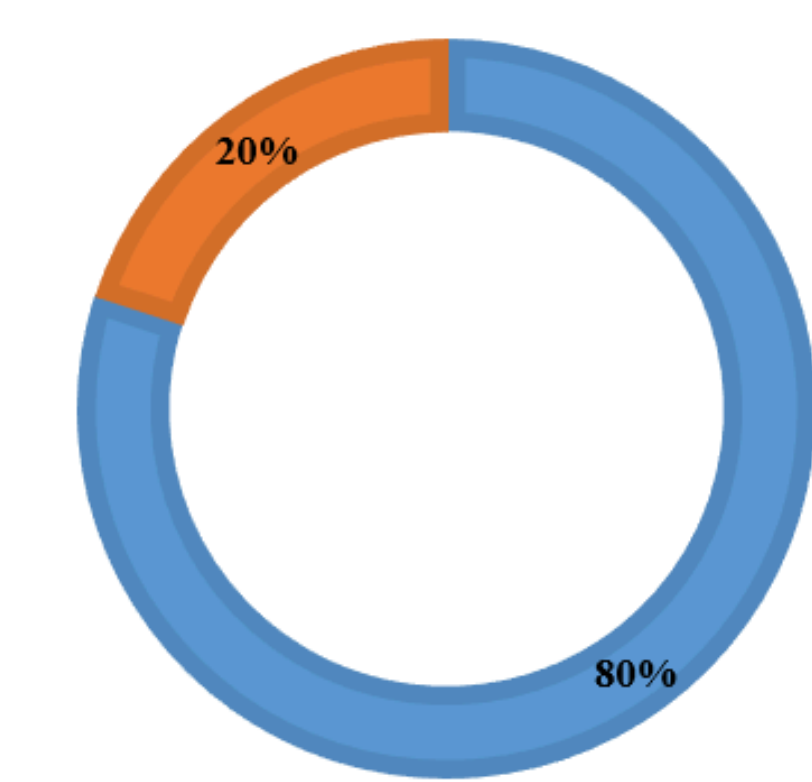
Sarando village survey results

"The flood is a revelation of the Facts from the Holy Writings..."

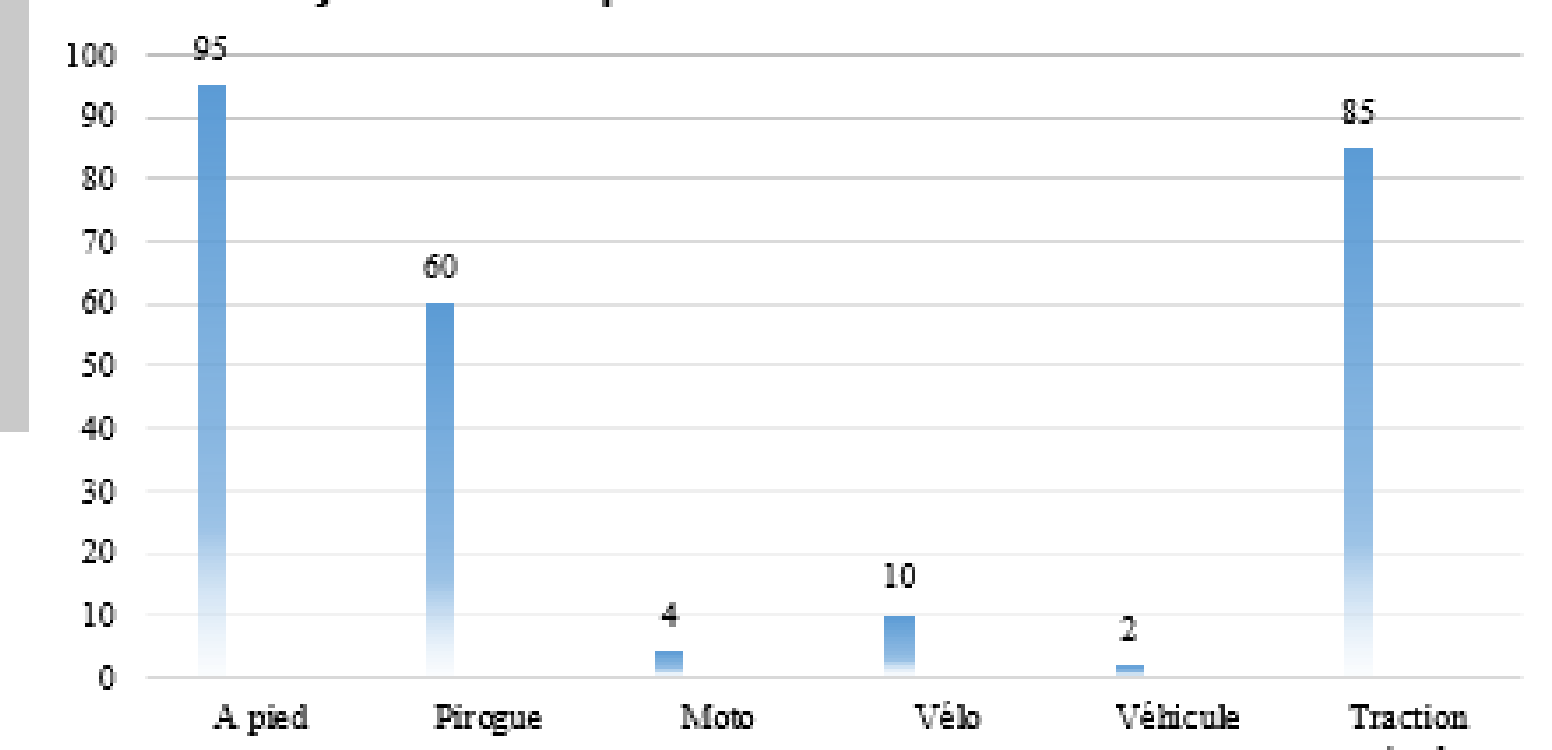
"There will come a time when God will purge the earth of its sins and evil through waves of floods, which is why these floods are frequent in our days and repetitive in recent years in different parts of the earth"

"If one year we find that there is a flood, it is certain that before these waves of floods come, a serious sin would surely have been committed by one of us... and we make a libation of animals as a sign of sacrifice and forgiveness to ward off the spell, and pray again for the forgiveness of our sins."

Distance between houses and the river



Moyens de déplacement Mode of transportation



CONTRIBUTION

We aim to contribute to how we can combine politics and engineering to propose sustainable solutions. In this simulation model, we have removed all the population settlements on this study area in order to analyze the water's performance.
The risk classes varied in the following decreasing order: No Risk > Low Risk > High Risk.
We found that the prevention of population from settling in the study area would lead to no risk of destruction of habitats, fields leading to the preservation of public infrastructure. The few risks that could occur would be higher in the area where the water spreads out of its normal major bed.

CONCLUSION

Remote sensing applied to flooding has made it possible, to know all the areas at risk of flooding and the different extends of damage. This has permitted the classification of risk zones in order to anticipate the installation of populations in these areas. The evolution of technology is an opportunity to be used in valorizing Geomatics as a decision-making tool. From the different impacts on the population to strategies for managing this crisis, it is urgent to develop more adequate policy in favor of protecting the population especially for those coming back to their former homes after a flooding event.