



REST-COAST

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Centre Tecnològic de Catalunya



Challenges of coastal restoration in the Ebro Delta

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Climate adaptation in deltas I: Coastal restoration
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Introduction

“We the humans are creating artificial deltas at the tale of the reservoirs at the expense of destroying the natural deltas and beaches over the coast”

Restoring the **river-to-coast continuum** means recovering large-scale connectivity (water-sediments-nutrients-species) along the river basin: river-reservoir-river-estuary-mouth-coast (room for the river & coast).

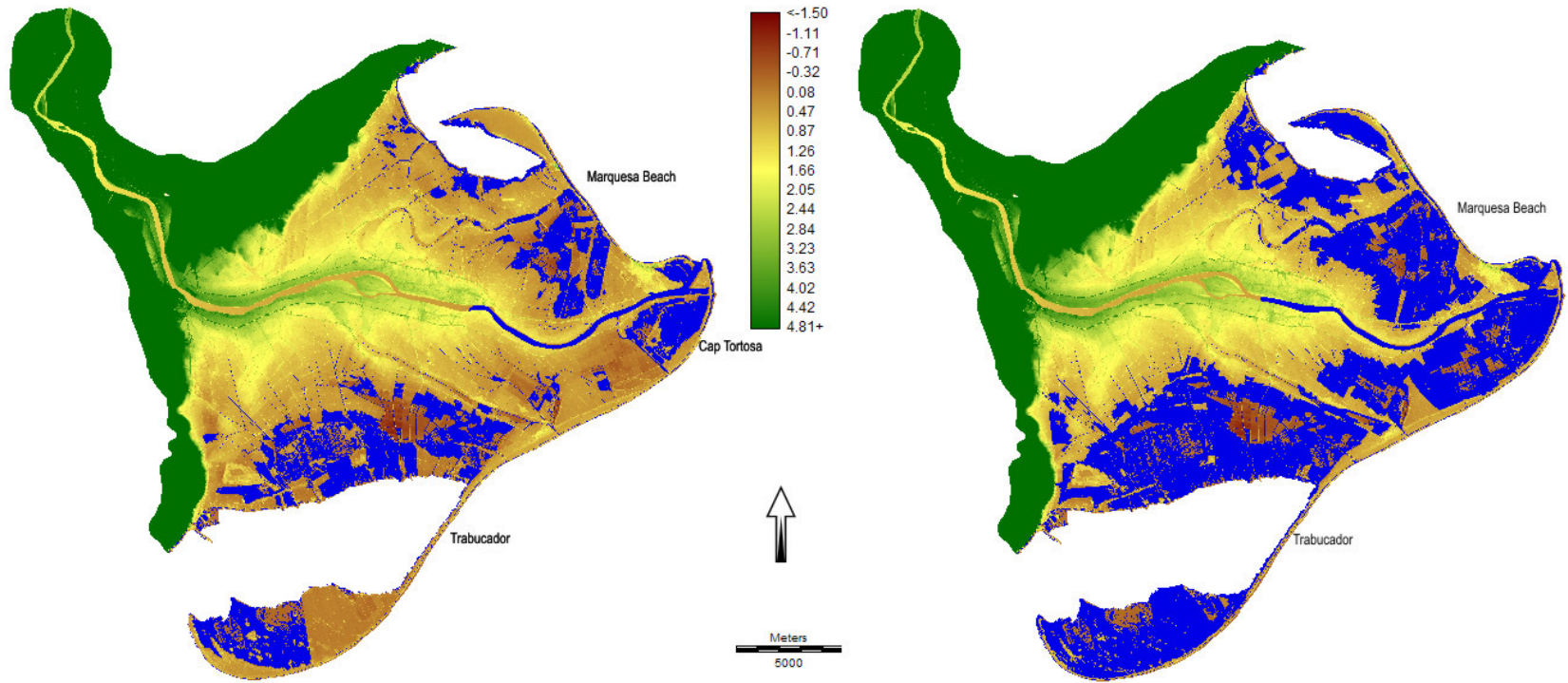


The case of the Ebro Delta

- The Ebro delta, as many other deltas around the globe, has seen its **sediment inputs** decreased by 99% due to damn construction since the 60's. This lack of sediment combined with natural dynamics, **sea lever rise** and **deterioration of natural habitats**, threats not only the different ecosystems of the Ebro delta but also the communities living in it and the economic activities associated with them.
- By recovering those natural habitats and a flow of sediments through the river, several **ecosystem services** would be improved such as water quality, carbon sequestration, food provisioning and flooding and erosion risk reduction.
- There is also a need to **naturalize the coastline** and make it permeable to marine storms and more resilient to sea lever rise.



The importance of coastal restoration

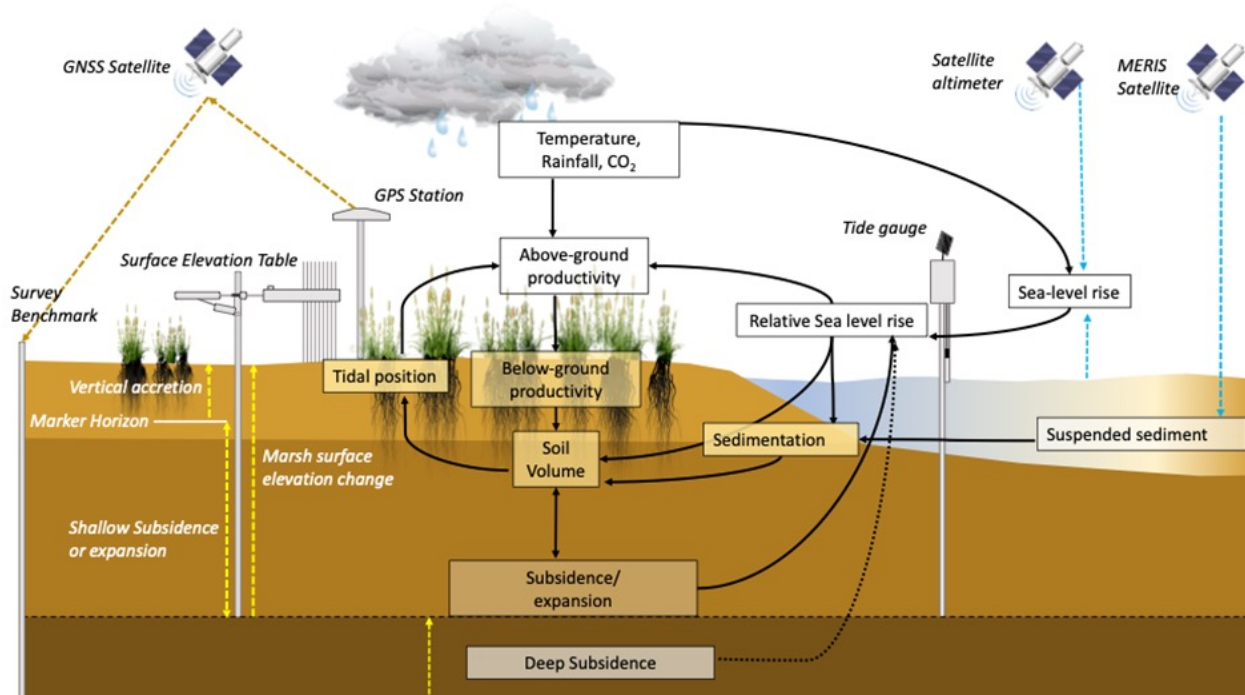


Flood hazard areas (in blue) to RSLR of 0.25 m (left) and 0.5 m (right) at the Ebro delta.
Source: Alvarado-Aguilar and Jiménez



What makes a coastal wetland resilient to global change?

The resilient formula: hydrological connectivity + sediment inputs + plant productivity + elevation capital + room for migration (transgression) = land capital

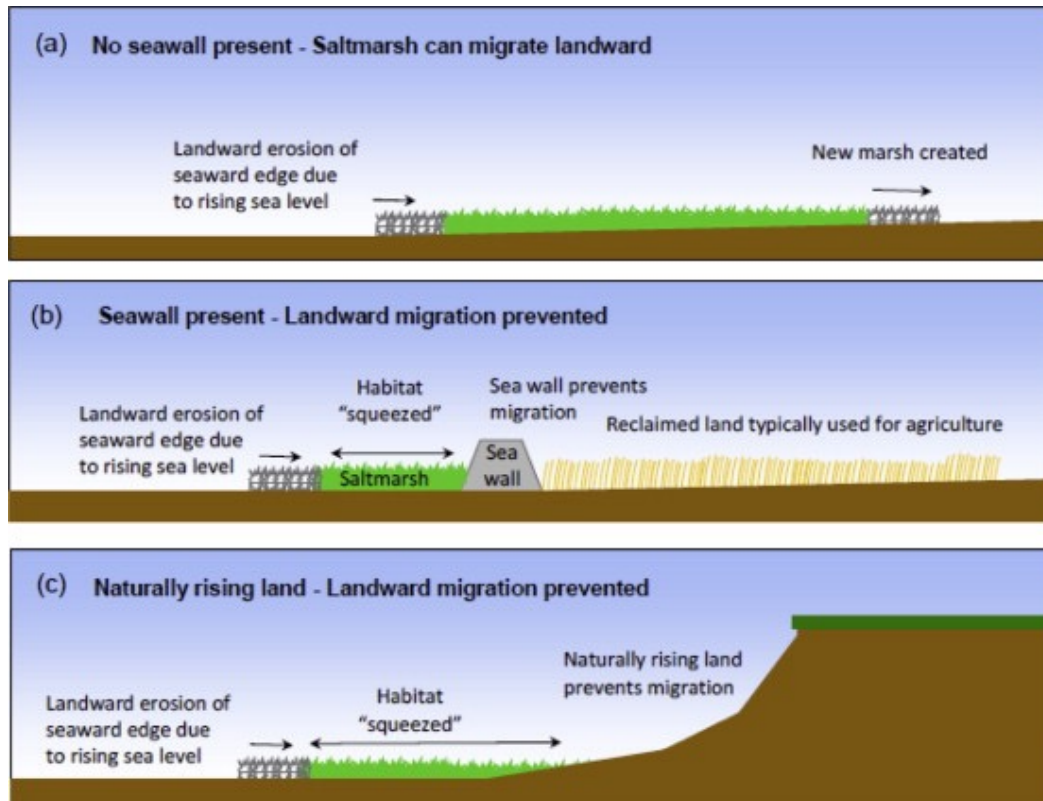


Process-based restoration !

Processes influencing marsh surface elevation. From Saintilan et al. 2022, Science.

The coastal squeeze

The lack of room for inland migration (transgression) is the main threat to the survival of coastal wetlands, and this is especially critical in the Mediterranean.



Pontee, N. (2013). **Defining coastal squeeze: A discussion.** Ocean & coastal management, 84, 204-207.

Some examples of good practice



The Project Life Ebro Admiclim tested the potential of sediment transport through river and irrigation network, it assessed the areas vulnerable to sea-level rise and developed a climate action plan for the Ebro Delta, among other tasks.



The REST-COAST project will promote large scale RESToration of COASTal ecosystems through rivers to sea connectivity (H2020). Special attention is taken into governance models that can trigger or block this transformation.



BIORESILMED project is implementing bioeconomy models to better adapt the Ebro Delta to climate change



Conclusions

- Humans are creating **artificial deltas** at the tale of the reservoirs at the expense of destroying the natural deltas over the coast.
- Coastal system will not survive climate change impacts unless we **re-connect** them with their river basins and give **room to the coast** to avoid coastal squeeze.
- Restoring the **sediment flux** at the river basins to reach the coast is a must for many reasons: environmental (recovering the ecological status of rivers and coastal systems), economic (is more expensive to retain that to manage sediments) and social (people over the coast don't want to lose their land).





Thank you!