

The risks of water in Tunisia: mapping approach

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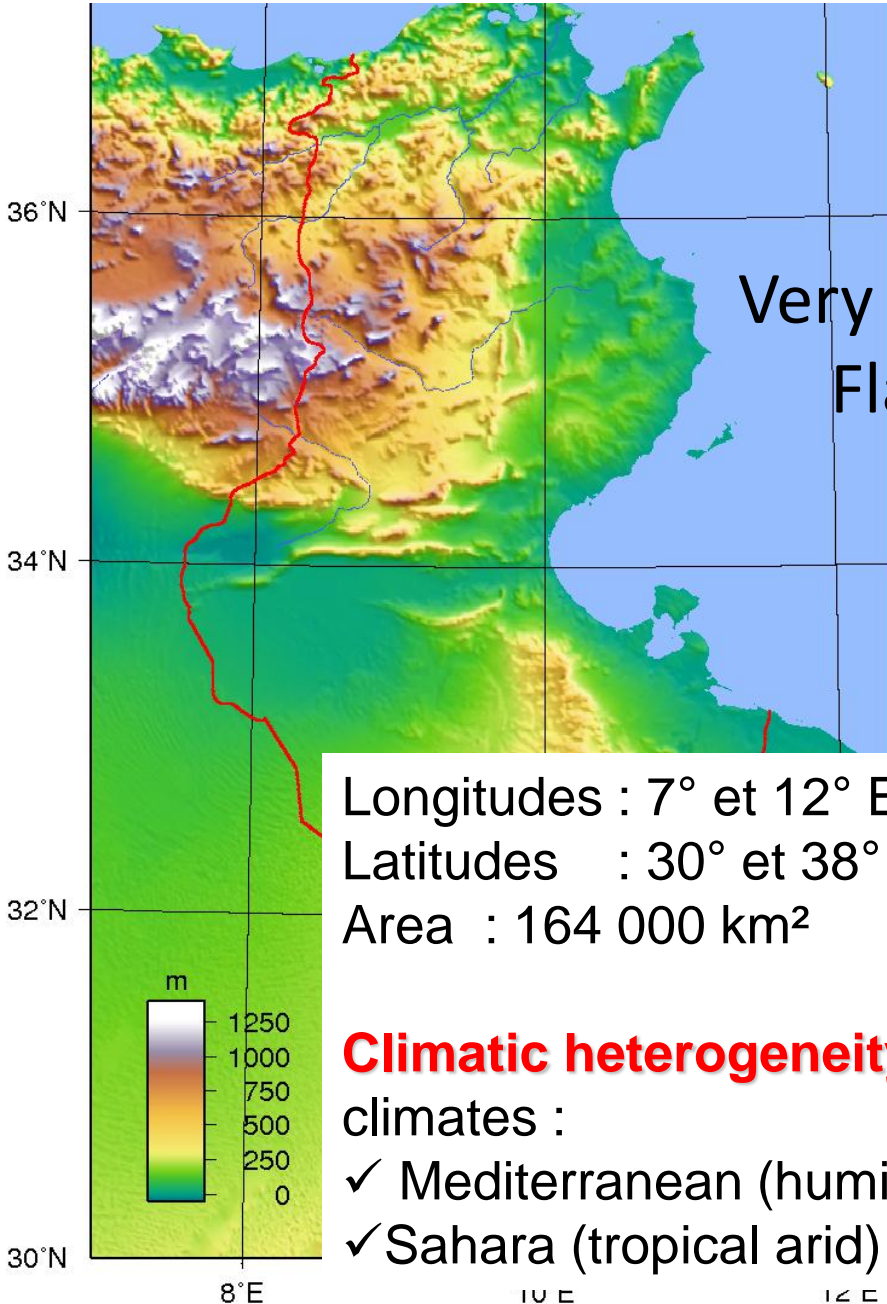
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Bassin Minier de Provence)



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Climate and hydrography of Tunisia

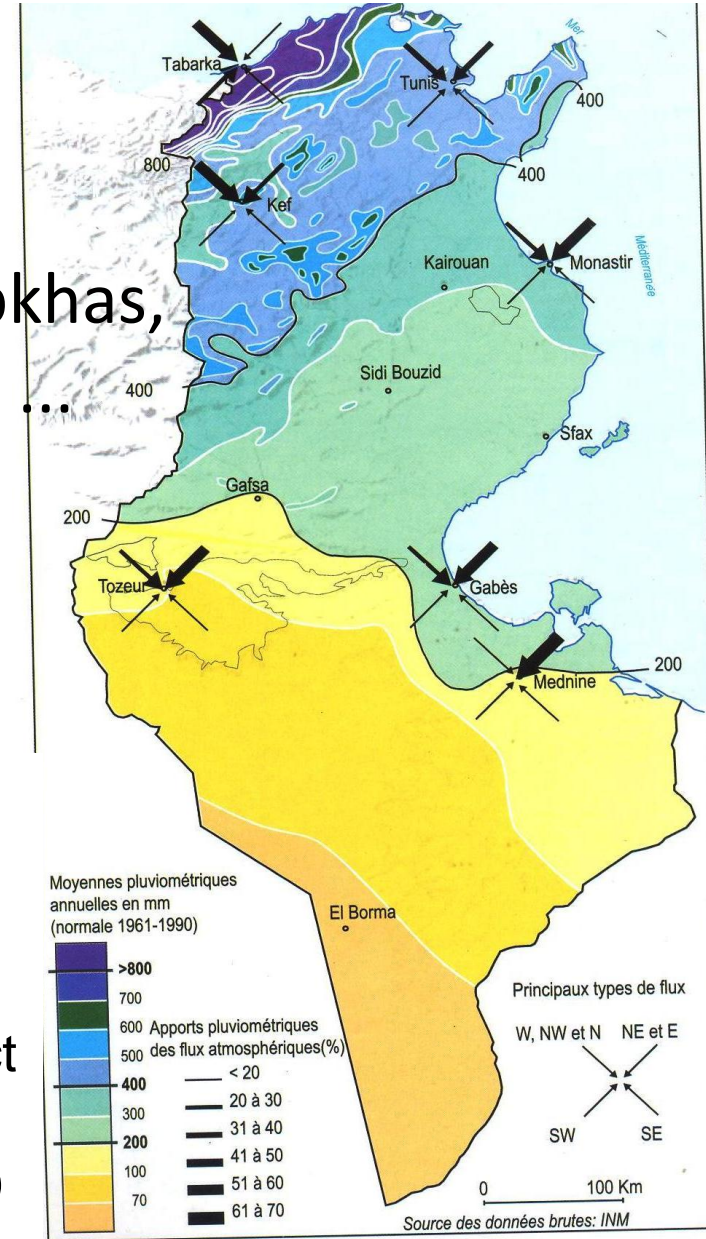


Very active Sebkhhas,
Flash floods ...

Longitudes : 7° et 12° East
Latitudes : 30° et 38° North
Area : 164 000 km²

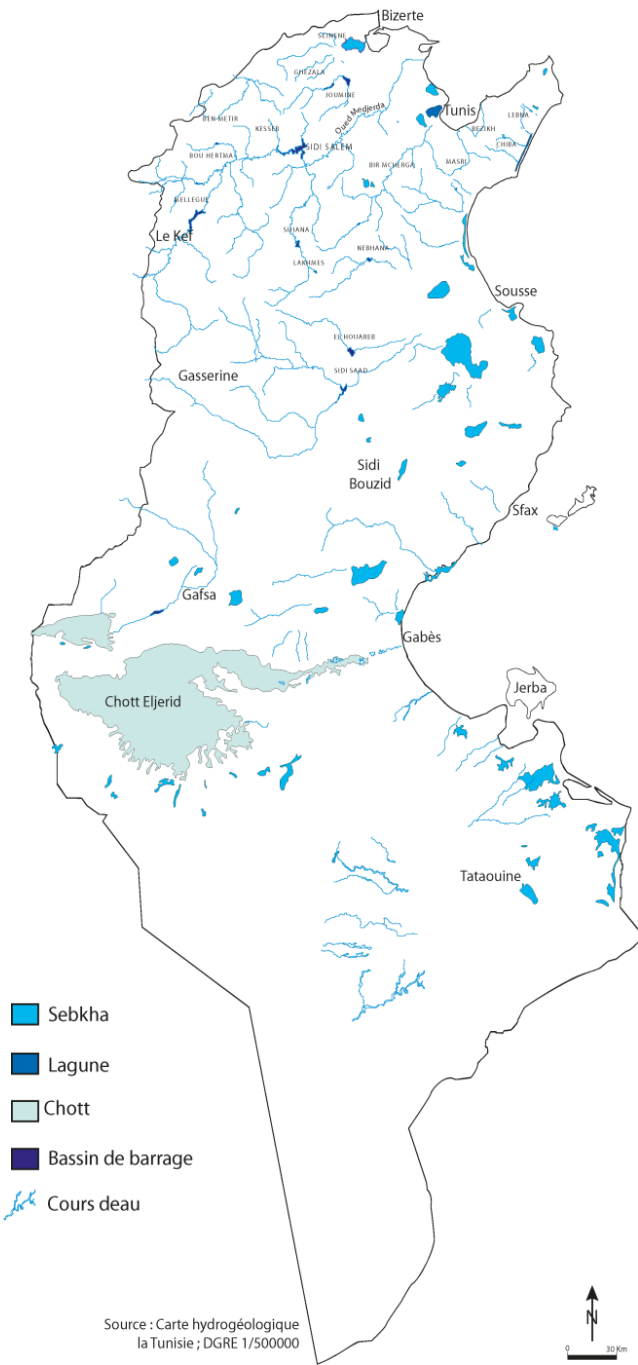
Climatic heterogeneity: two distinct climates :

- ✓ Mediterranean (humid temperate)
- ✓ Sahara (tropical arid)



AUTEUR : Taoufik El MELKI

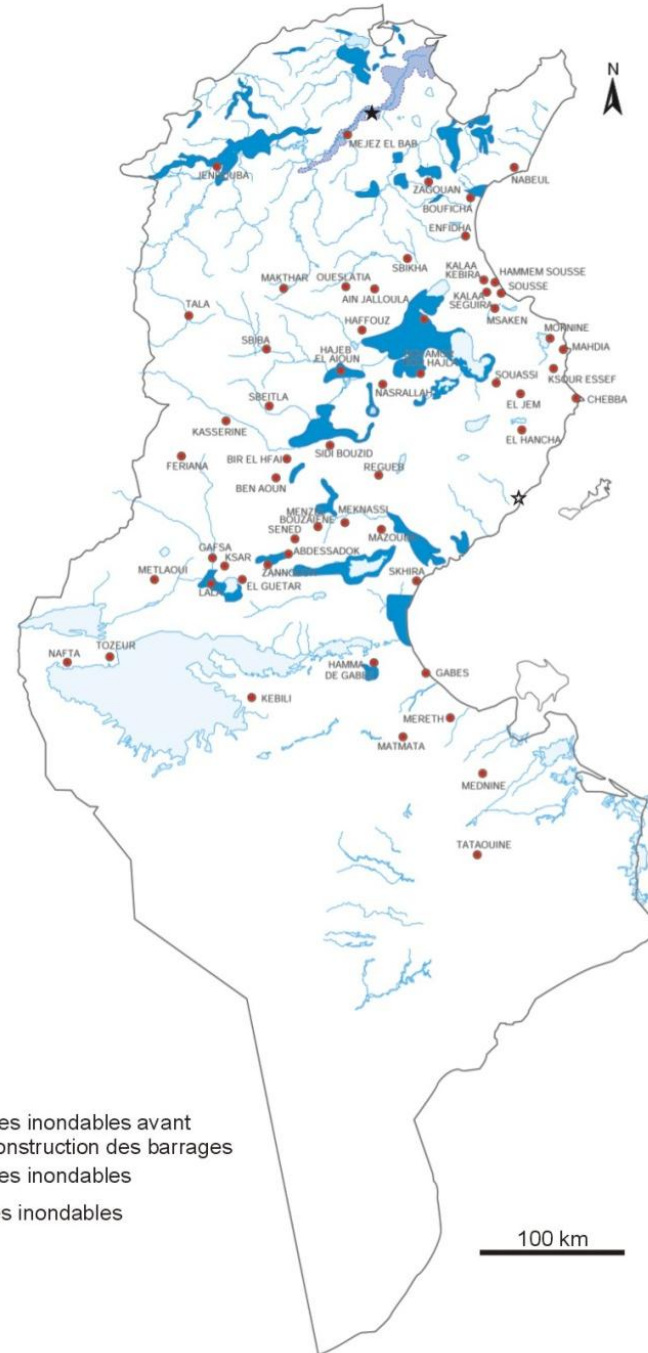
Main rivers and wetlands of Tunisia



Source : Carte hydrogéologique la Tunisie ; DGRÉ 1/500000

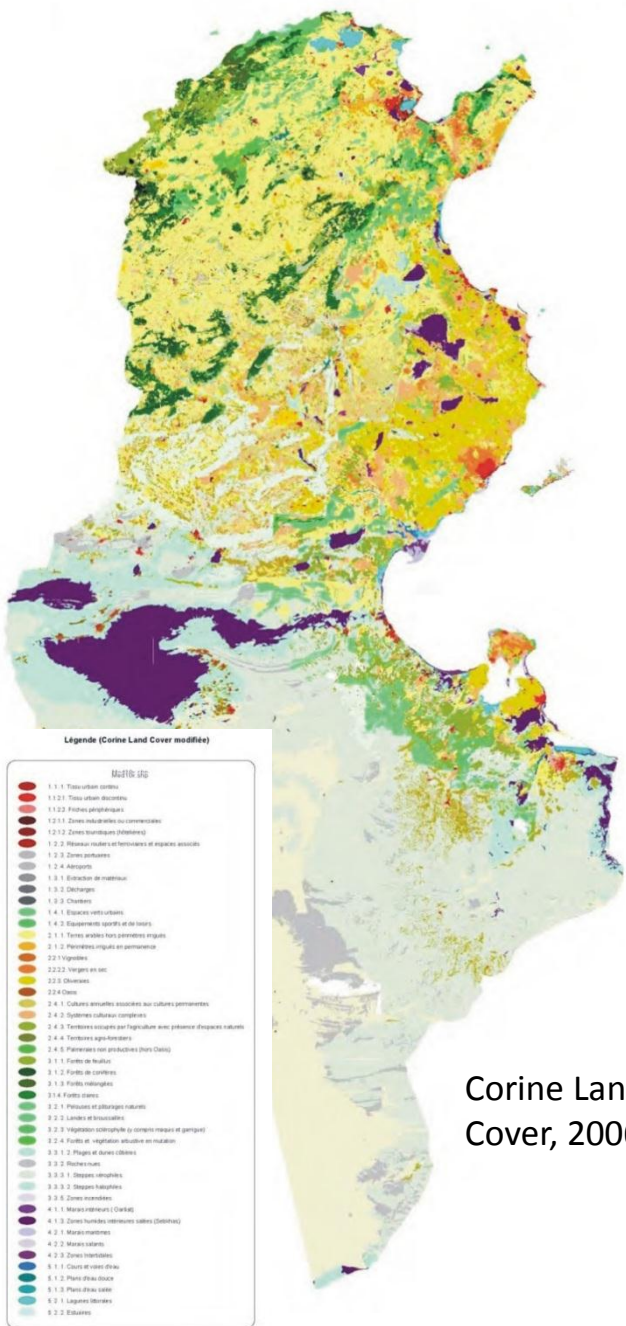
Flood areas in Tunisia

When rainfall becomes weaker and much more arid climate conditions, wadis can no longer reach the sea, its waters seep when crossing the plains and will flow into depressions called Sebkhias generally located along the sea.



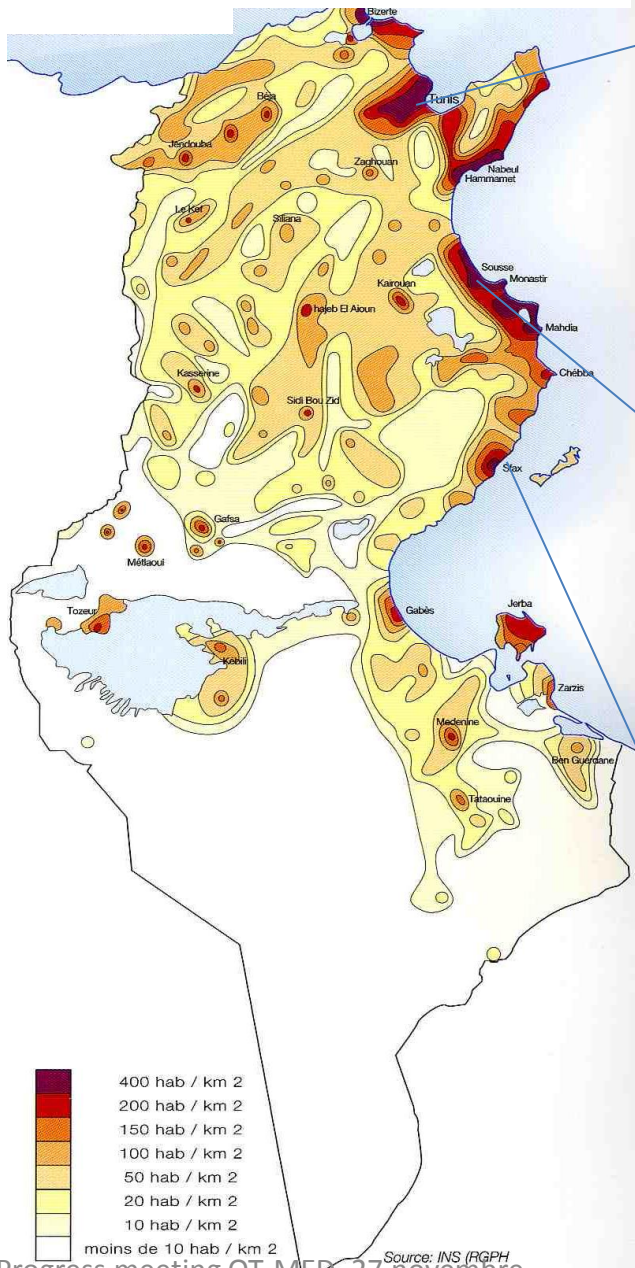
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Land use in Tunisia in 2006



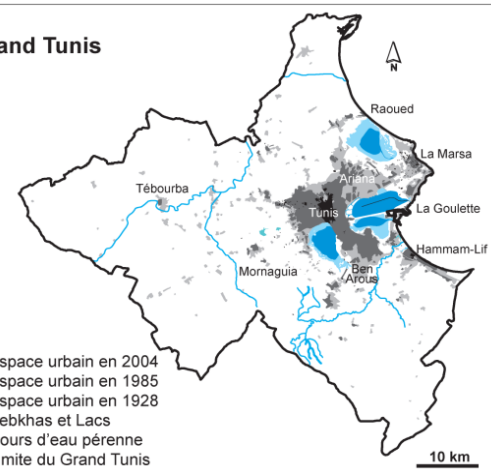
Corine Land Cover, 2006

Population by town and rural imadat 1994

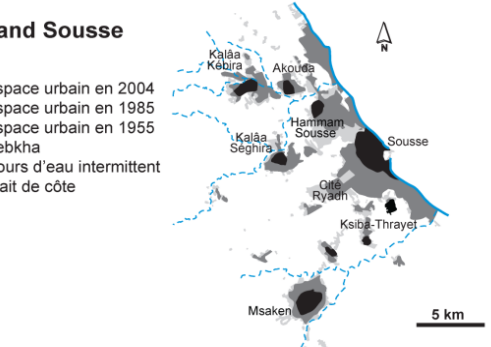


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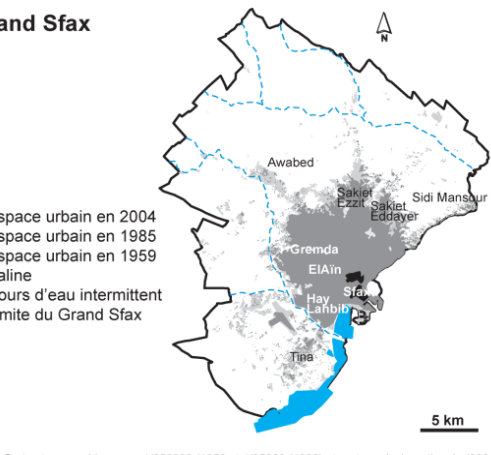
Grand Tunis



Grand Sousse



Grand Sfax



Floods: the number one risk in Tunisia

These events have resulted in deaths and property damage.

1969

1973

1979

1982

Inondation de référence
Centre de Tunisie
Débit max : 17050 m³/s (o. Zroud)
P max : 364 mm

Inondation de référence
Bassin de la Majerda
Majerda à Slouguia : 3500 m³/s
P max : 243 mm

Sud-est tunisien
D max = 2360 m³/s (Fessi)
P max : 203 mm

Inondation de référence
Région de Sfax
D max, Lâacheche : 2100 m³/s
P max : 206 mm

1982

1986

1990

1995

Inondation de référence
Région de Sfax
Lâacheche : 2100 m³/s
P max : 206 mm

Plaine de Grombalia
P max : 241 mm
Sbaihia : 1485 m³/s

Centre de Tunisie
Oued Elben
P max : 378 mm

Sahel Tunisien
P max : 254 mm
O. Laya = 500 m³/s

2003

2007 2009

2012

Inondation de référence
Milieu urbain Grand Tunis
P max : 233,5 mm

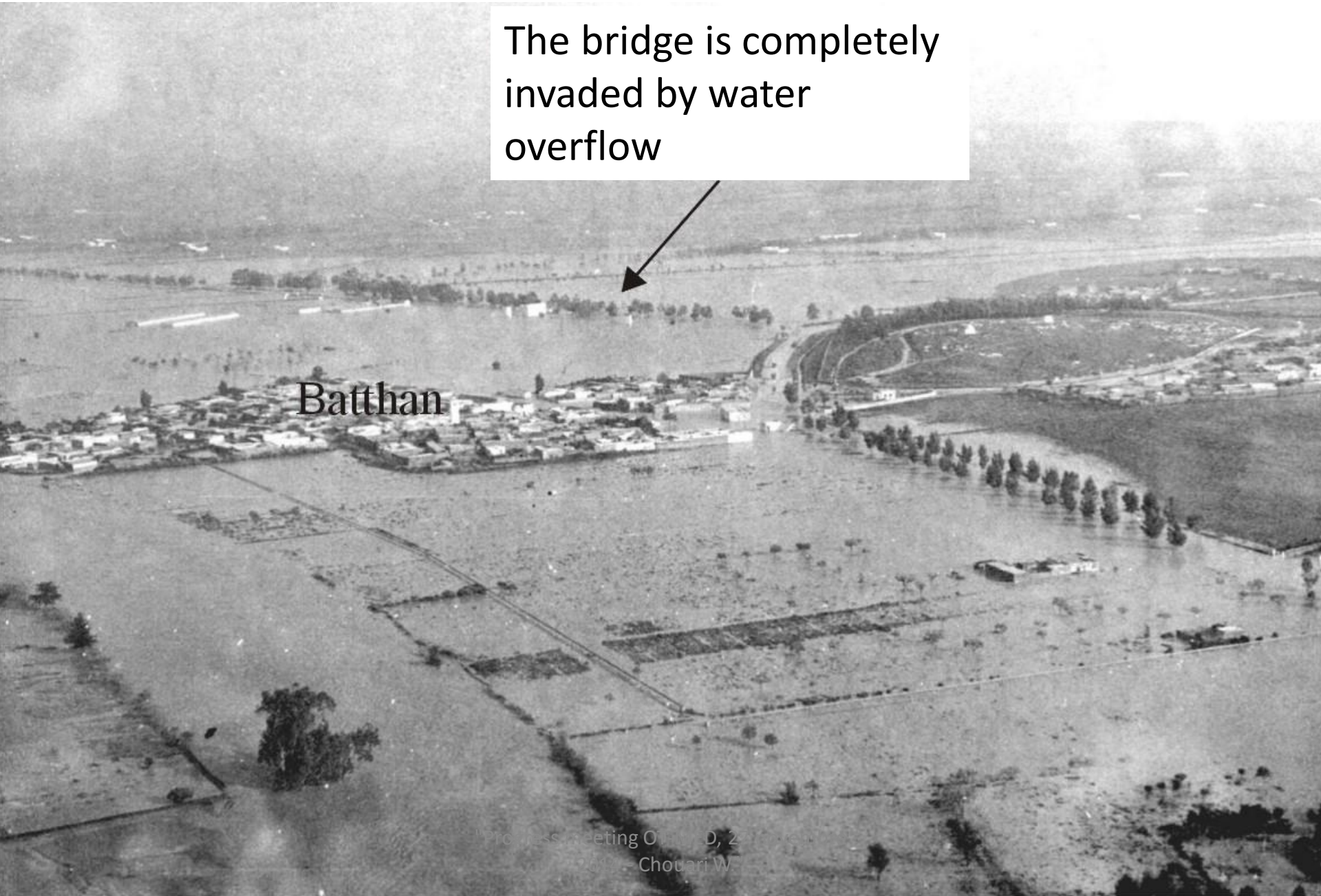
Milieu urbain Sfax
P max : 105 mm

Inondation centennale
Nord de Tunis
P et fonte de neige

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The bridge is completely
invaded by water
overflow

Batthan





Floods despite of protection !

In January 2003, floods in North West (Ghardimaou, Jendouba Bousalem) with 180 mm in less than 24 hours causing flooding of the Majerda river.

In September 2003, Tunis has a record of precipitation: 140 mm in 2 hours. The floods have submerged urban areas.

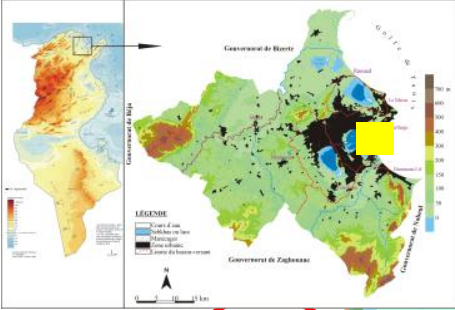
Civil security, Bou Salem plain , February 2012



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Lake of Tunis

Unsupervised Classification of Lake Tunis
Based on Landsat MSS image 08/11/1972

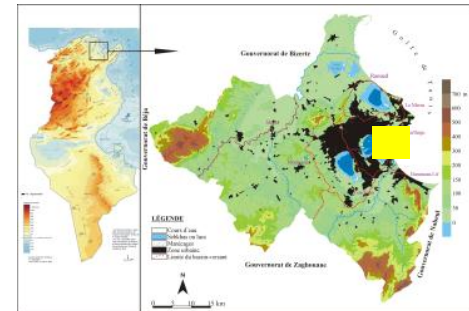


- Deep water
- Shallow water (> 40 cm)
- Concentration of algae
- Black vase

Pollution has caused an ecological imbalance characterized by the **proliferation of green algae nitrophilous** floating.

Inadequate management of water bodies

Unsupervised classification of Lake Tunis
from the Landsat image 08/10/1987



- Deep water
- Turbid water
- Shallow water
- Waterlogged soil water
- Moist soil
- Bare soil dry

- The realignment of the banks;
- The establishment of a system operating according to the movement of tidal ;
- The modification of the bathymetry of the lake;
- Creation of land for construction.

0 550 1 100 2 200 3 300 4 400
Meters

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RESULTS	OBJECTIVES	METHOD USED
1	- Perform a risk model	- Scientific literature
	- Produce maps for understanding the evolution of human and physical territory	<ul style="list-style-type: none"> - Choice of data - Centralization of data (source, date) - Making use these data in the same format - Creation of missing data
	Implementation of a GIS	<ul style="list-style-type: none"> - What data to visualize and what scale? - Features? - Implementation
	Launch of Web-GIS	Make accessible, intuitive and ergonomic choice of data and GIS functionality
2	Integration of these tools in the institutional system	Questionnaire to institutions
3	Perception and representation of flood risk	Questionnaire (actors in risk management, people)

Résultat 1

Social perception / representation of flood risk In Tunis



- **Questionnaire**

Number of people interviewed : 350

number of institutional respondents : 35

After discussion with officials of the Planning :

The plausibility of incorporating maps, GIS and Web GIS, in the system of risk management (prevention) for urban planning.

- **The main variables studied :**

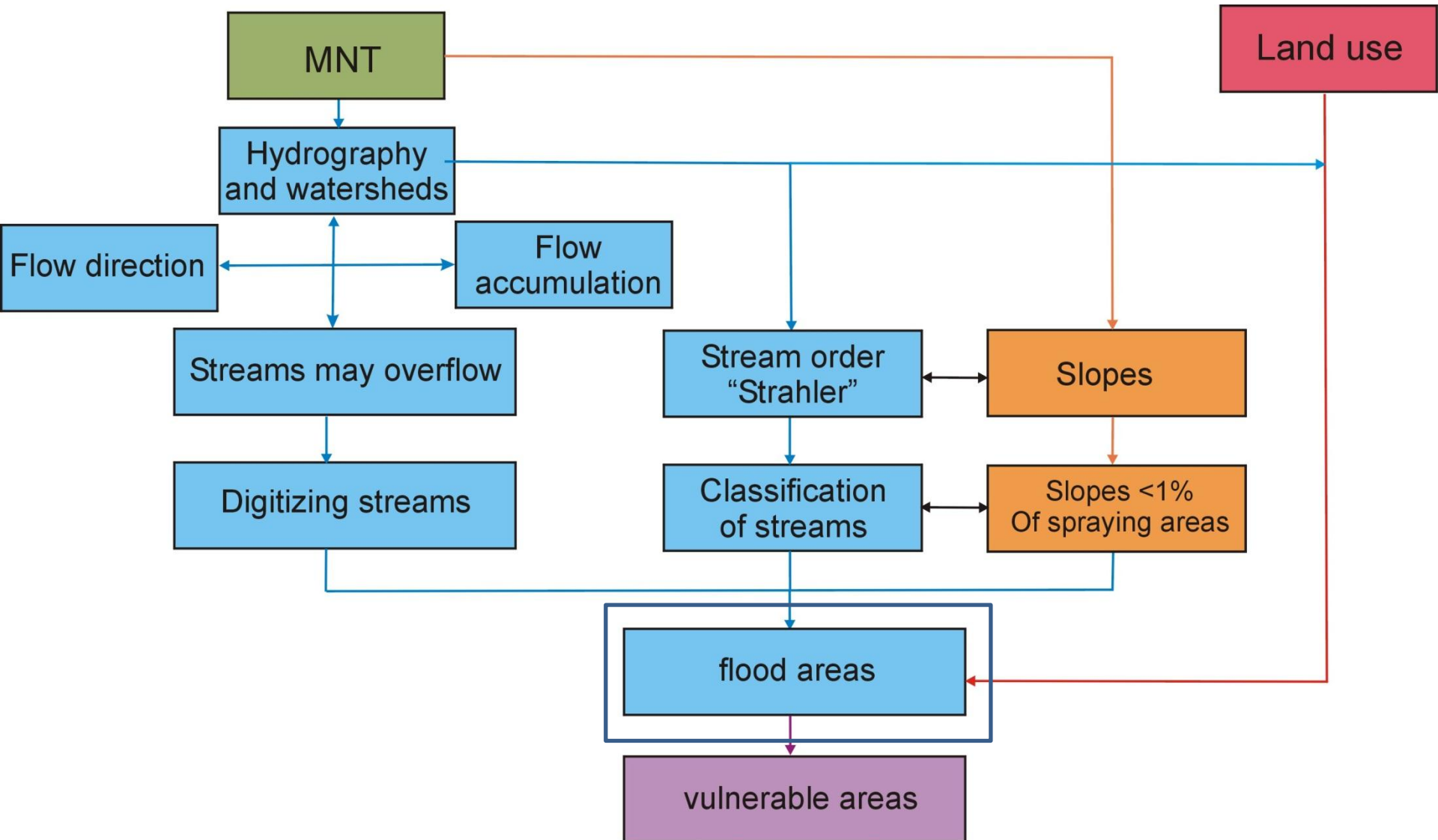
The socio-economic framework

History of flooding

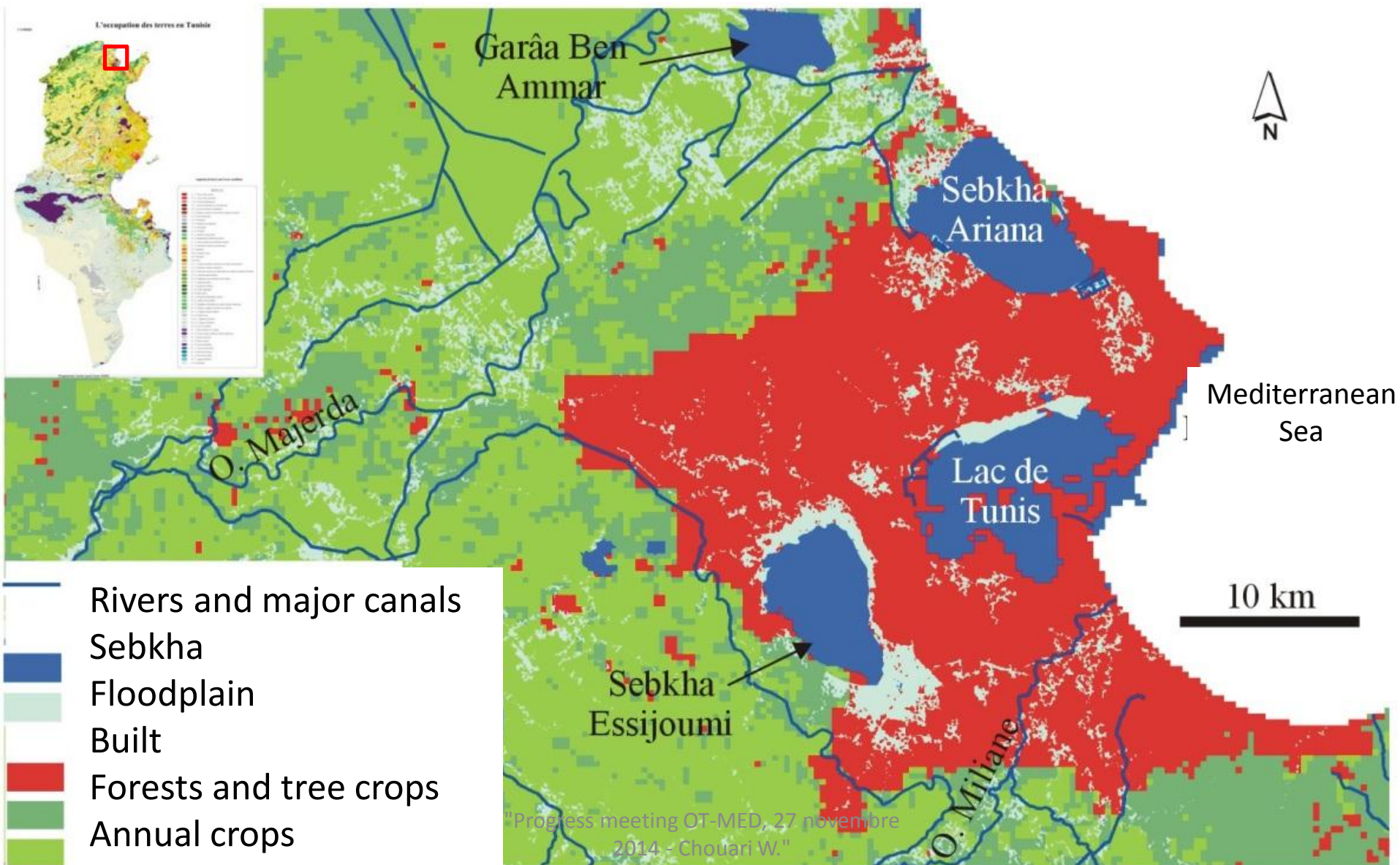
The social perception /representation of flood risk

Résultat 2

Mapping the physical vulnerability to floods in Tunisia



The superposition of frequently flooded areas and the land use reflects the levels of vulnerability to floods in Tunis agglomeration



Web-Gis

The screenshot shows a web browser window displaying a GIS application. The browser's address bar shows the URL <https://www.ohm-provence.org/Tunisie/>. The page title is "Cartographie de la vulnérabilité potentielle au risque des inondations en Tunisie". On the left, there is a "Contenu de la carte" (Map Content) panel with a list of layers. The "hydro surf" layer is selected and highlighted with a blue circle. The main map area shows a topographic map of Tunisia with a river network. A legend at the bottom right of the map area identifies two types of flood zones: "Zones inondées en Janvier-Février 2005. Débit de 750 m3/s" (light blue) and "Zones inondées en Mars 1973. Débit de 3500 m3/s" (dark blue). A scale bar indicates 6 kilometers, and a north arrow is present.

Cartographie des zones inondables sur l'oued Medjerda

Often it is possible to:

- **Map** at the request of geographical data (layers, geographical influence)
- **View** the map in a browser;
- **Measurements** on the map;
- **Query** the data mapped to access and view their semantic.

Publications

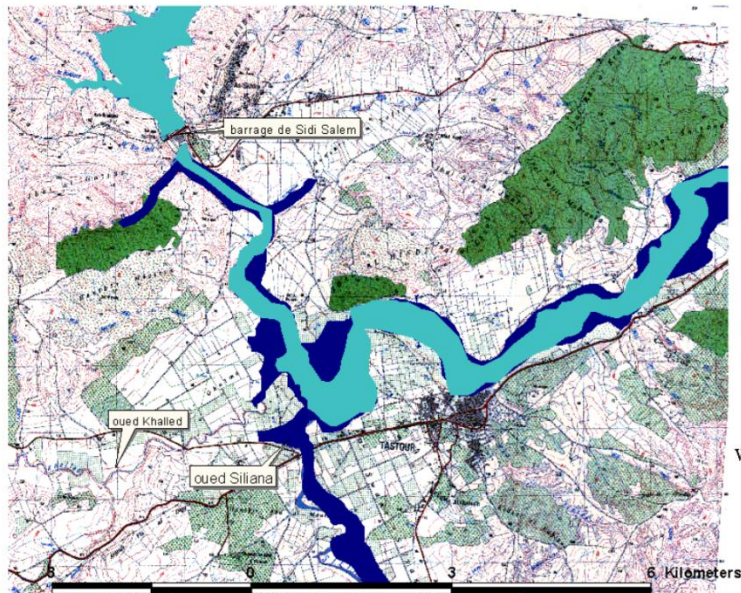
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Perspectives

- Geovisualization of survey data
- Geovisualisation history of disasters

Integrate the Web-Gis tool data on past events (collection and visualization of multimedia information)


Cartographie des zones inondables sur l'oued Medjerda



Zones inondées en Janvier-Février 2003. Débit de 750 m³/s
Zones inondées en Mars 1973. Débit de 3500m³/s

Civil security, Bou Salem plain , February 2012





Thank you for your attention

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