

First assessment of the Tunisian coastline vulnerability to sea level rise

Par *Yadh LABANE*

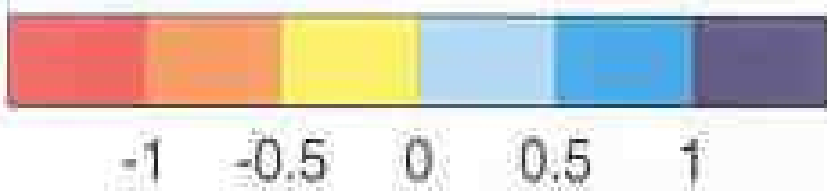
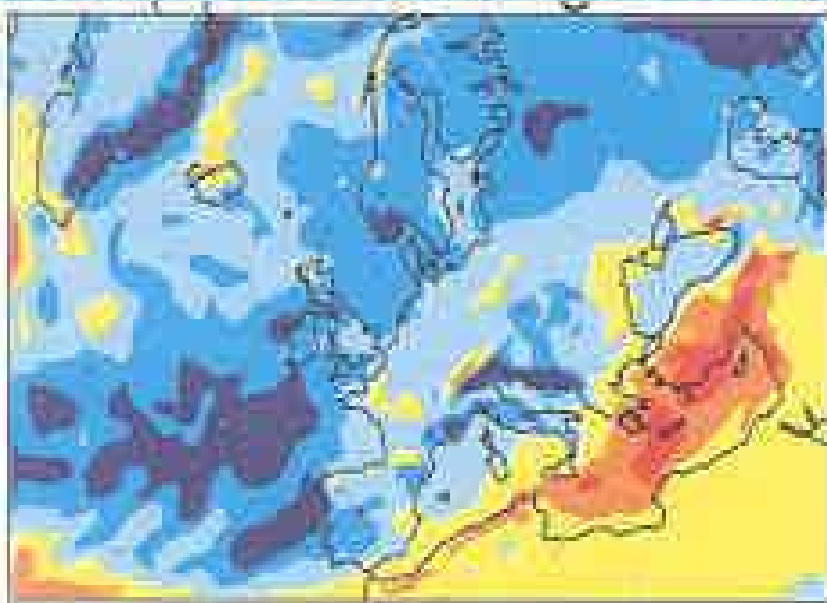
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Introduction

- As non-annex I Party to the UNFCCC (ratified in 1993) Tunisia has submitted their first national communication at October 2001 and presented it in COP7, Marrakech, November 2001
 - Subsequent studies have been realized (two projects on CC, TUN 95 / G31, RAB 94 / G31): Climate change and water resources in the Maghreb region, assessment of the Tunisian juridical aspect related to green house gases (GHG) emissions, national inventory of GHG emissions, Examination of policies, institutional aspects and advisory related to climate change in Tunisia, Identification of mitigation options of GHG emissions related to the energy sector, the waste sector, the agriculture and forestry sector, **among which: first assessment of the Tunisian coastline vulnerability to sea level rise**
- Tunisian NGO on Climate Change and Sustainable Development

Climate change over Mediterranean region



■ Global change over Mediterranean:

- change in temperature, greater than average global warming,
- Sea level rise with greater geographical variability
- Change in extreme events frequency

■ Mean impacts

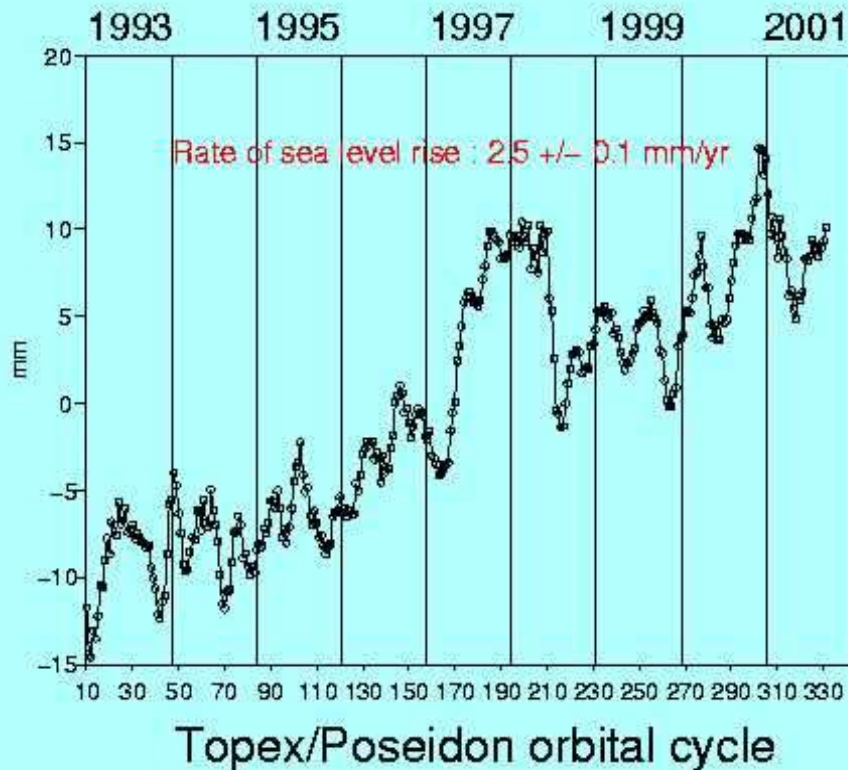
- Water resources
- Coastlines

Topex/Poseidon Measures

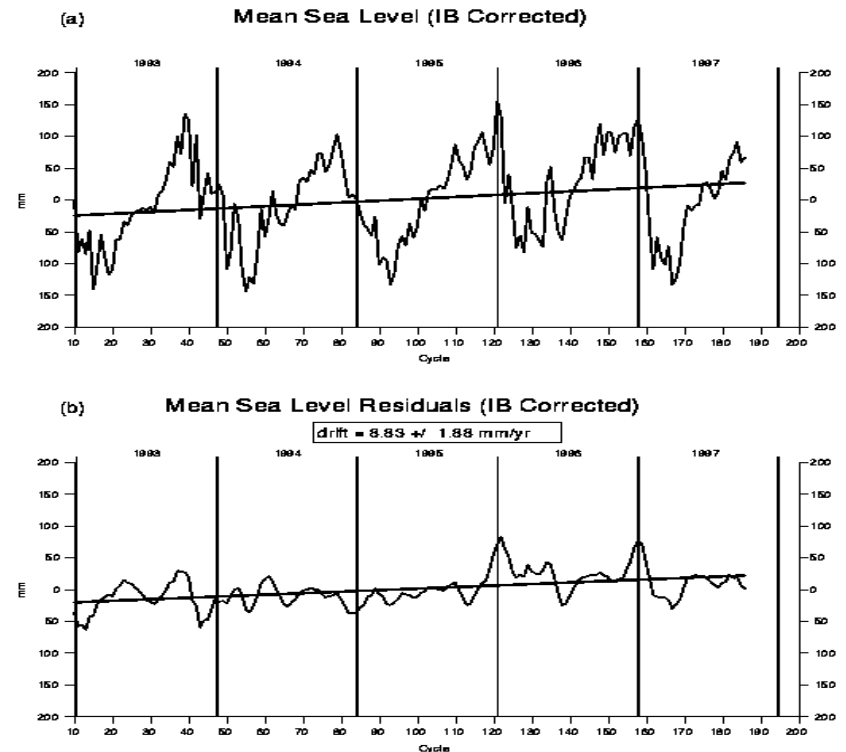
At the Global scale: a sea level rise of ~2.5 mm/year since 1993

At the Mediterranean region: a drift of 8,83 mm/year, more than the global value

Global mean sea level (Topex/Poseidon)

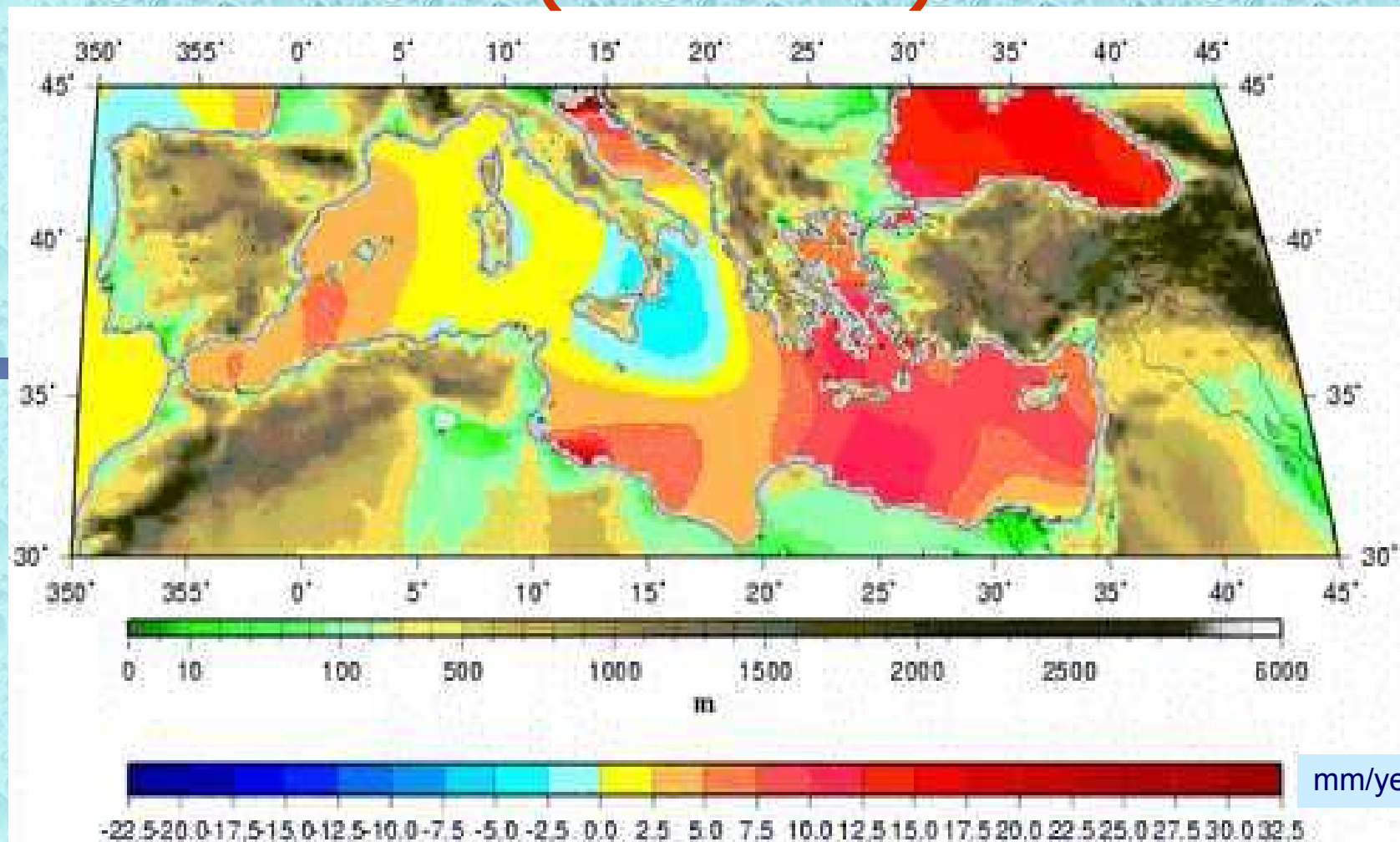


MEDITERRANEAN SEA



Topex/Poseidon Measures

Drift of the mean level Mediterranean sea (1993-2001)

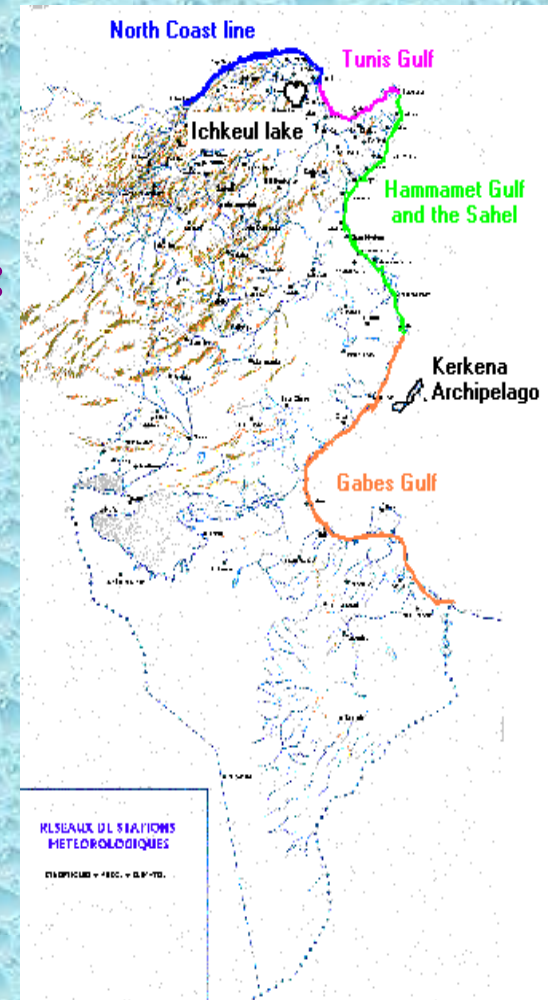


Economic weight (or vulnerability) of the Tunisian coastlines

- *2/3 of the total population*
- *More than 70 % of the economic activities (95 % textiles, 70 % metallurgy, 2/3 food, 80 % chemical industry)*
- *More than 90 % of the tourist accommodation capacities*
- *Communication with the world (95 % of total communication by marine lines)*
- *a interesting environmental and biodiversity resources*

Assessment of the vulnerability: Approache

- Assessment of the current sea level Characteristics
- With reference to IPCC scenarios (1992a...f): Projection of the future evolution of the sea level
- Establishment of a analysis chart:
 - Identification of important activity sectors and environmental ecosystems
 - Sensitivity analysis to sea level
- Assessment of impacts
- Assessment of the vulnerability (by region and by socio-economic and environmental system)



Expected sea level rise at the Tunisian coaslines in 2100 (with reference to the curently mean level NGT)

	Currently level	Sc Min-R 2100	Ref-R 2100	Sc Max-R 2100
North coaslines	0.16	0.54	0.66	0.71
Tunis Gulf	0.16	0.54	0.66	0.71
d'Hammamet	0.00	0.38	0.50	0.55
Gulf				
Sfax	0.00	0.38	0.50	0.55
Kerkenna	0.00	0.38	0.50	0.55
island				
Gabès	-0.13	0.25	0.37	0.42
Jerba island	0.00	0.38	0.50	0.55
South coaslines	0.00	0.38	0.50	0.55

NGT : the mean level in Tunisia
(used in the coastal management)



Vulnerability Analysis: North coastlines (Tabarka-Rass Ettarf)

- *high cliffs*
- *Little affected by sea level rise.*
- *Little degree of vulnérability*
- *Le Lac Ichkeul: wetland region with particular vulnerability*



Les aiguilles de Tabarka

Wetland: Ichkeul lake

Potential sea level rise impacts

In gray: expansion of water area to detriment of marshy area

In blue: migration of marshy area on cultivated area

With an assumption of (1 m) rise in the water level

an increase in water area to the detriment of marshy terrain:

loss of 1160 ha of cultivated area.



The Ichkeul lake is located in the coastal region with contact with Mediterranean Sea.

Vulnerability analysis : Tunis Gulf

- low coastlines with a particular shape
- High human pressure
- A very important infrastructure
- A greater economic and social vulnerability



Ship canal of Tunis lake:
A basic infrastructure potentially Vulnerable
to sea level rise



Vulnerability analysis : Tunis Gulf



Flooded area with a sea level rise of 0.50m

Lossed area:
6440 ha

Flooded area in we consider the overcoast (surcôtes)



Vulnerability analysis: Hammamet gulf and the Sahel

- Dominance of beaches
- Important tourist infrastructures and activities
- Concerns related to some managed areas



Vulnerability analysis: Hammamet gulf and the Sahel

Part of sebkha (wet land with salt water and no contact with the sea) susceptible to be changed on lagoon

Loosed area: 1965 ha

Part of sebkha susceptible to be changed on lagoon if we consider the overcoast

Beaches in danger

Beaches that can adapted to sea level rise by retreat



Vulnerability analysis : Gabes gulf

–*Very low coaslines*

–a particular
shape

–*A very important
physical and
environmental
vulnerability*



In the south of Zarzis: a very low coaslines

Vulnerability analysis : inland areas



- 18 island areas
- Variable morphology:
 - high (Zembra, La Galite)
 - Low (Kerkena)
- Main characteristics: a interesting environmental and biodiversity resources
- Kerkéna : a middle scenario in relation (sea level rise of 55 cm): 7000 ha risks being lost (1 / 3) of the total area



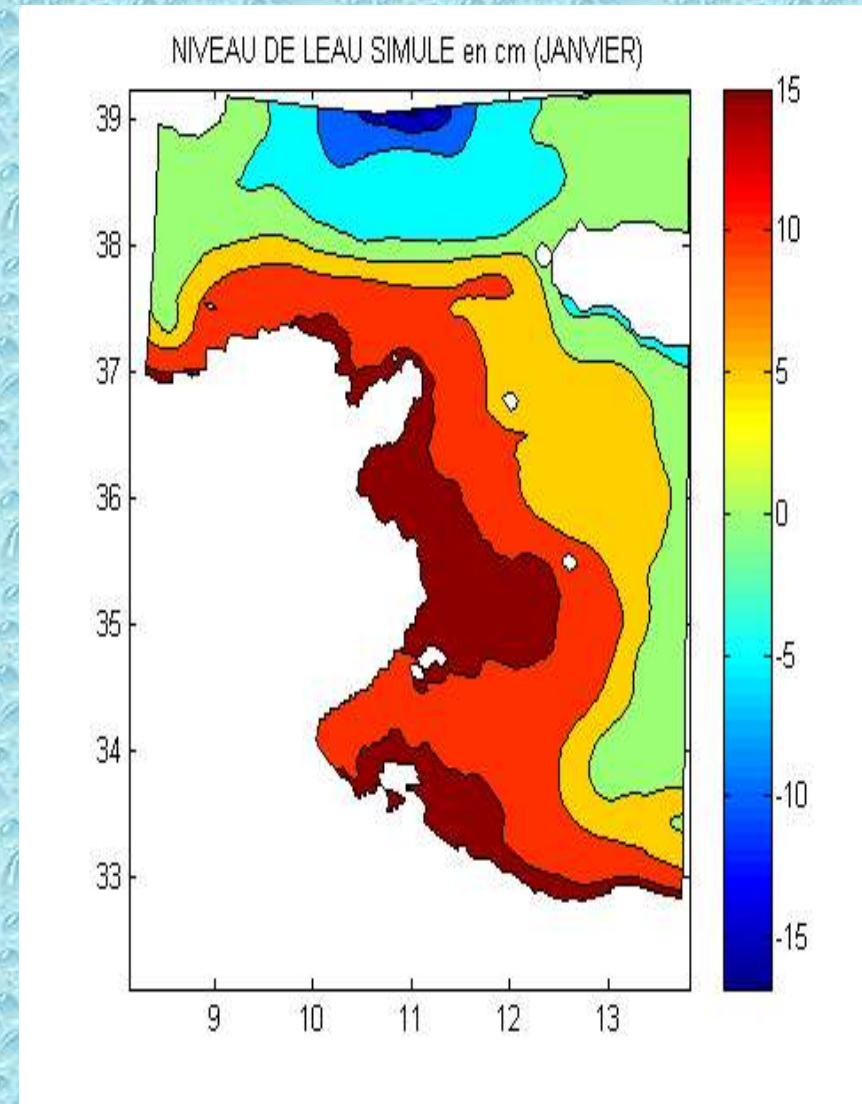
The Kerkena Island

Scientific tool

Model to simulate the sea level near the Tunisian coast.

Developped by the Tunisian Insitute for science and technologies sea

Responsible of the model: Mr Ali HARZALLAH
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Approach to response to expected sea level rise

- **Adopt a simple “up Approach” based on simple actions**
- **Ensure its integration in the national coastlines management plan**
- **Starting with “No regrets” and low cost, no cost measures**
- **Institutional arrangement**

Conclusion

- **The Tunisian coastline has a double vulnerability to climate change:**
 - a socio-economic vulnerability
 - and an environmental vulnerability.
- **This initial assessment of the Tunisian coastline vulnerability to Mediterranean sea level rise needs:**
 - to be completed using adopted tools and technologies
 - and also extended to other threats like tourist expansion.

Conclusion

The current legal framework (The Maritime public Property) is interesting.

We need mainly to:

- ✓ introduce new innovations in the implementation of the legal provisions
- ✓ ensure a good following.

In the long term:

- some institutional arrangements
 - the implementation of the legal provisions
- are advised to adapt to sea level rise

Conclusion

In the short term:

The improvement and strengthen of the national coastline management plan is probably the best way to adapt to sea level rise and response to climate change