

# Flood risk assessment and mitigation measure for Rioni River.

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# Objectives and research questions



The main objectives:

- I. Estimate flood hazard for Rioni River**
- II. Determine the effect of different mitigation measure.**

Sub-objectives:

- 1. Hazard assessment for the region using hydrodynamic modelling.*
- 2. Flood hazard for different mitigation measures.*

# Study area



The investigated region is situated in the western part of Georgia, in the Rioni River delta. Four municipalities share the Rioni River delta within the area of our interest: Khobi, Senaki, Lanchkhuti and Poti regions with port city Poti. This is the populated region with developed infrastructures.

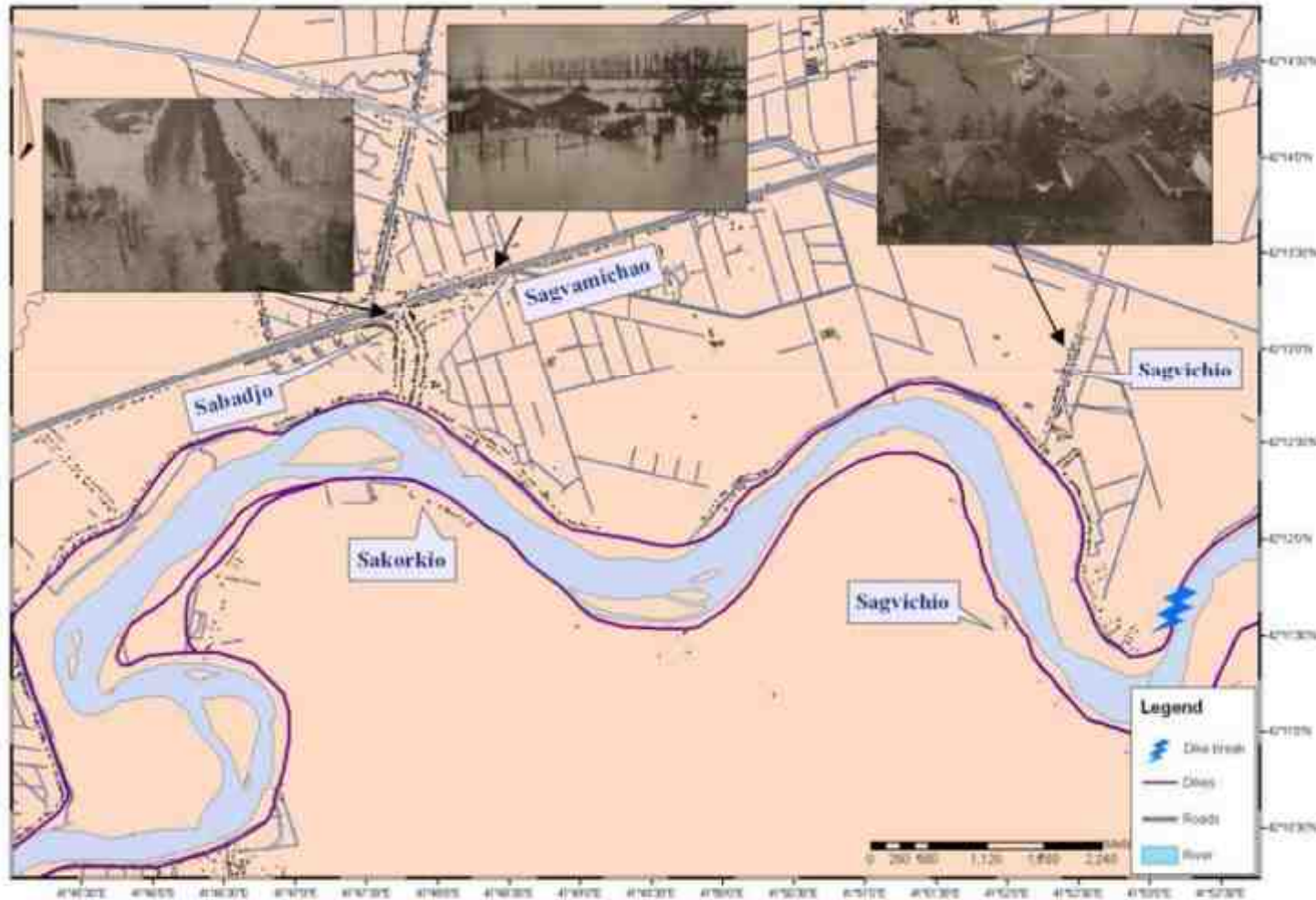
# History of the region



During the centuries, Kolkheti lowland has been covered in marsh. At the beginning of the last century, the plan of draining the swamp area had been developed. The project was initiated in 1920 and finished in 1938.



# Analysis mask



# Data and Methods



## **Elevation data:**

Topomaps of different scale

## **Areal images and cadastral data:**

1. Hydrological network of the area (rivers, channels).
2. Buildings (industrial, private, residential).
3. Land parcels (private, public).
4. Land cover and land use (forest, wetlands, fields, pastures).
5. Infrastructure of the area (main roads, railway, country roads and tracks).

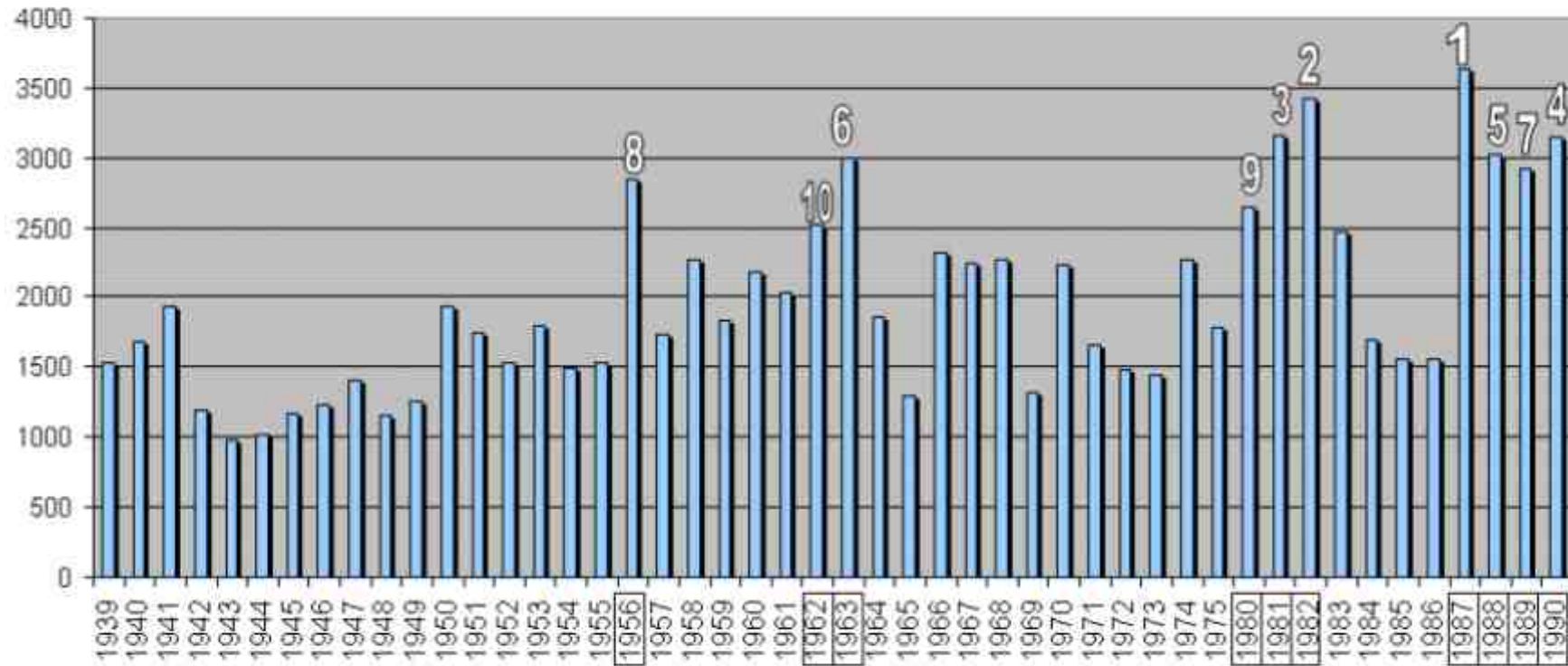
## **Hydrological data:**

- I. 1980 – 1990 discharge daily measurements. Appendix 1 a.
- II. 1939 – 1976 maximum annual water discharge. Appendix 1 b.

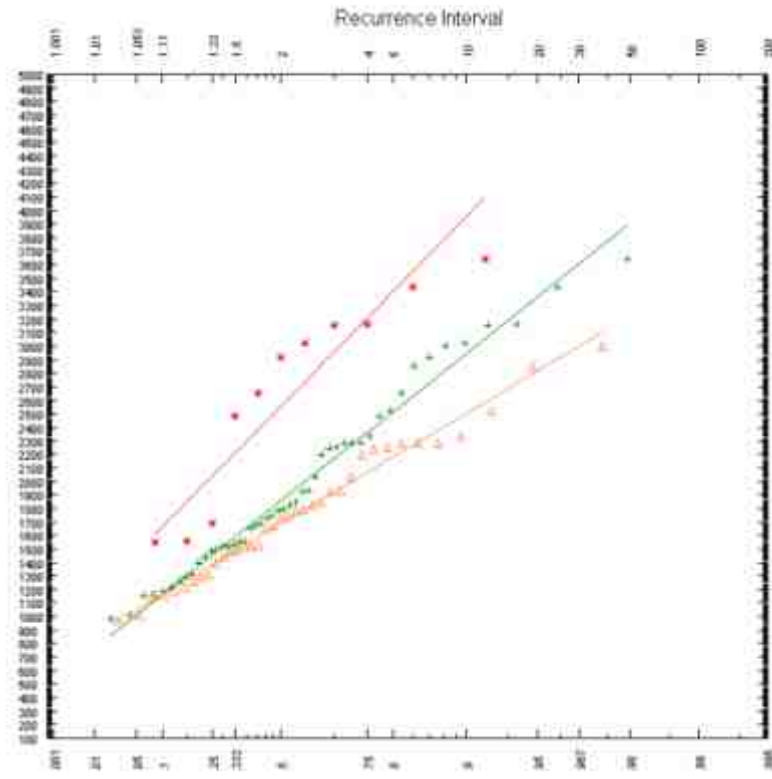
# Data and Methods



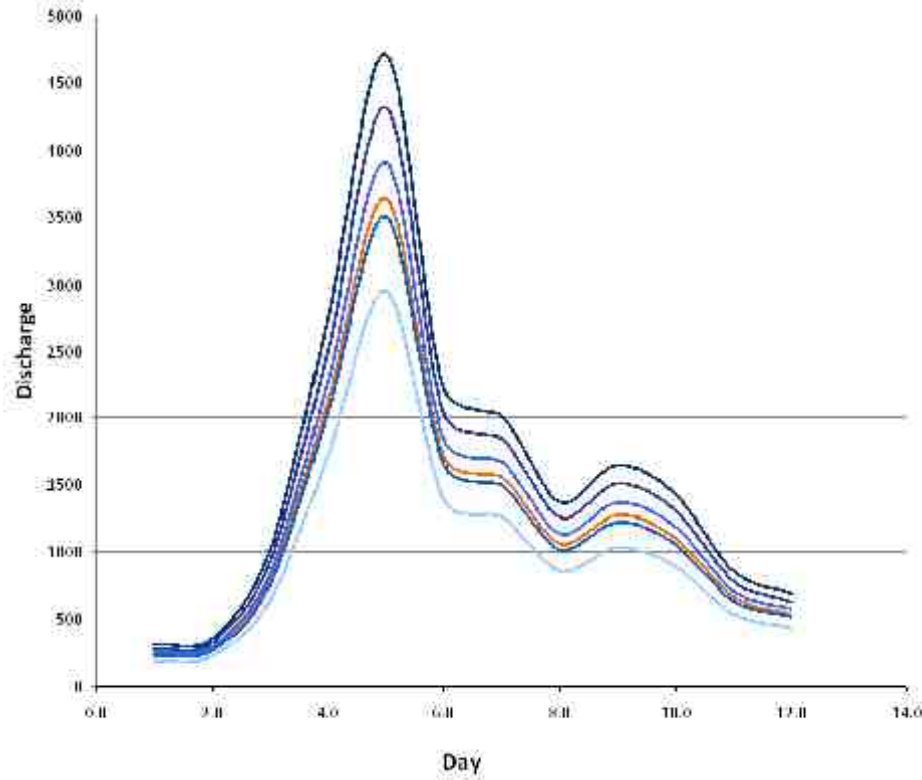
Rioni River anual peak discharge (1939-1990)



# Magnitude frequency relationship



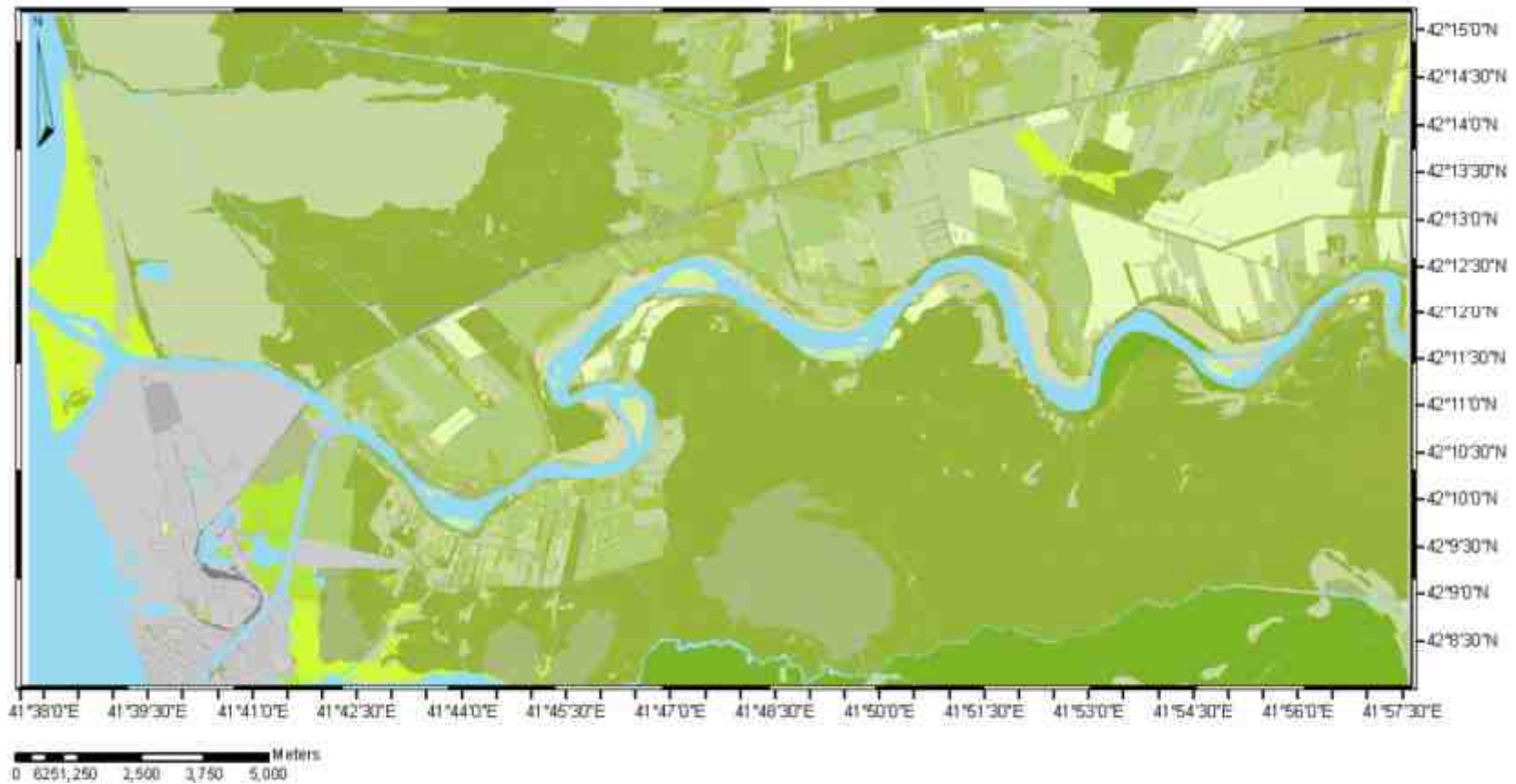
+ Discharge m<sup>3</sup>/s (1939-1990)   
 △ Discharge m<sup>3</sup>/s (1939-1975)   
 \* Discharge m<sup>3</sup>/s (1980-1990)





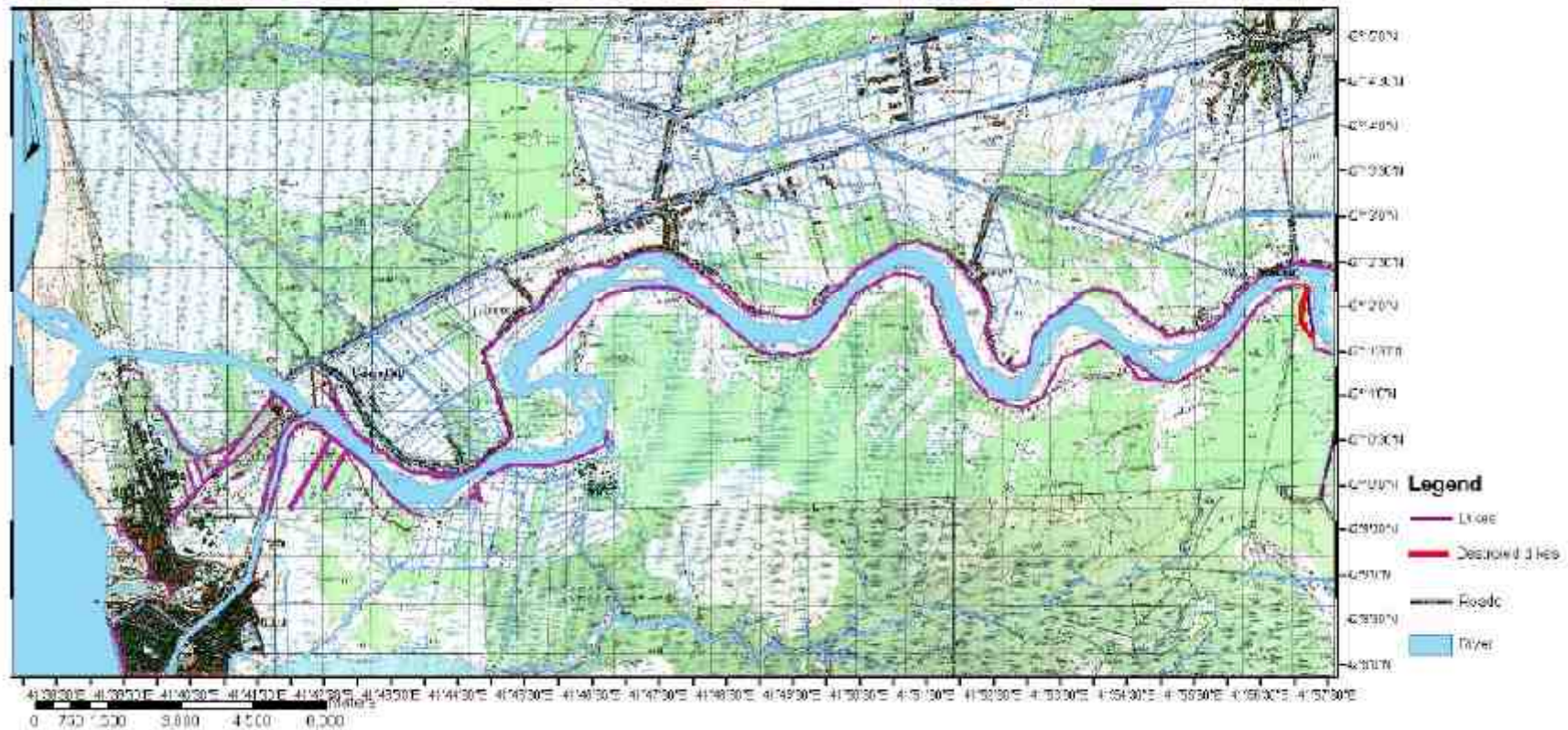
# Data and Methods

## Roughness coefficient



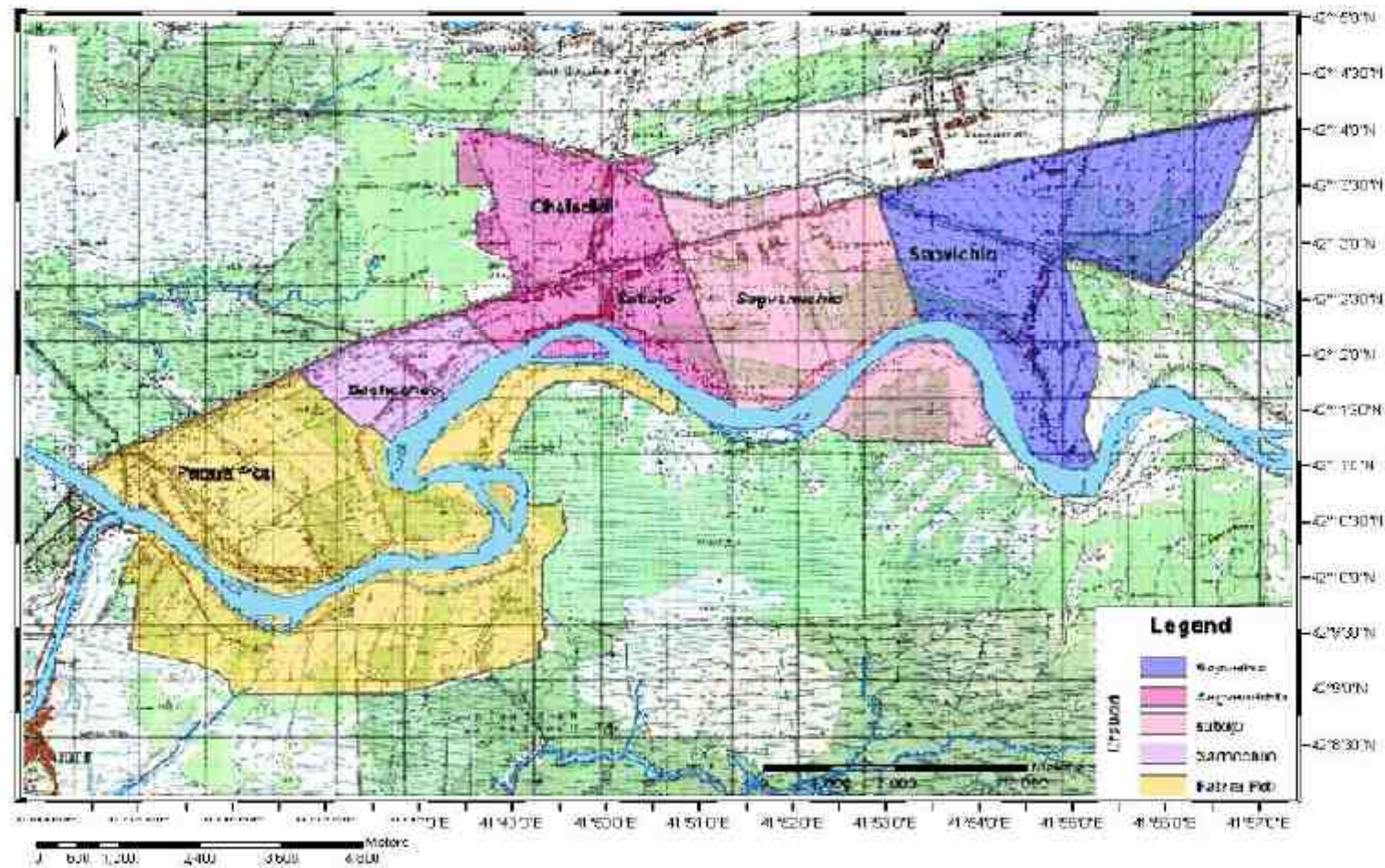
# Data and Methods

## Riverbed profiles and dike break location:



# Data and Methods

## Field work



# Data and Methods

## Field work



# Data and Methods

## Field work

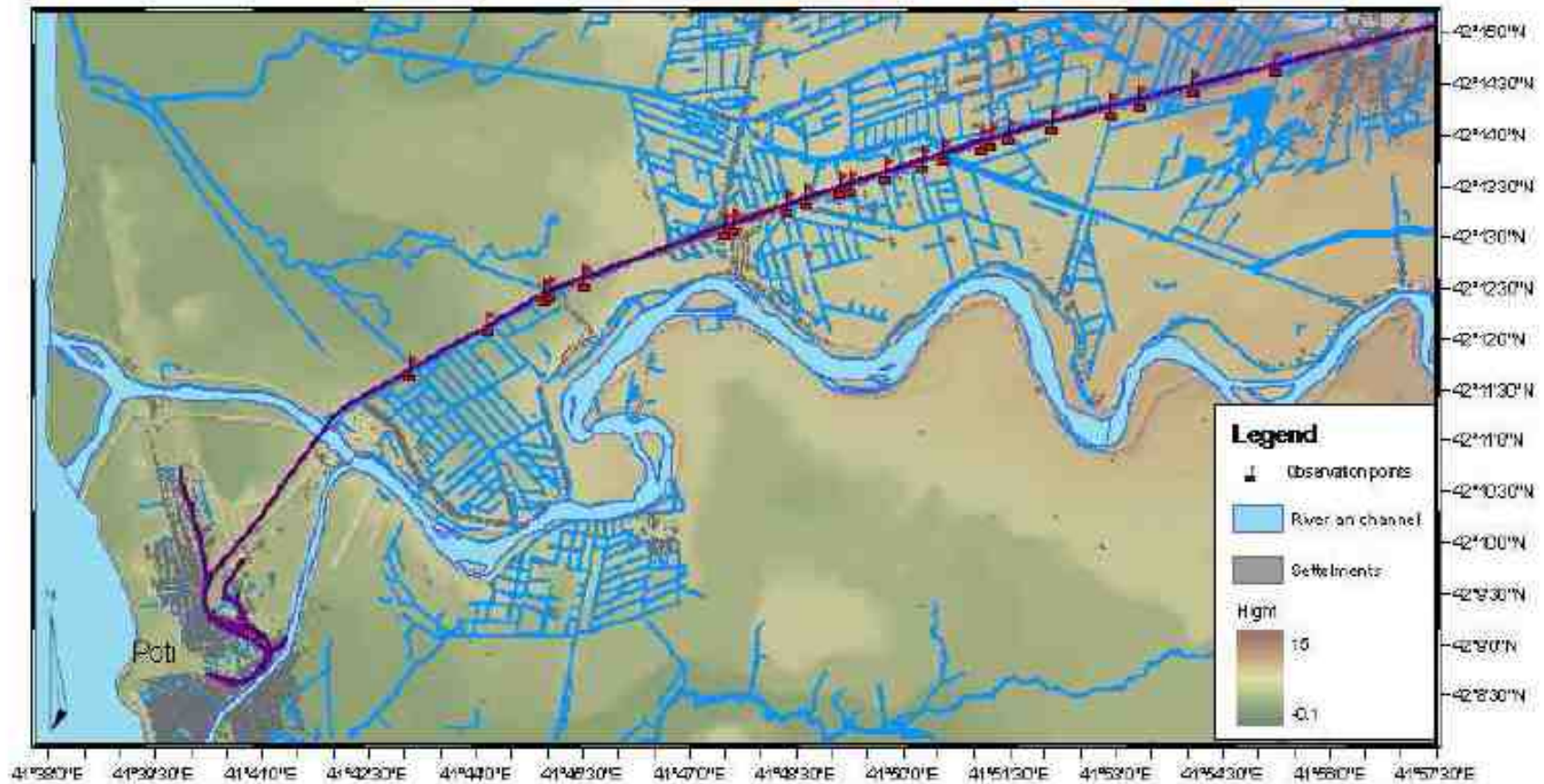


# Data and Methods



## Field work

OBSERVED POINTS FOR MAIN ROADS AND RAILWAY



# Generation of digital terrain models for flood simulation



ESTIMATION OF DIKE'S HEIGHT USING CROS SECTION DATA



# Flood modeling SOBEK

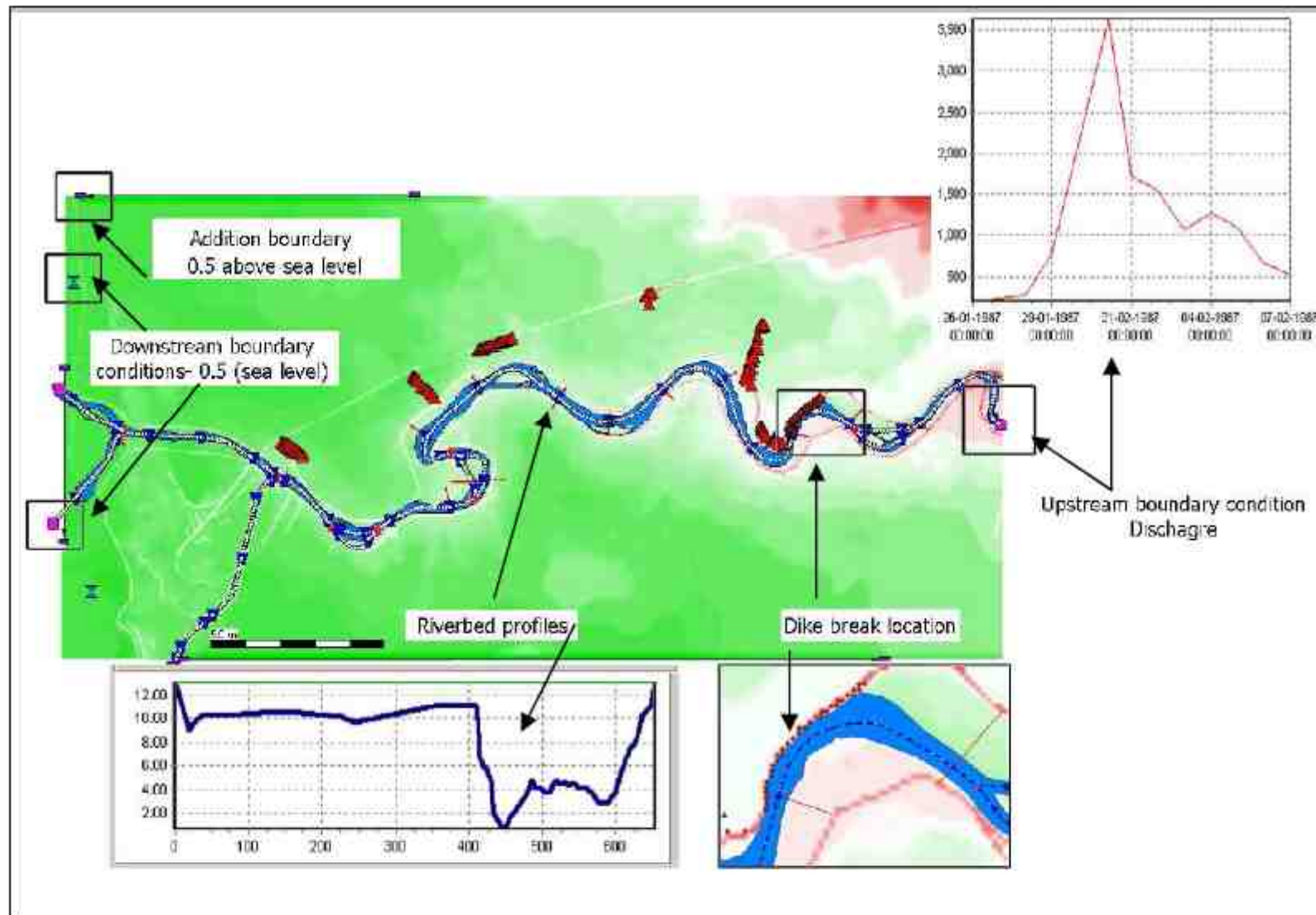


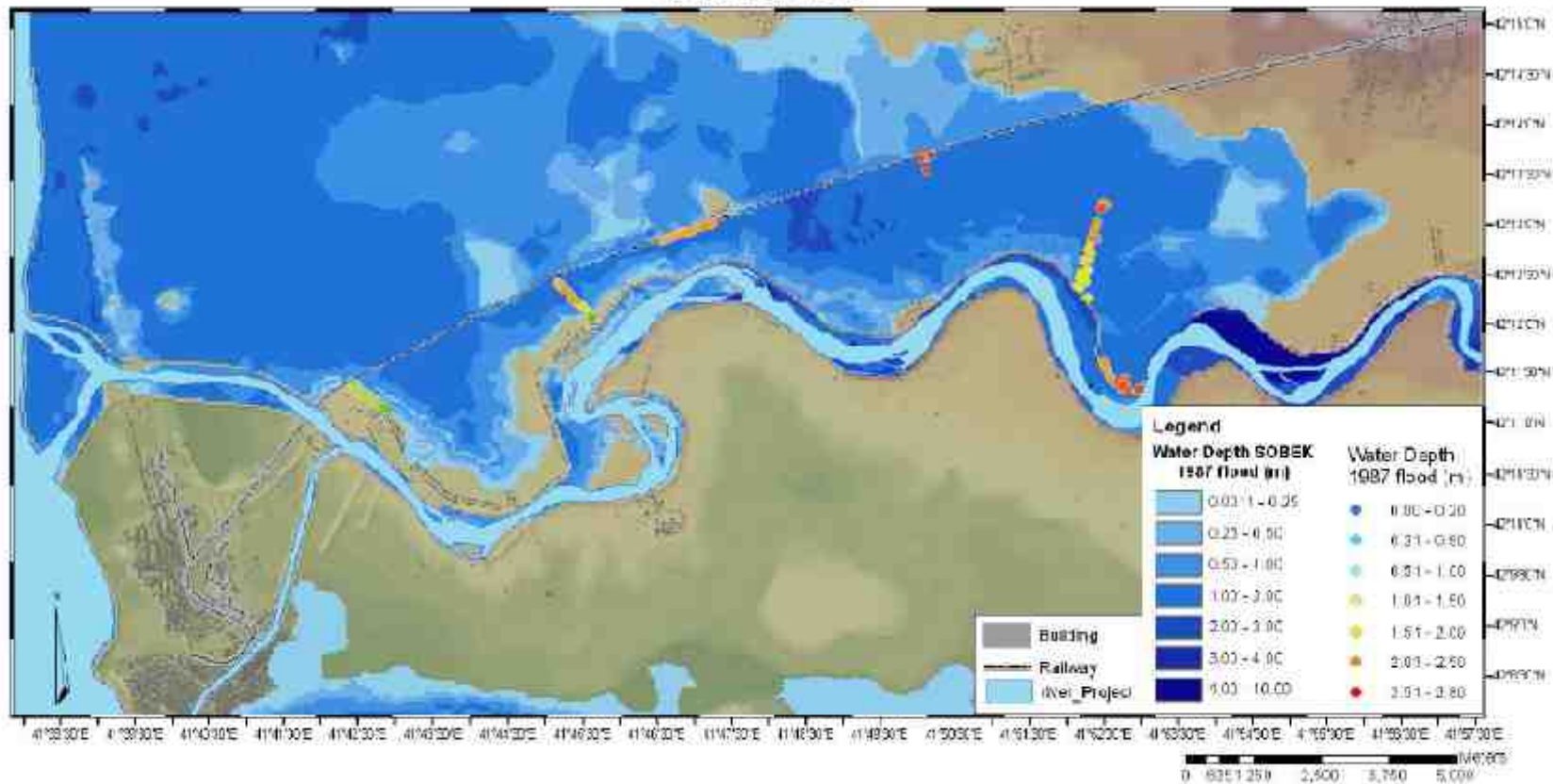
Figure 4.1 SOBEK model schematization used for calibration 1987 event



# 1987 Y. FLOOD MODELING



Maximum Water Depth Map for 1987 Flood  
SOBEK vs PGIS



# Flood hazard assessment



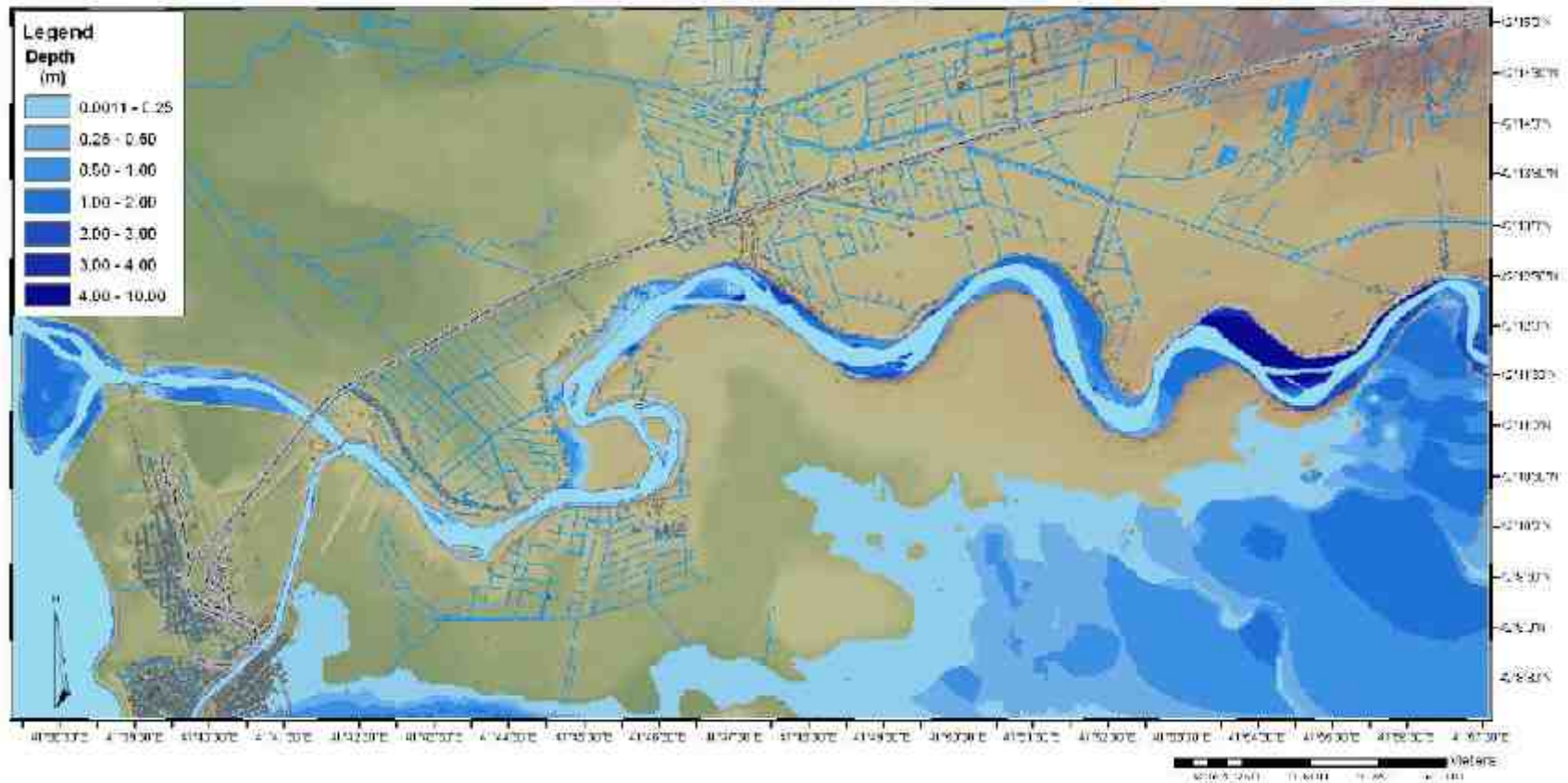
Flood Depth Map for Current Situation  
0.1 probability



# Flood hazard assessment



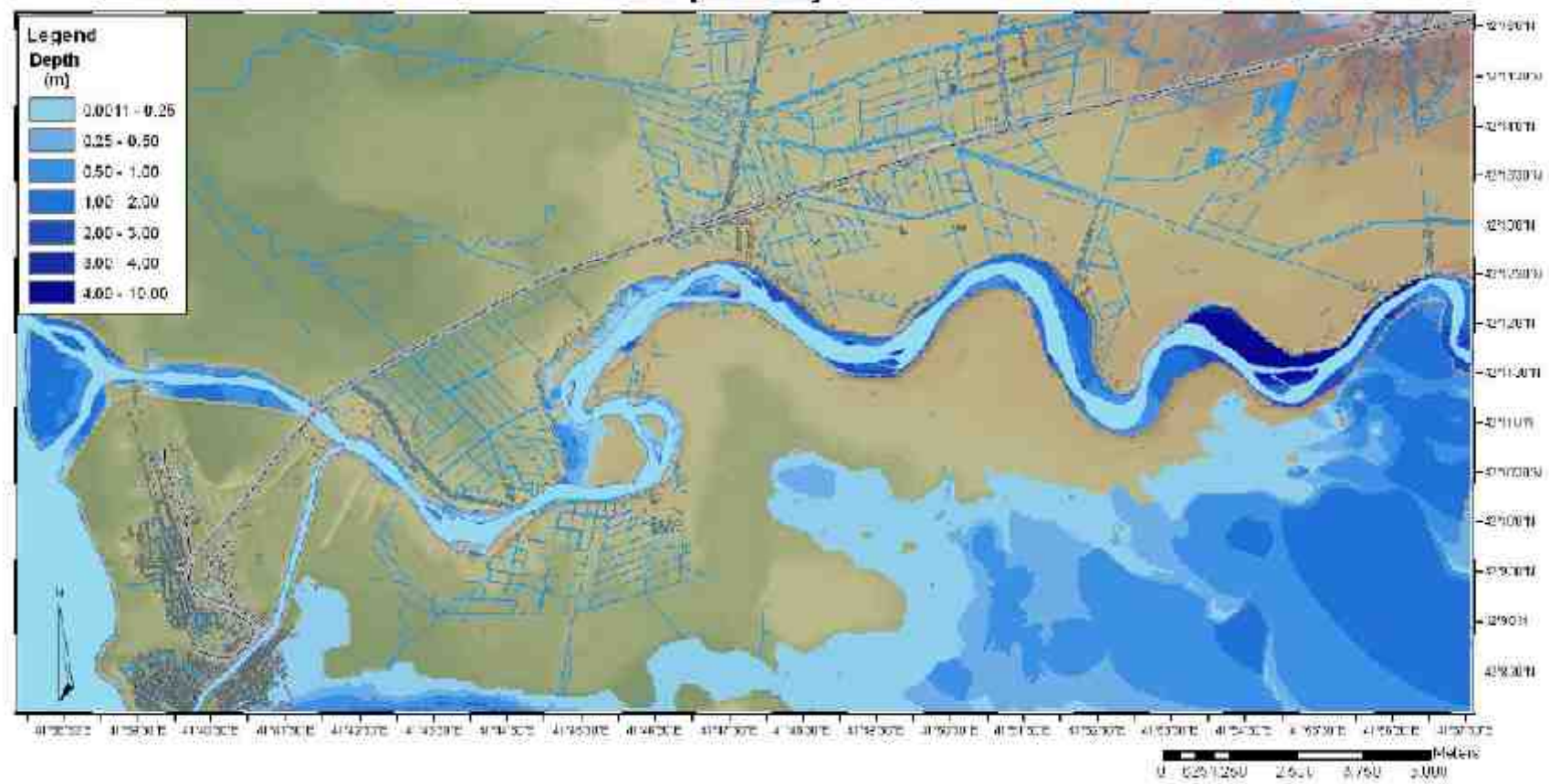
Flood Depth Map for Current Situation  
0.04 probability



# Flood hazard assessment



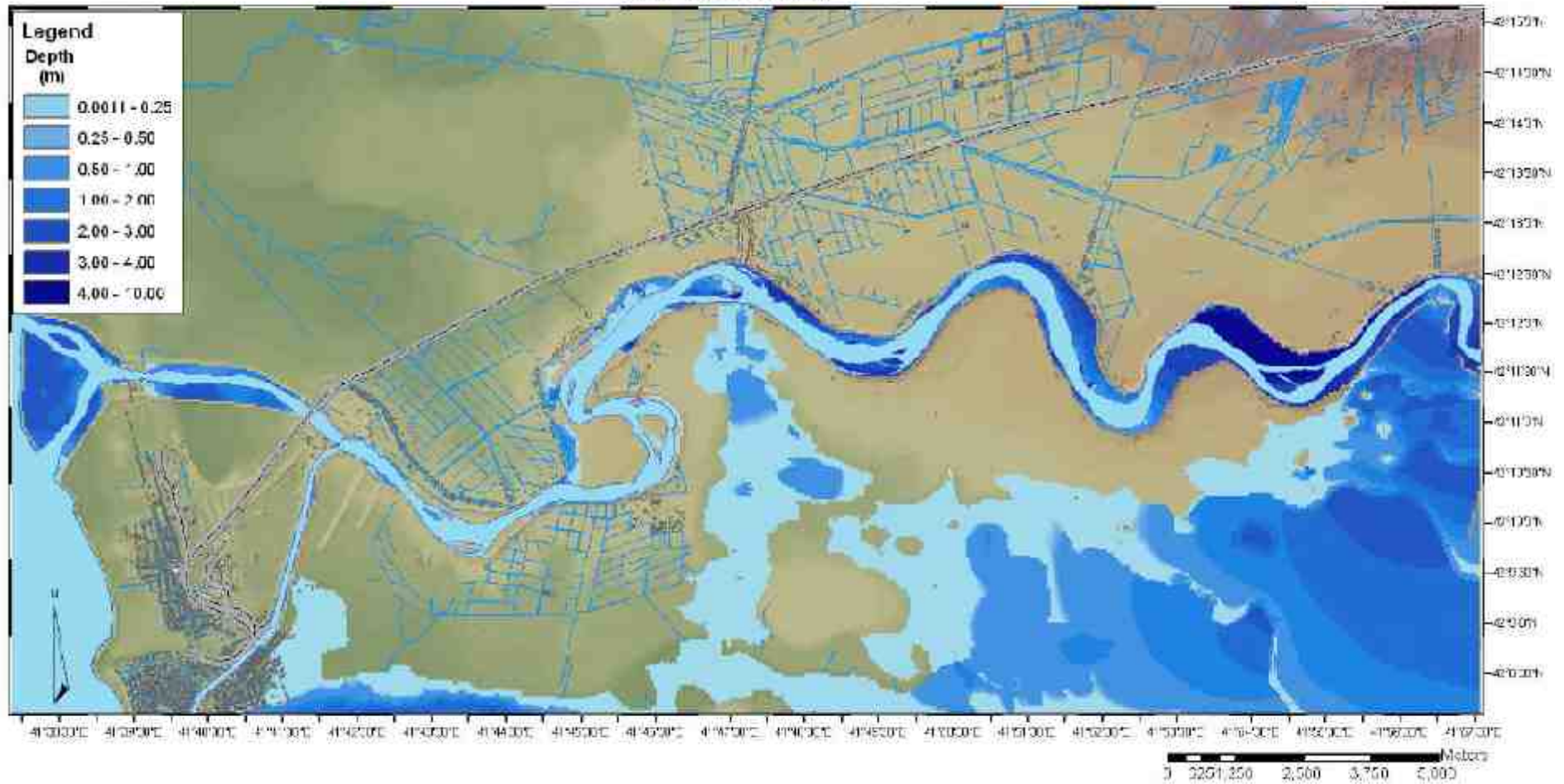
Flood Depth Map for Current Situation  
0.02 probability



# Flood hazard assessment

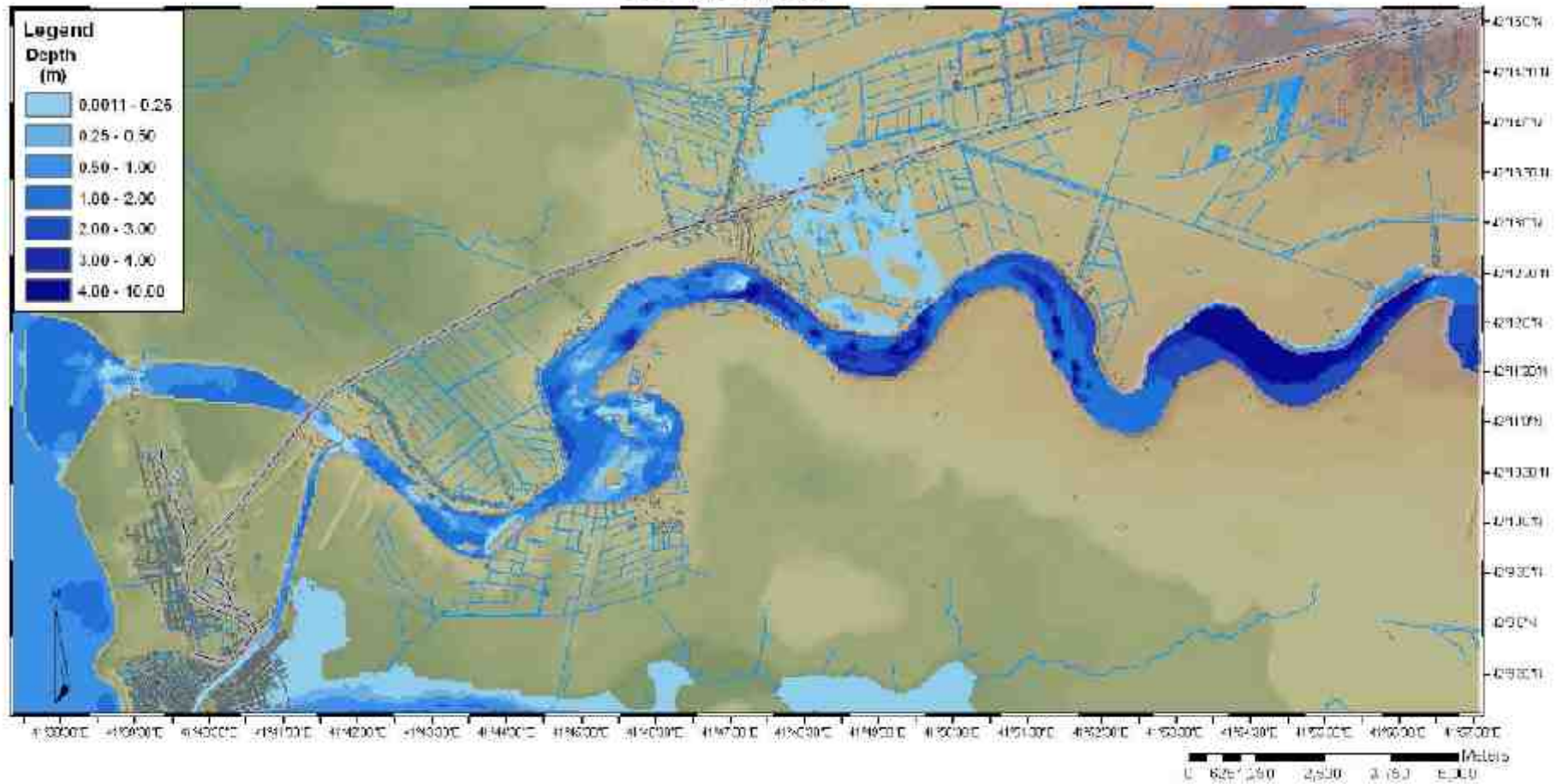


Flood Depth Map for Current Situation  
0.01 probability



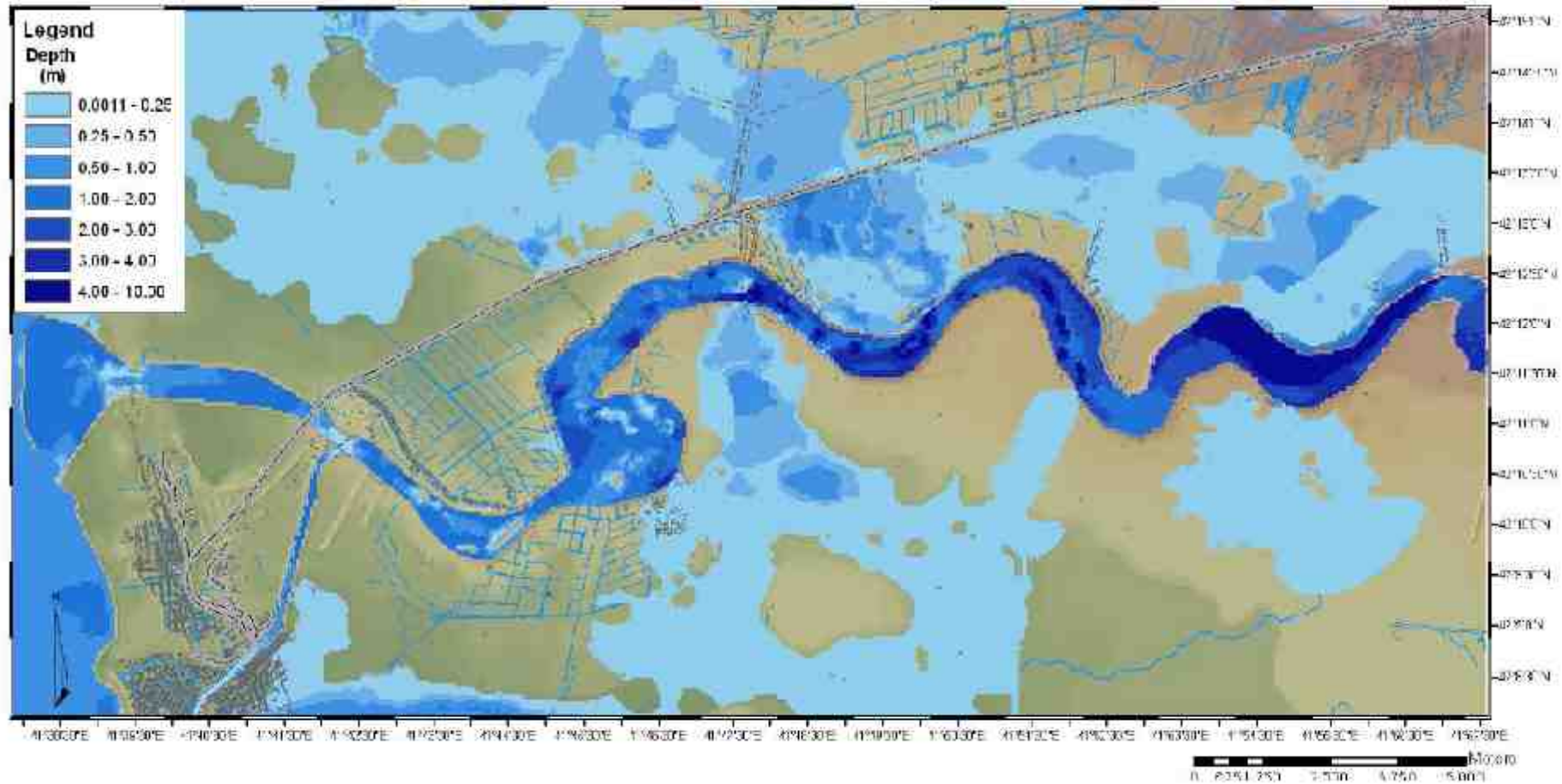
# Mitigation measure

Flood Depth Map for Reconstructed Dikes (Initial Height)  
0.02 probability



# Mitigation measure

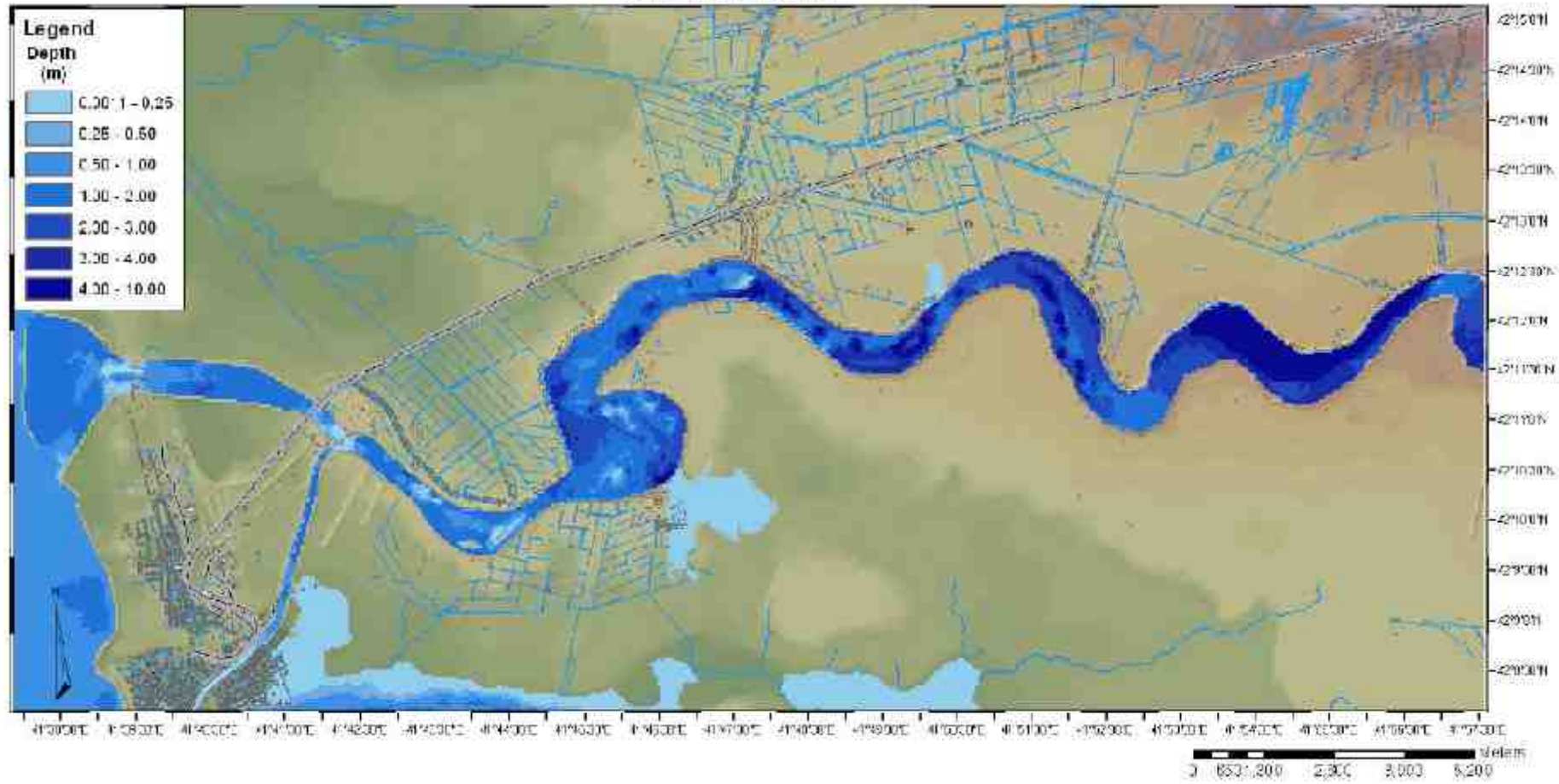
Flood Depth Map for Reconstructed Dikes (Initial Height)  
0.01 probability



# Mitigation measure



Flood Depth Map for Reconstructed Dikes (Initial Height + 1m)  
0.01 probability





# Flood hazard assessment



First Wetting Time Map for Reconstructed Dikes (Initial Height +1m)  
0.01 probability

