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USE OF HIGH-RESOLUTION IMAGES FROM UAV FOR FLOOD ZONE MAPPING

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OUTLINE

- Introduction
- Material and methods
- Results
- Conclusion

INTRODUCTION

Abidjan is subject to frequent flood events during each rainy season mainly due to climate change and human activities, (**Danumah, 2016**)

INTRODUCTION

Bonoumin watershed where the neighborhoods installed in the bottom of the valley have experienced major flooding since 1992, with water heights varying between 100 and 200 cm

(Kangah & Alla, 2015)

INTRODUCTION

GENERAL OBJECTIVE

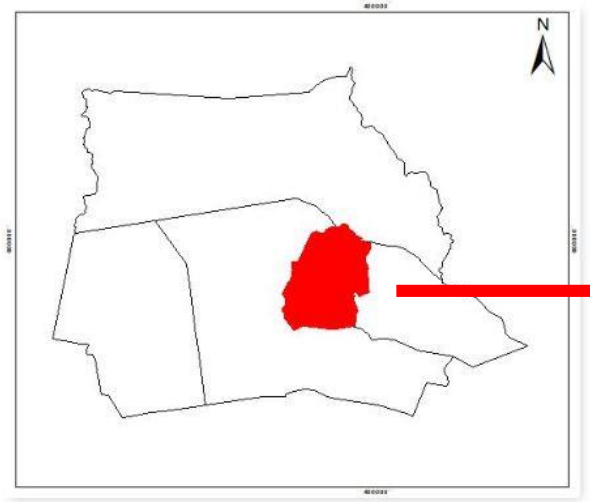
Mapping flood risk in Bonoumin Watershed using very high resolution imagery

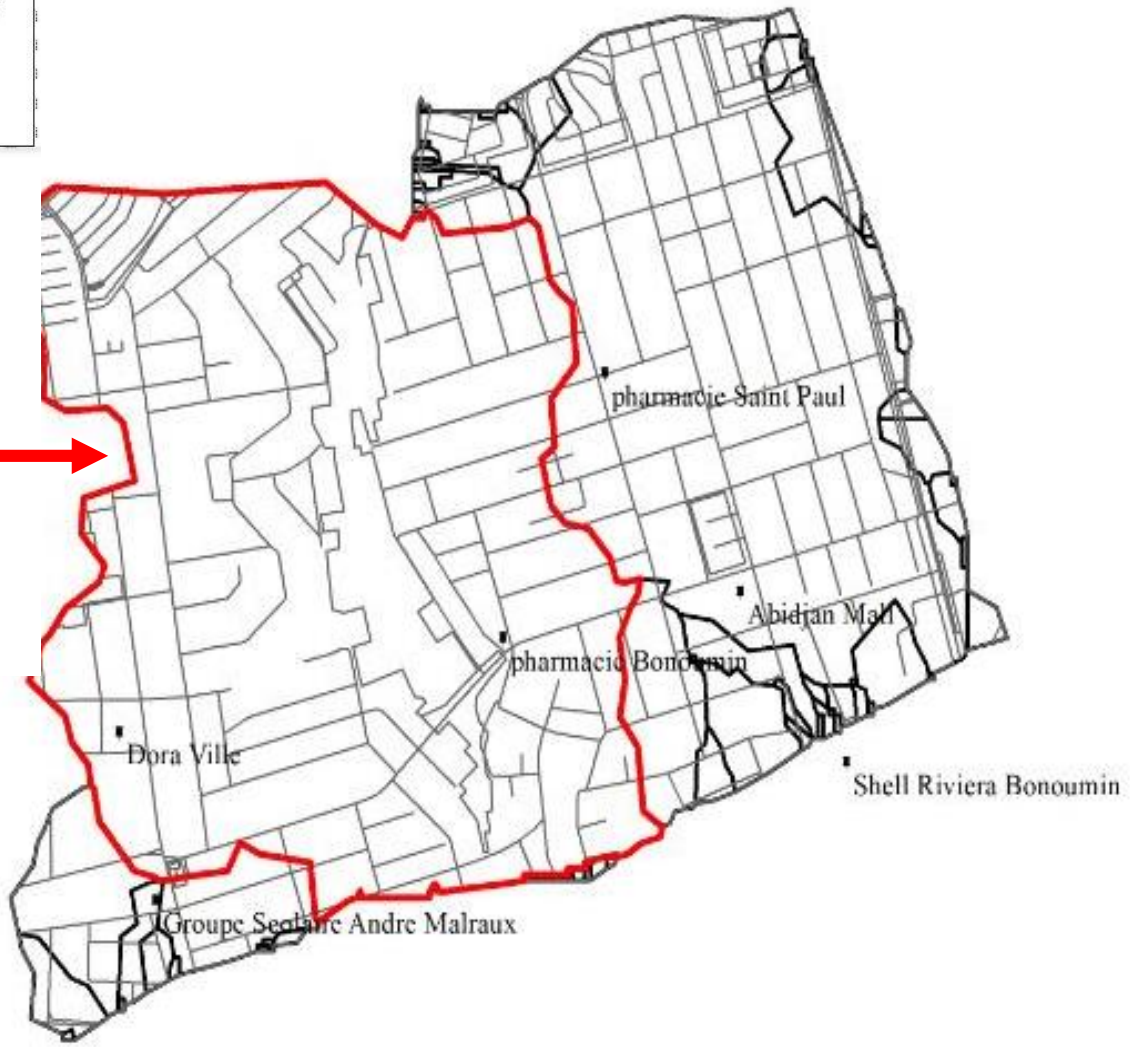
SPECIFIC OBJECTIVES

OS 1 : Map Bonoumin Watershed based on Unmanned Aerial Vehicle (UAV) dataset

OS 2 : Assess vulnerability and hazard indicators for floods risk extent

Material and methods





LOCATION

Abidjan, commune de Cocody

Area

3 km²

- Equatorial climate, hot and humid
- Very high population density (3 387 inhbts./km²)

Material and methods

Satellite images

- Sentinel 2A du 15/01/2020
- MNA (Alos Palsar) du 2 september 2007

UAV images

1124 image acquired on 03/08/2020

- Orthoimage de résolution ≈ 3 cm
- MNA ≈ 3 cm

Material and methods

UAV vehicle

- Drone DJI Phantom 4 RTK
- Base station D-RTK 2

Matériel et méthode

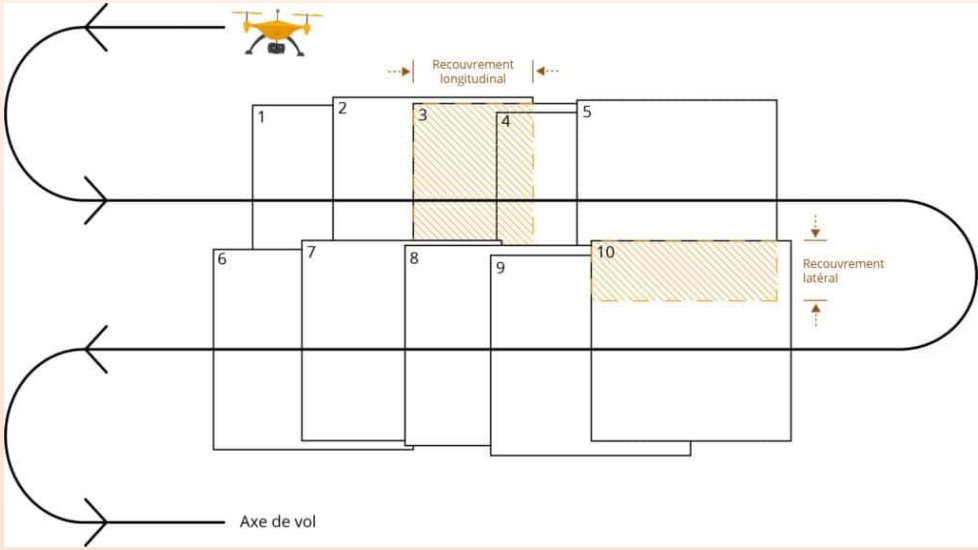
Software

Material and methods

Planning mission

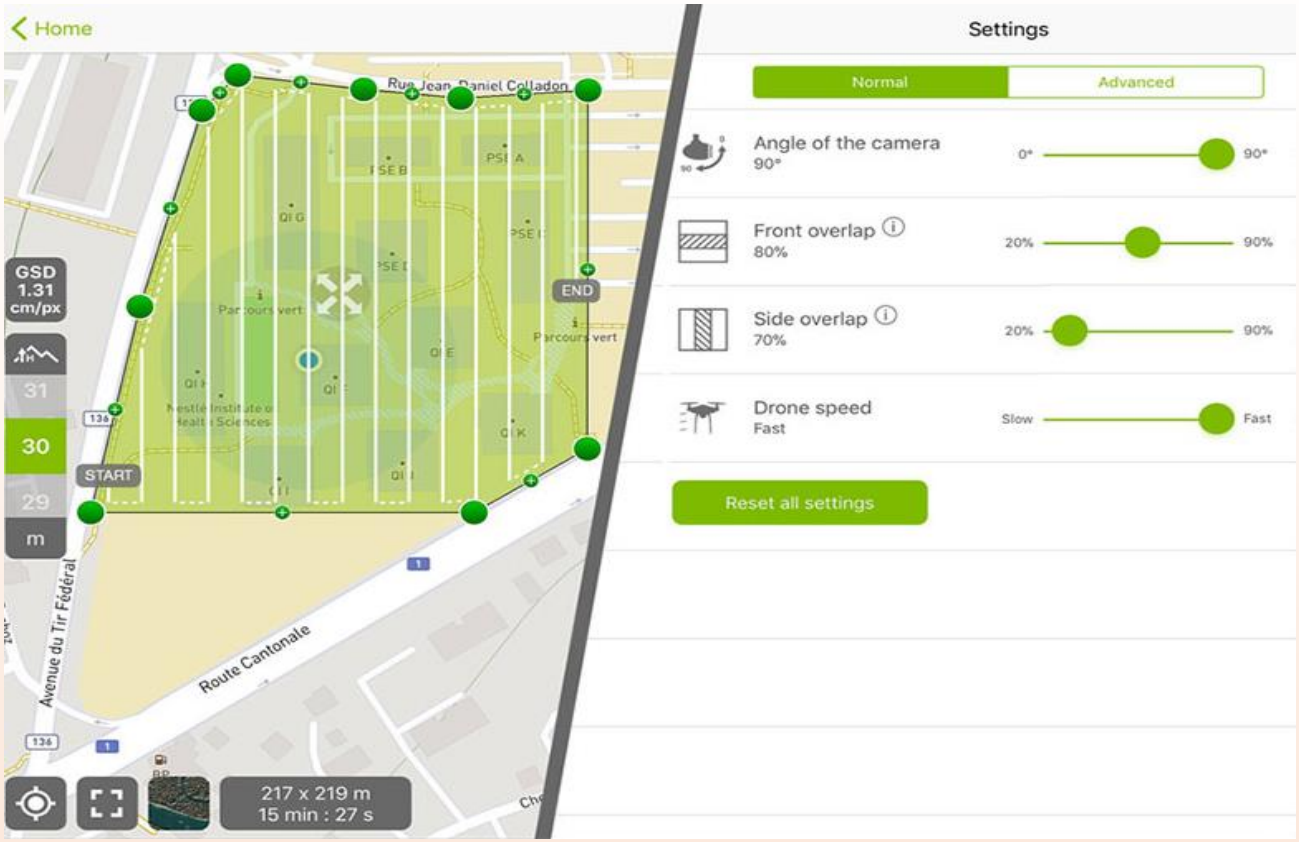
To perform a photogrammetry treatment, we must use a multitude of georeferenced photos that overlap one another.

To ensure the quality of these photos, it is important to define the different parameters of our flight plan, such as **altitude** and **overlap**.



Matériel et méthode

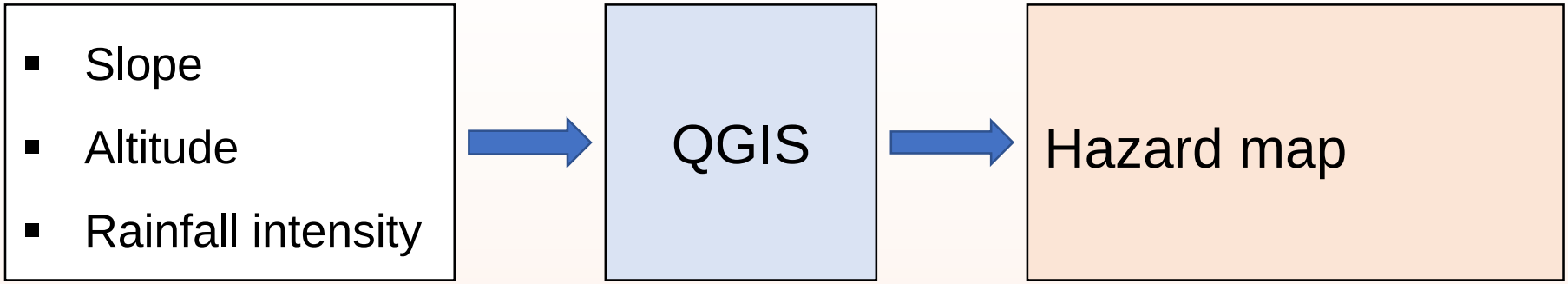
Planning mission



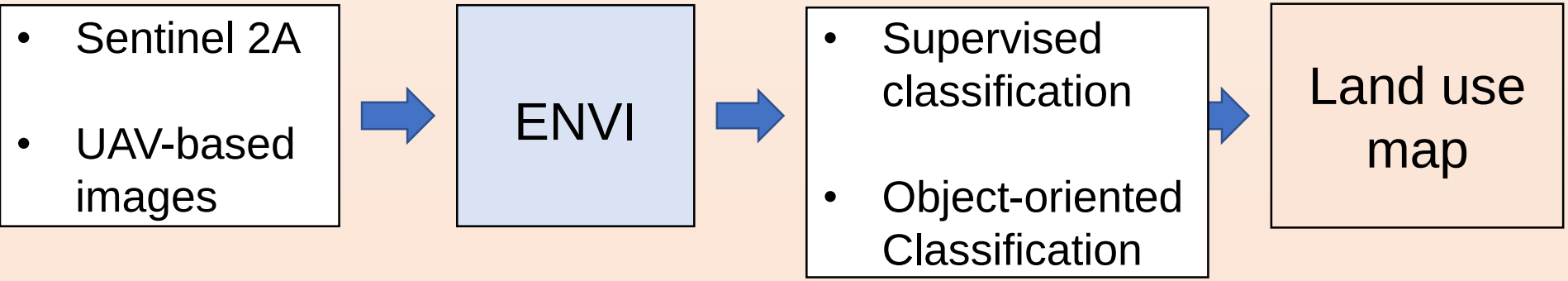
Paramètres du Plans de Vol	Valeurs
•Altitude	100 m
•Recouvrement latéral	70%
•frontal des images	80%
•Angle de vue de la caméra	90°
•Vitesse du drone	Moyennent Elévée

Material and methods

Mapping Flood Hazard



Mapping Flood Vulnerability



Matériel et méthode

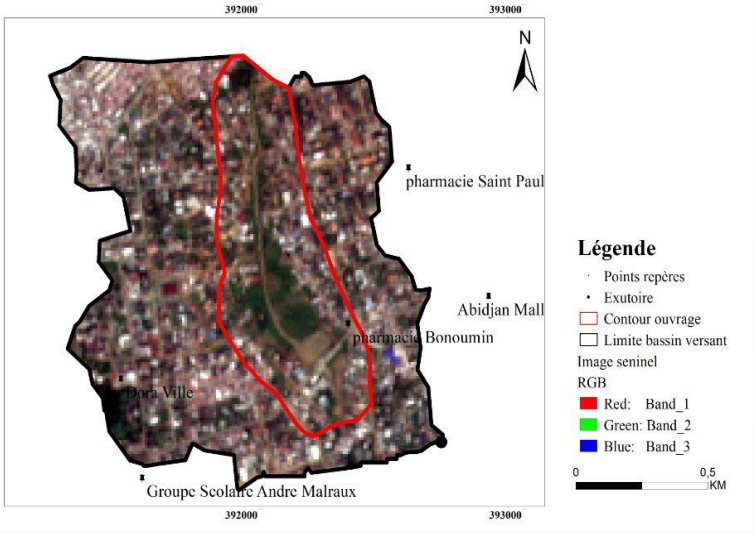
Mapping flood risk

$$\boldsymbol{Risk = (hazard \times vulnerability)}$$

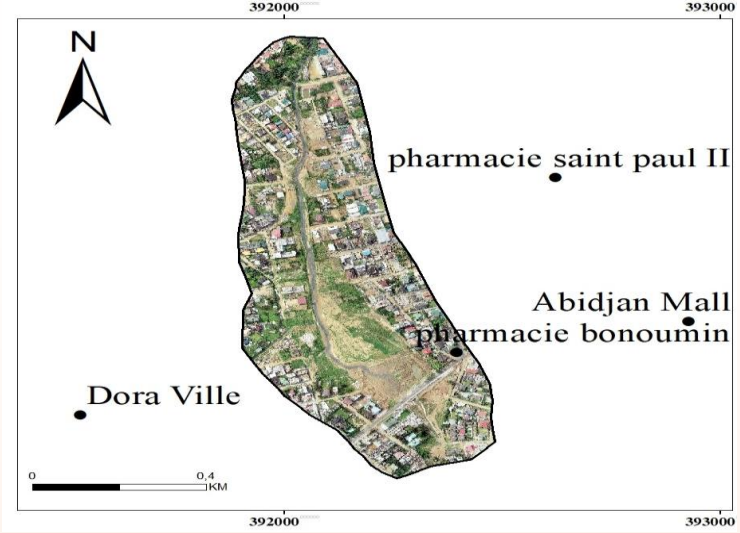
For the elaboration of the maps related to the flood, ratings was attributed to the selected factors

Analytic Hierarchy Process (AHP) multicriteria analysis (Saaty, 1980)

Results

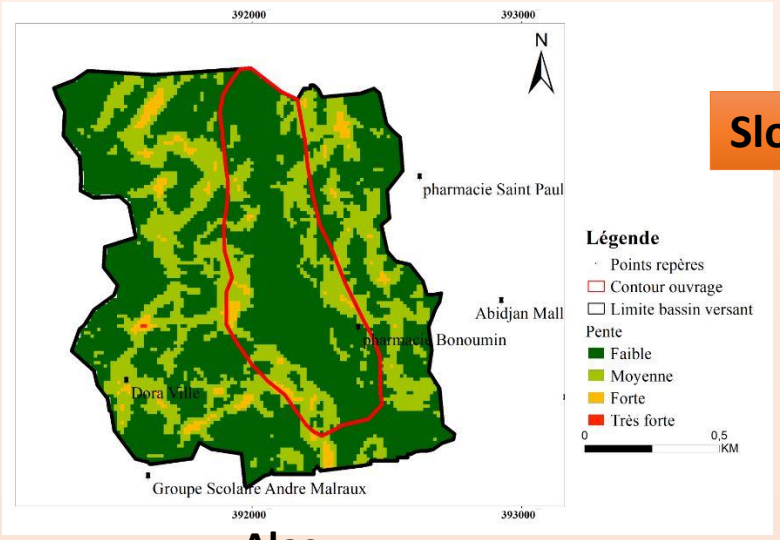


Orthophoto sentinel 2A

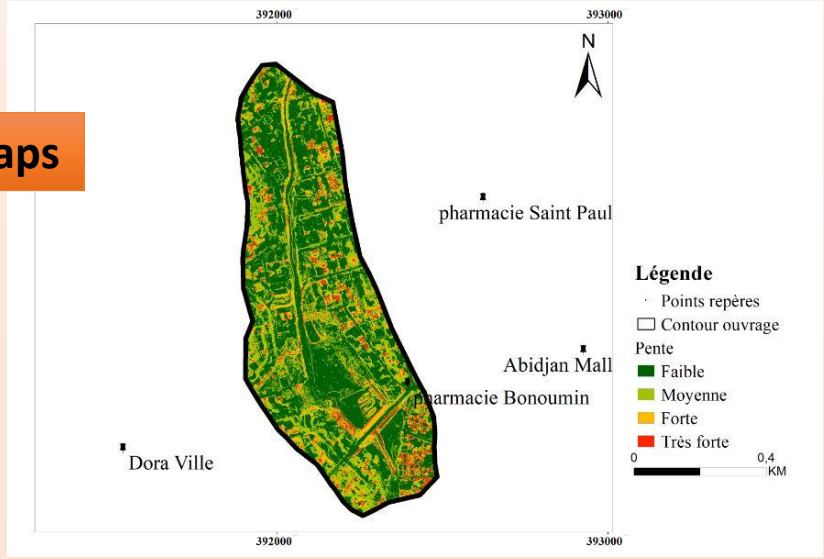


Ortho-photo UAV

Slope maps



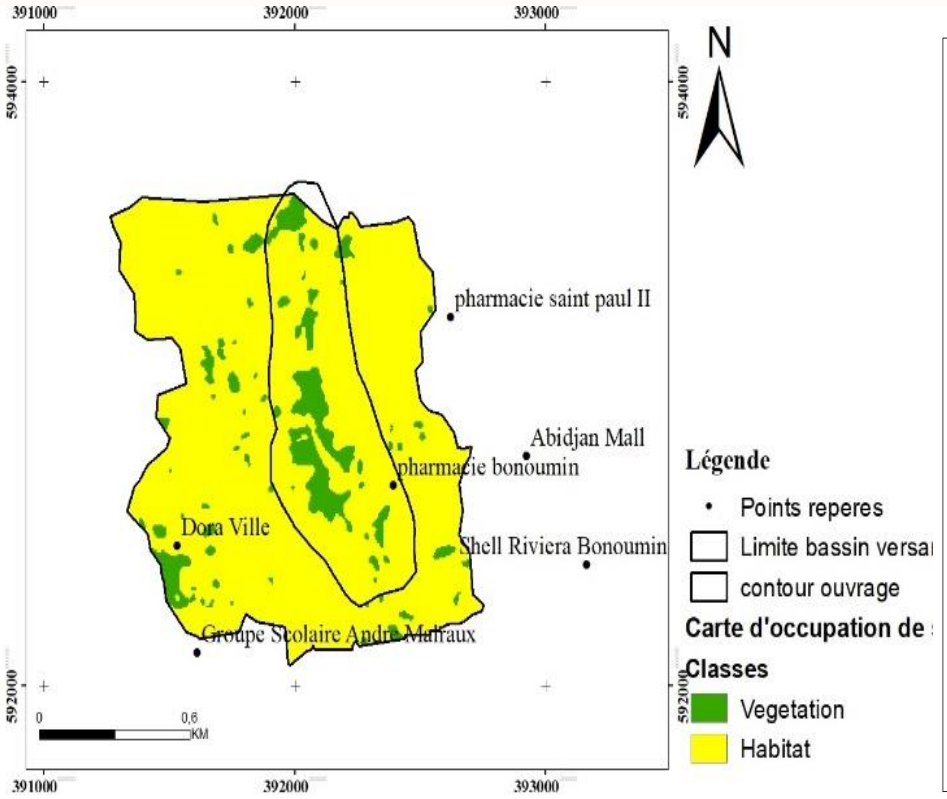
Alos



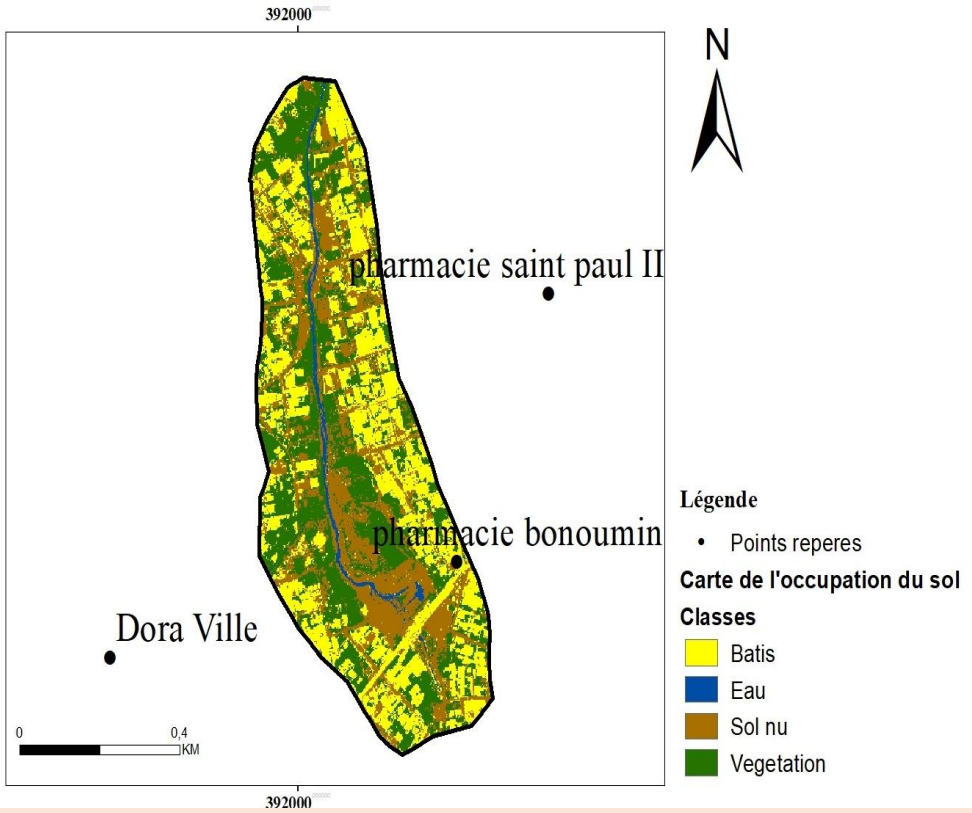
UAV

Results

Land use map



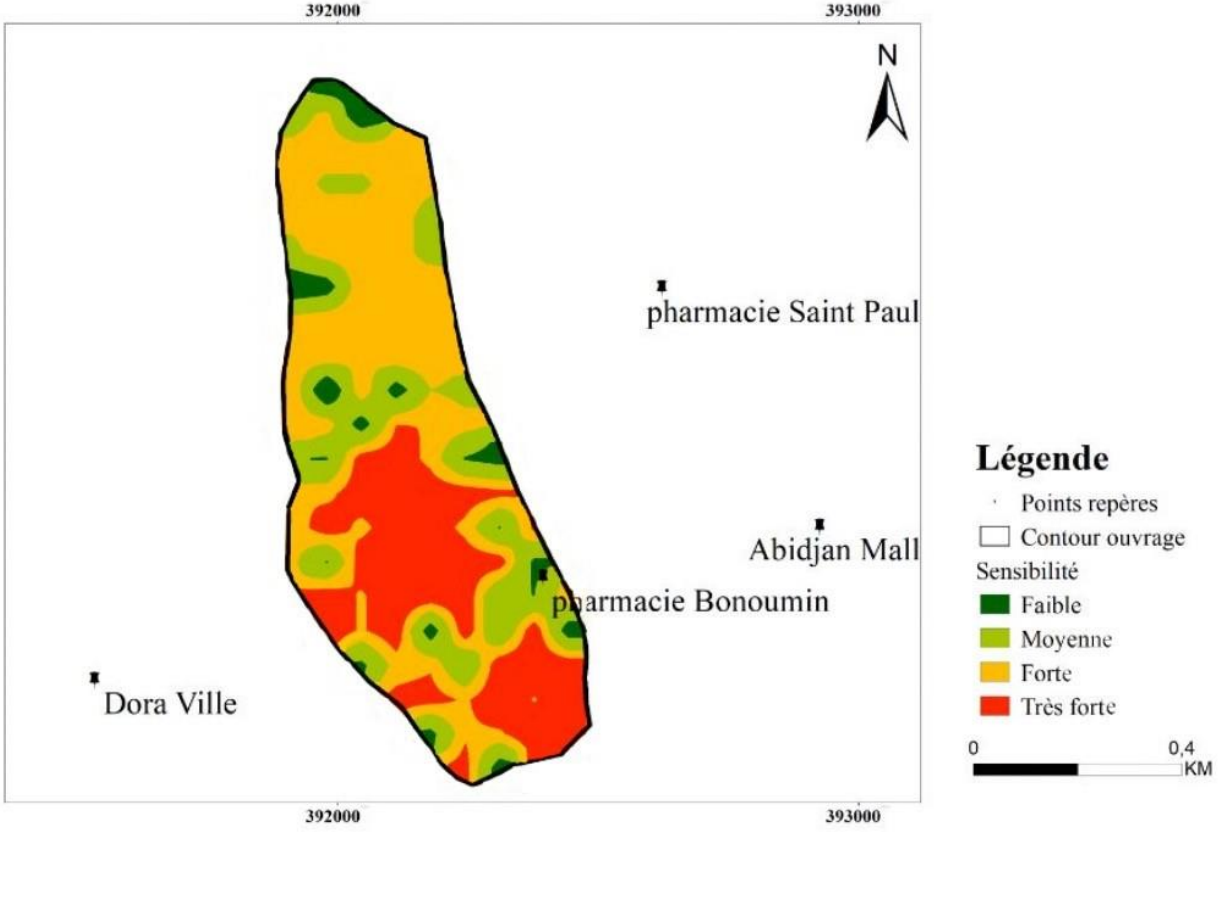
Sentinel 2A



Uav

Results

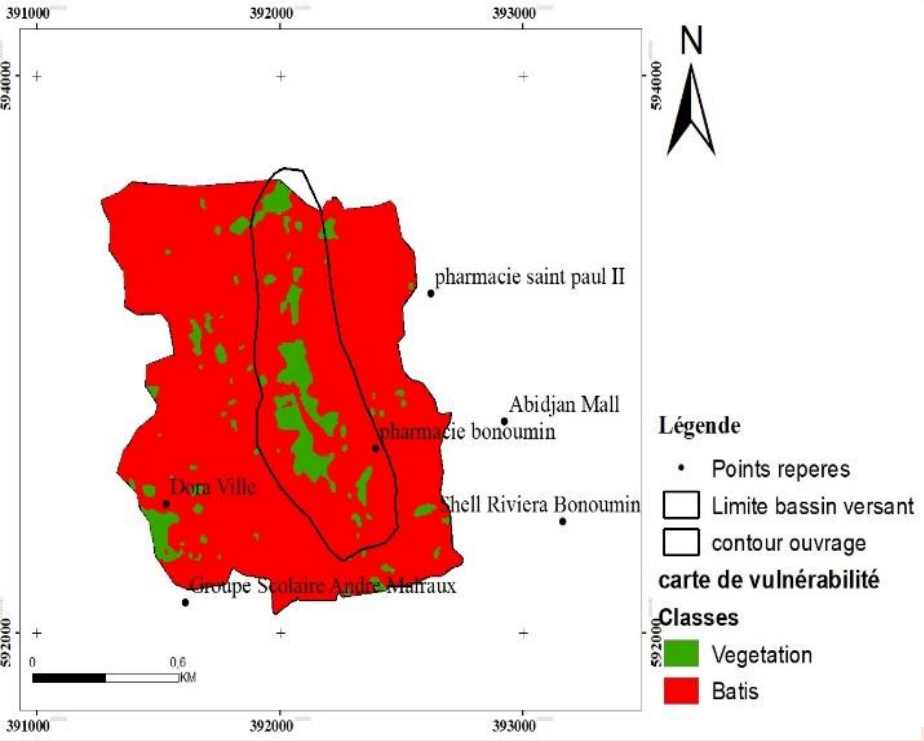
Hazard map



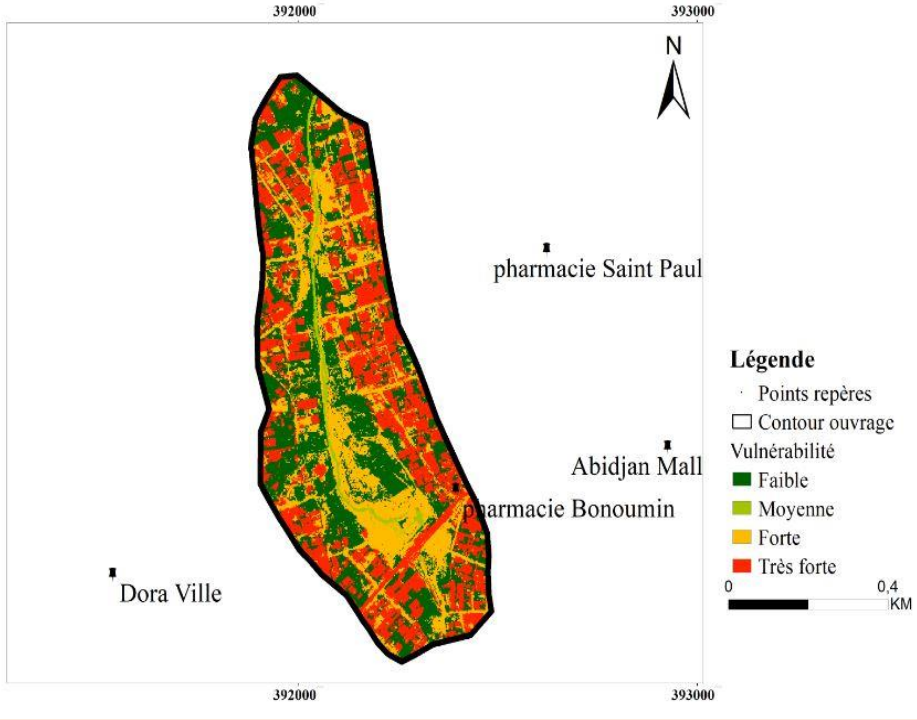
- 75% of the area is under high sensitive to flood

Results

Vulnerability map



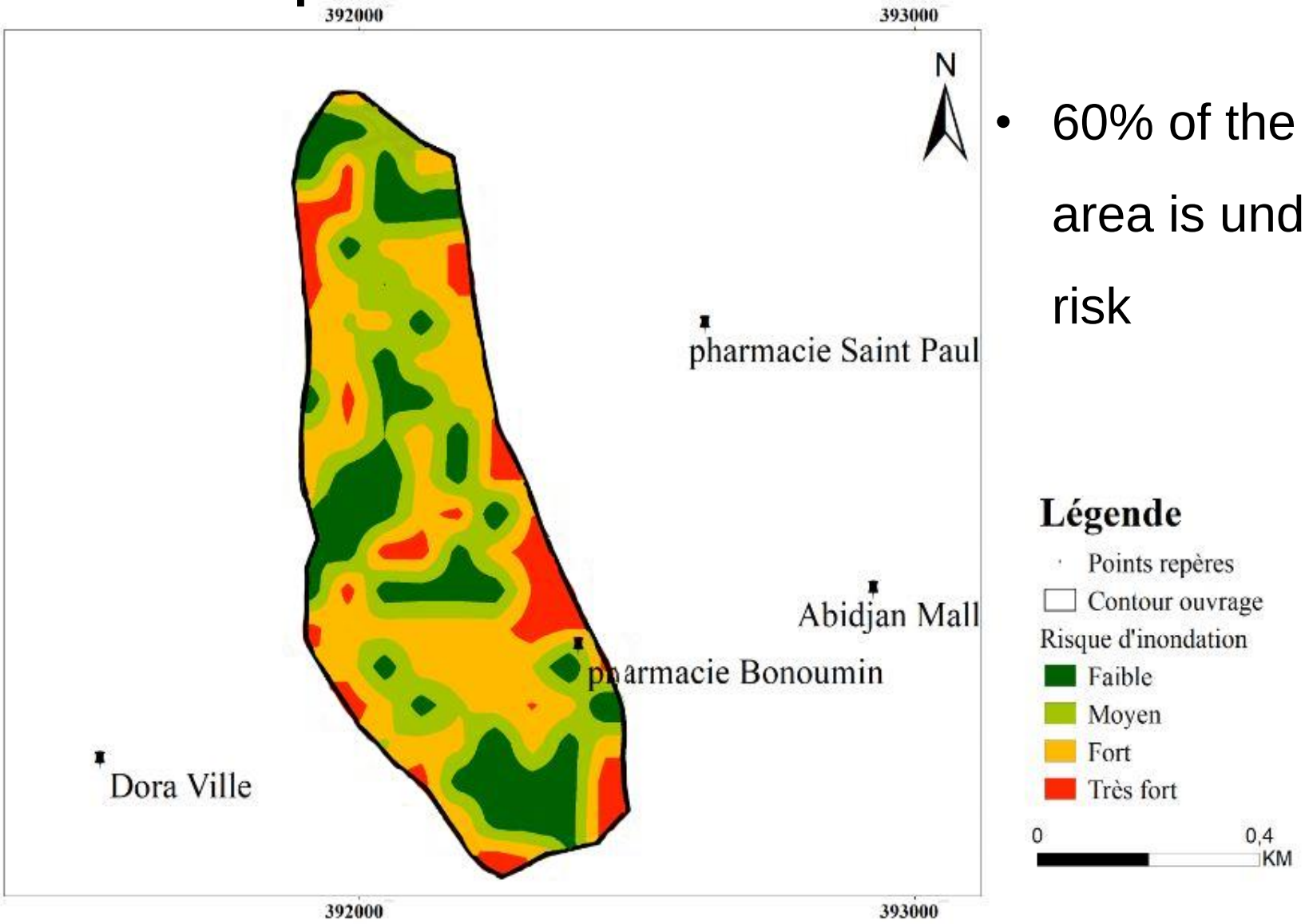
High = 90%



High = 60%

Results

Flood risk map



- 60% of the study area is under high risk

Conclusion

- The combination of satellite data, digital elevation model (DEM) and UAV images allowed the mapping of flood risk areas in the Bonoumin watershed.

- Areas under high and very high risk of flooding cover about 60% of the watershed

THANK YOU