Adaptation to and mitigation of climate change through management and restoration of European estuarine ecosystems

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ADAPTA BLUES

IH cantabria
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UNIVERSIDAD DE CANTABRIA

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figueira
da foz.para todos

The Nature Conservancy

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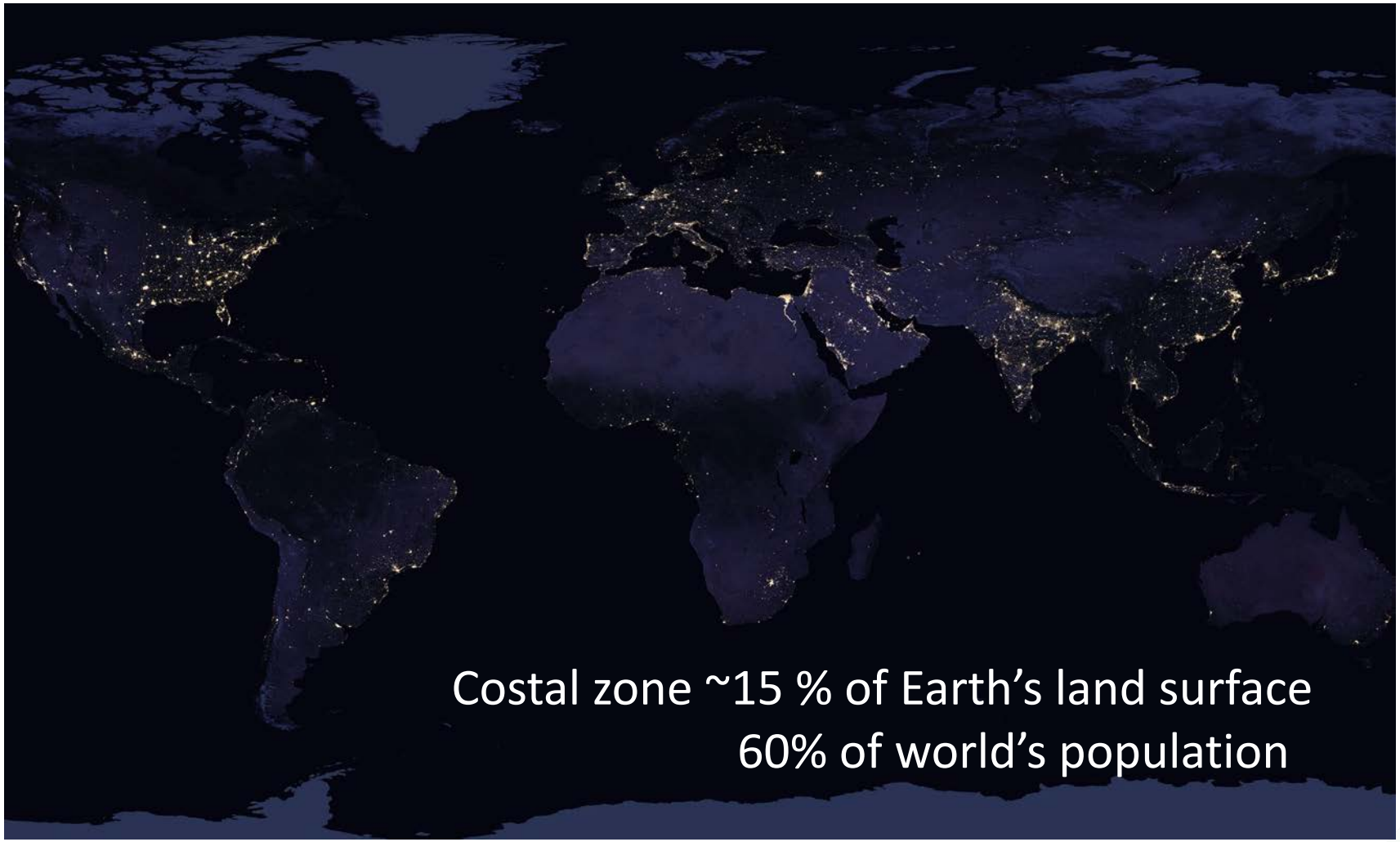
EUROPARC FEDERATION



From Google earth version nocturna

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Focal points of human settlement and commerce

By Edward Duncan

By Mike McBay

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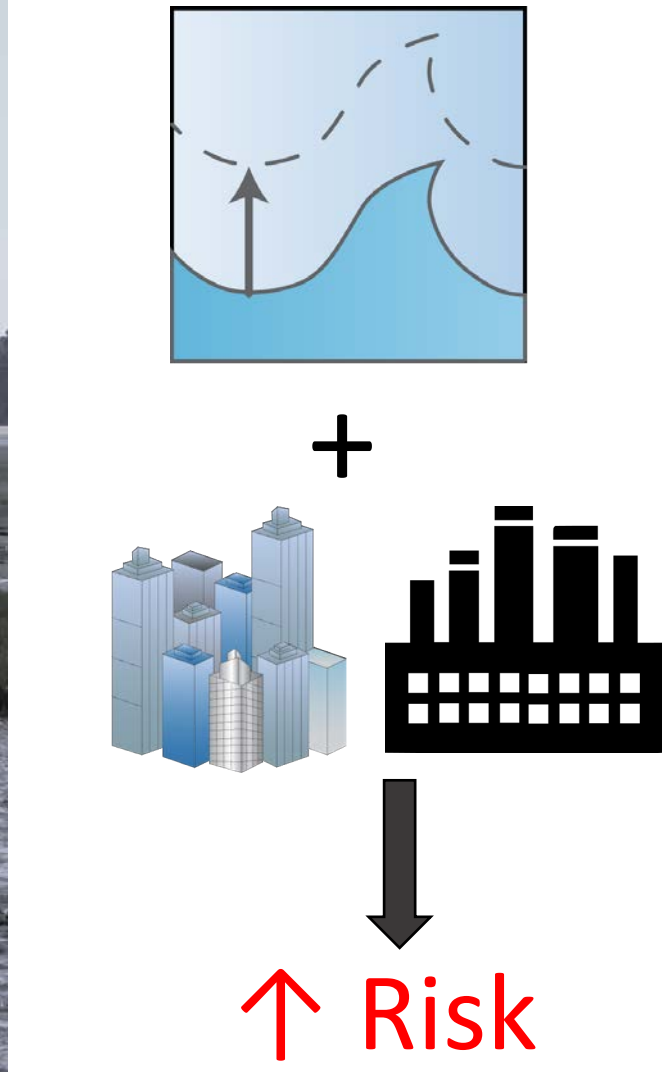
High risk due to CC



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Estuarine habitats: key for coastal societies in Europe

Saltmarshes

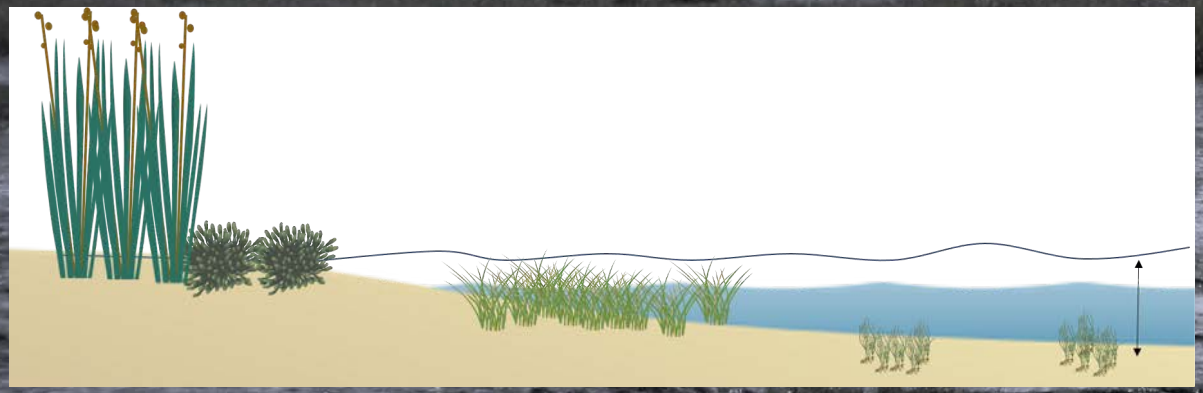
By Greg Tompson, USFWS

Seagrasses

By Dimitar Nikolov Berov

Tidal flats

By GRID-Arendal



- Fisheries support
- Biodiversity
- Water quality
- Cultural and aesthetic values

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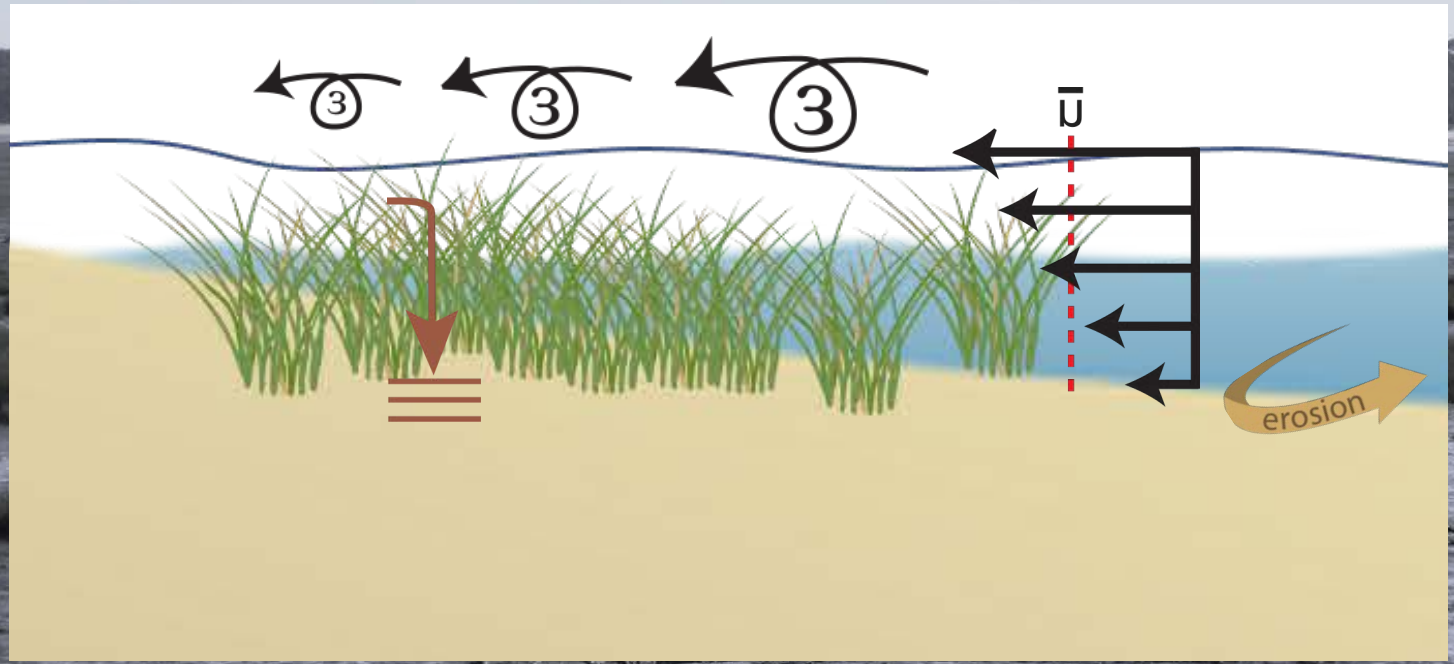
Estuarine habitats: key for climate change adaptation and mitigation

Coastal protection



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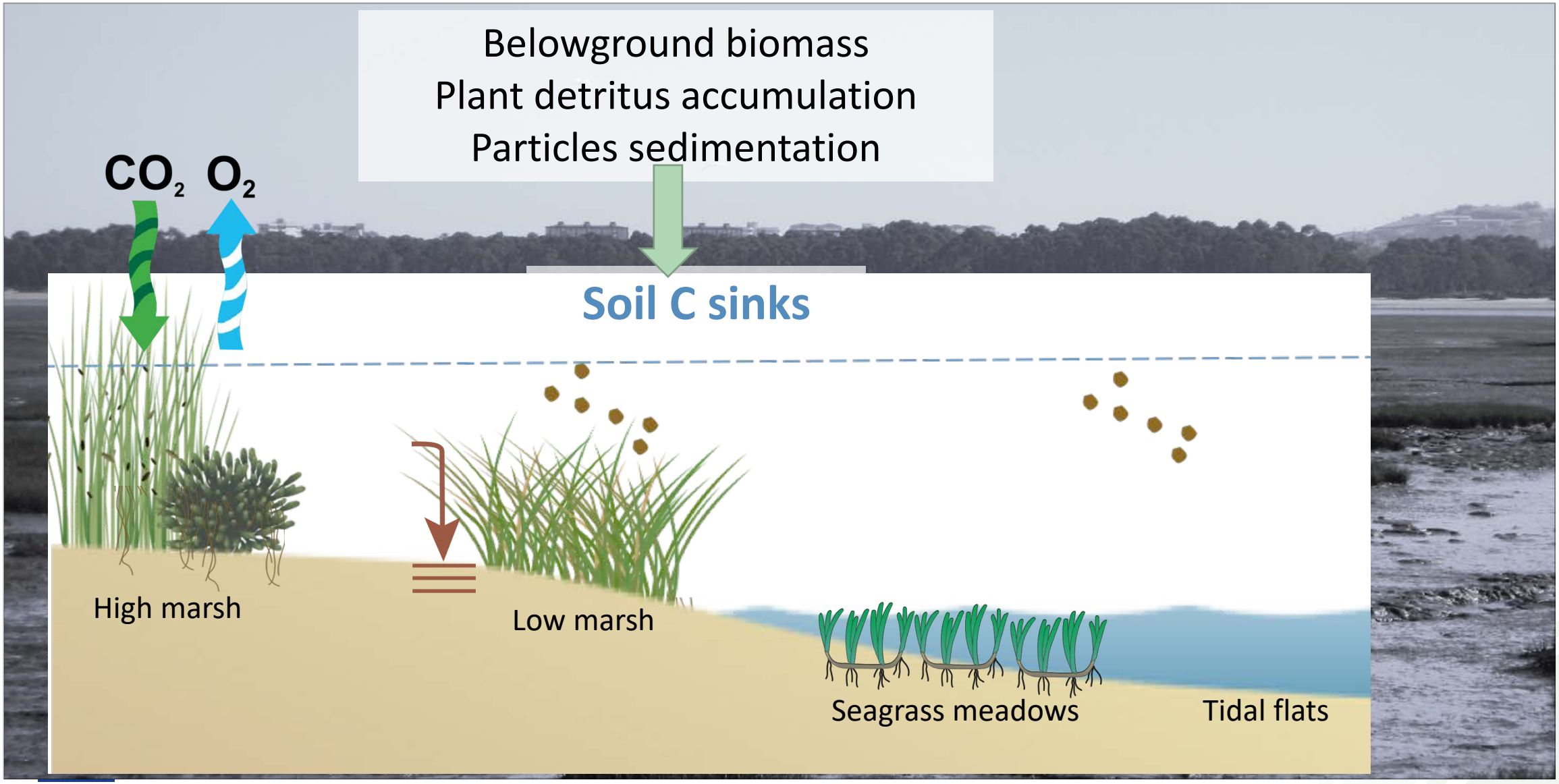
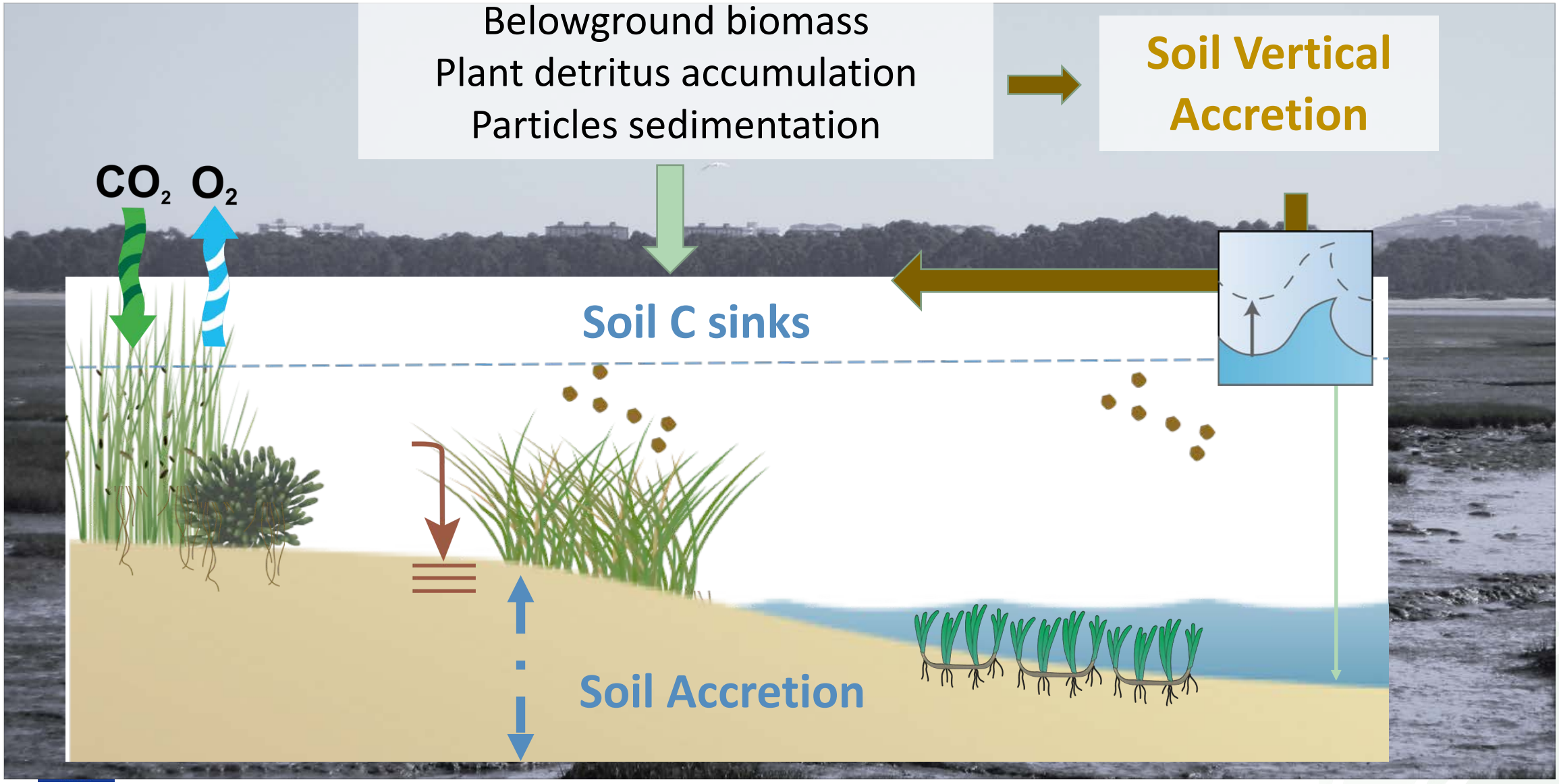
Soil vertical accretion-> SLR adaptation



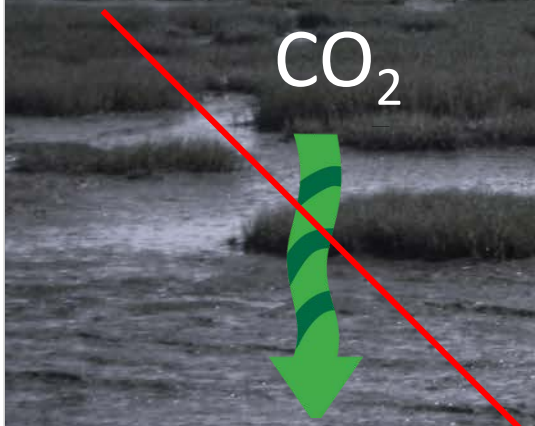
Soil vertical accretion-> SLR adaptation



Estuaries have been historically modified by humans

- 2/3 lost in Europe since 1900

(Airoldi and Beck 2014)



By Roger W

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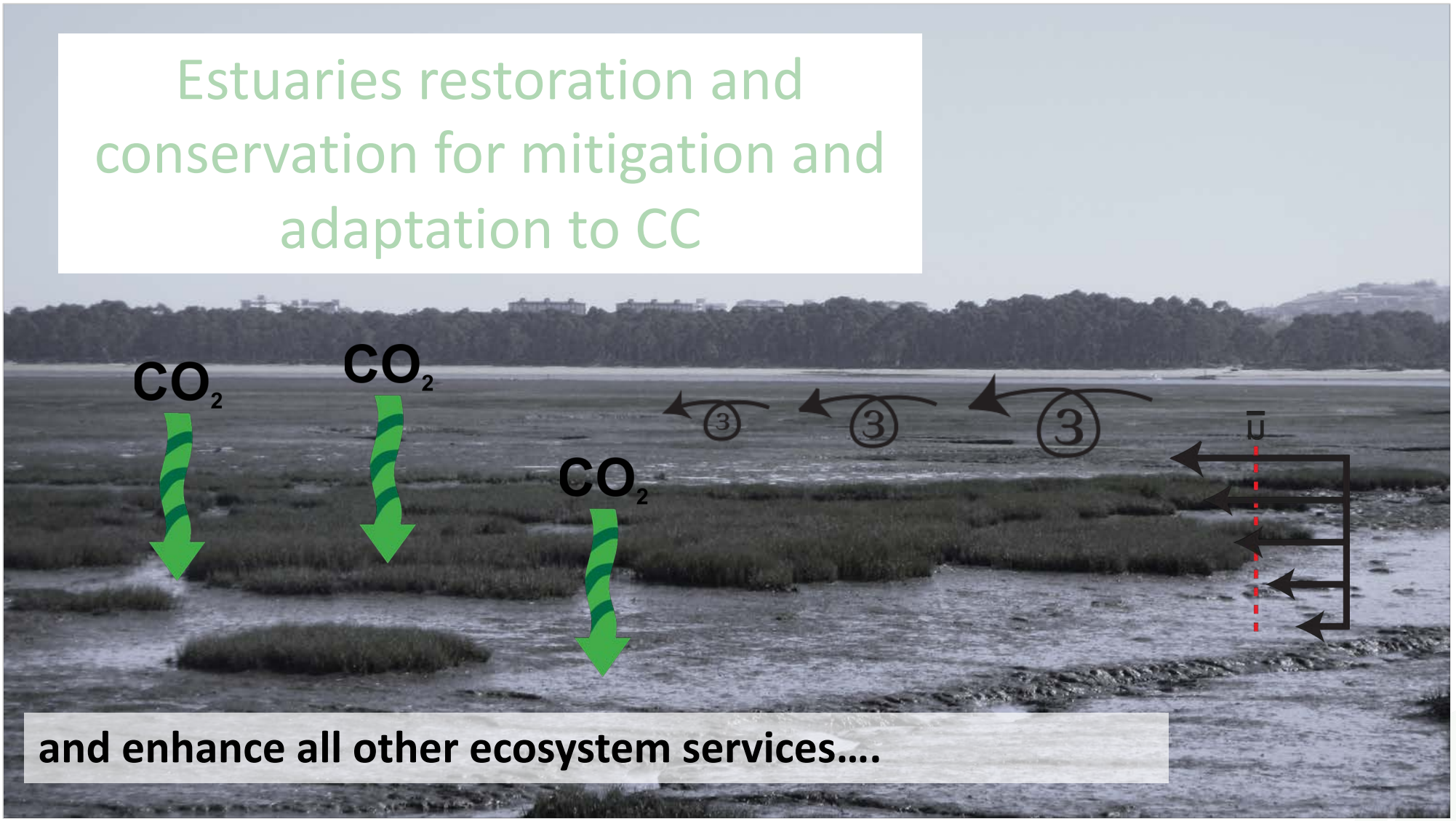
Estuaries restoration and conservation for mitigation and adaptation to CC



and enhance all other ecosystem services….

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5 Years

€ 2.2 Millions

4 Partners

3 Countries

5 Estuaries

1 Municipality

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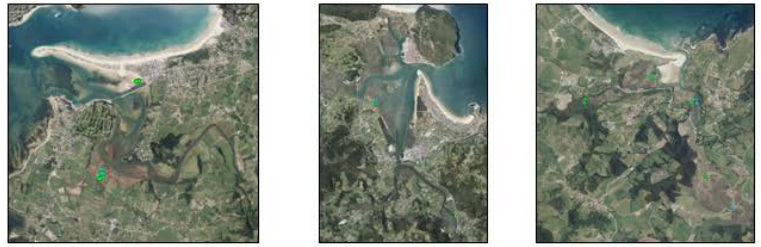
Estuaries of study

Western Scheldt

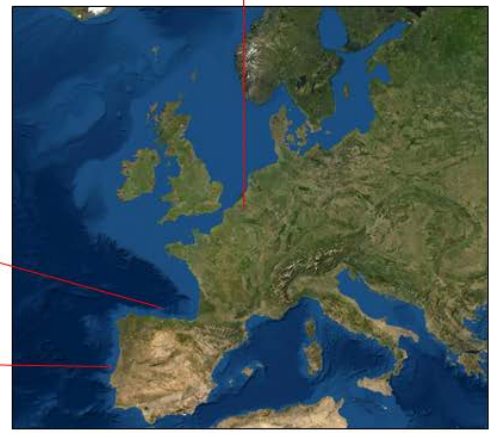
Santoña

Oyambre

Santander Bay



Cantabria



Mondego estuary

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General goal: to demonstrate the potential of the conservation and restoration of European estuaries as an ecosystem-based approach to adapt to CC, decreasing the risk in coastal areas, while contributing to CC mitigation.

O1. **CC services provided by estuarine habitats**

O2. CC adaptation and risk reduction technical recommendations for three different Atlantic European regions based on the management of estuarine ecosystems.

O3. **Estuarine restoration for CC adaptation in a European estuary**

O4**.** Financial mechanisms that support estuarine restoration based on the CC services provided.

O5. Promote the application of estuaries conservation and restoration as NbS to CC adaptation in European coastal areas.

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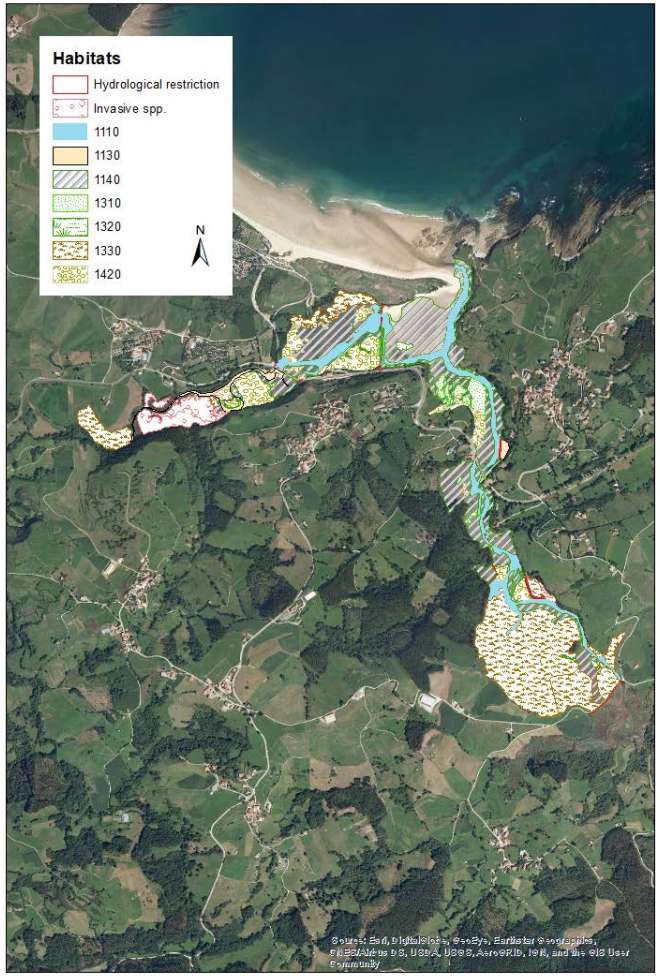
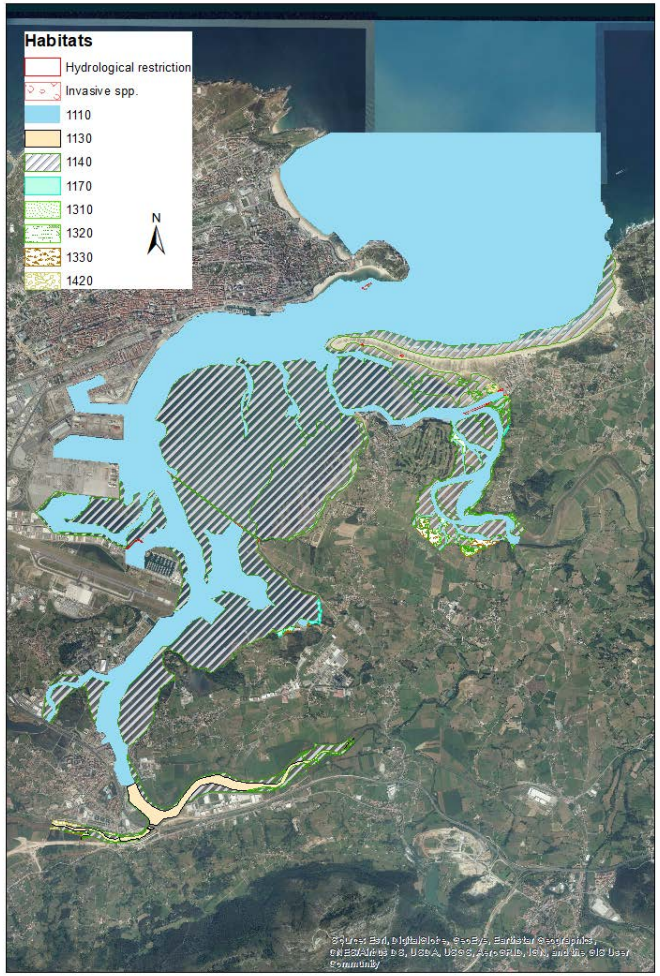
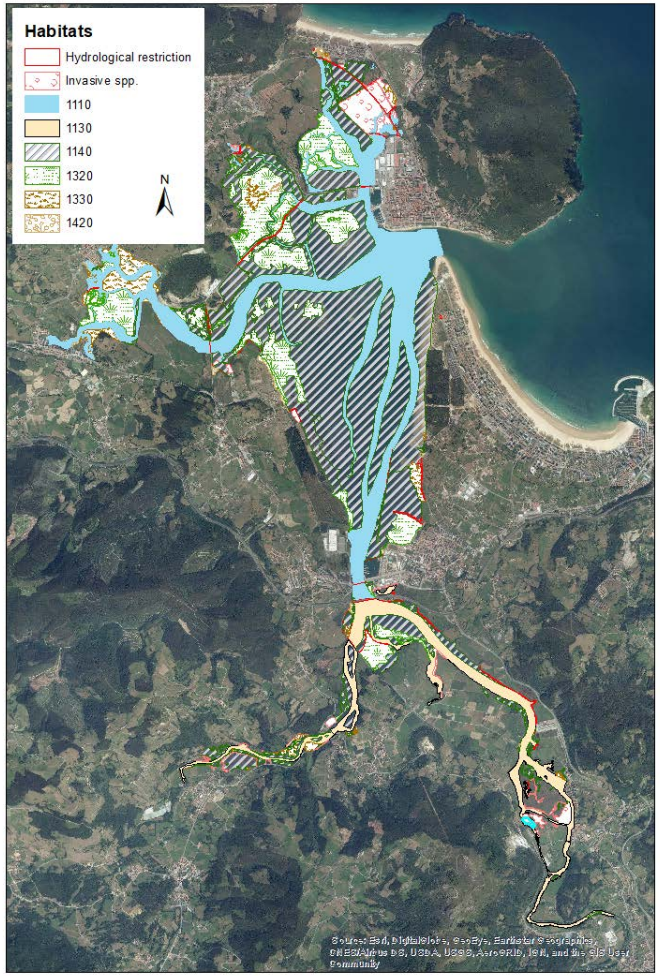
Detailed Habitat cartography







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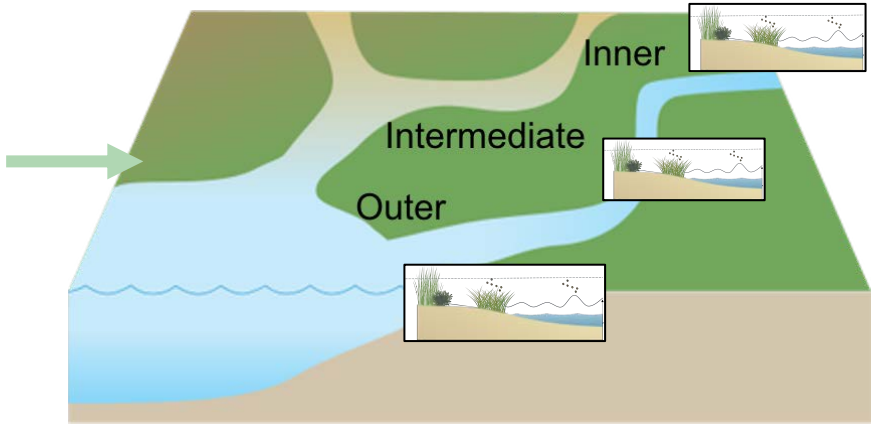
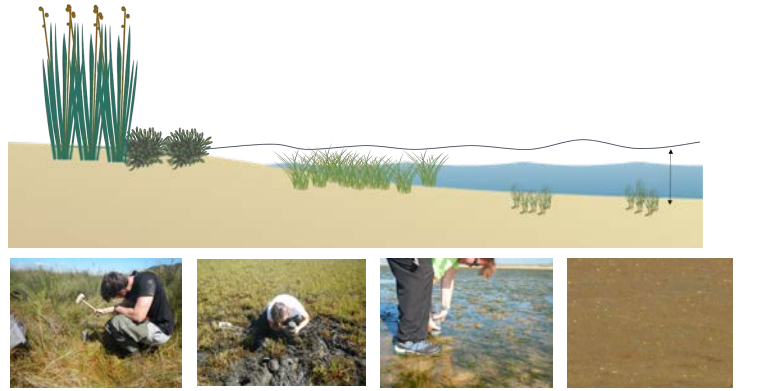
Carbon Sinks capacity





136 cores

➢ Top 30 cm soil C_{org} stocks

- DBD,
- C_{org} %DW
- Grain size
- ^{210}Pb

Habitat	#Cores
High marsh	45
Low marsh	30
Seagrass	17
Tidal sflats	44

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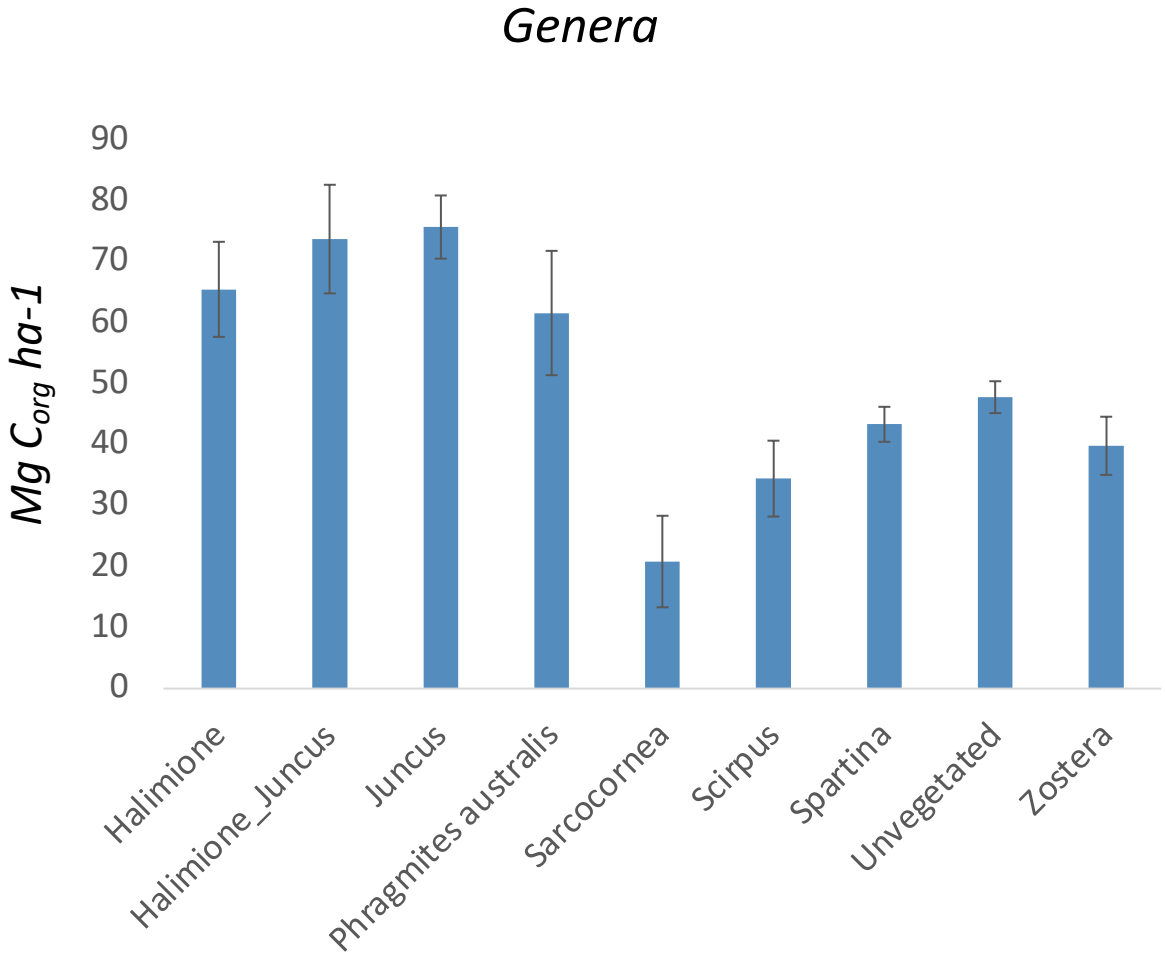
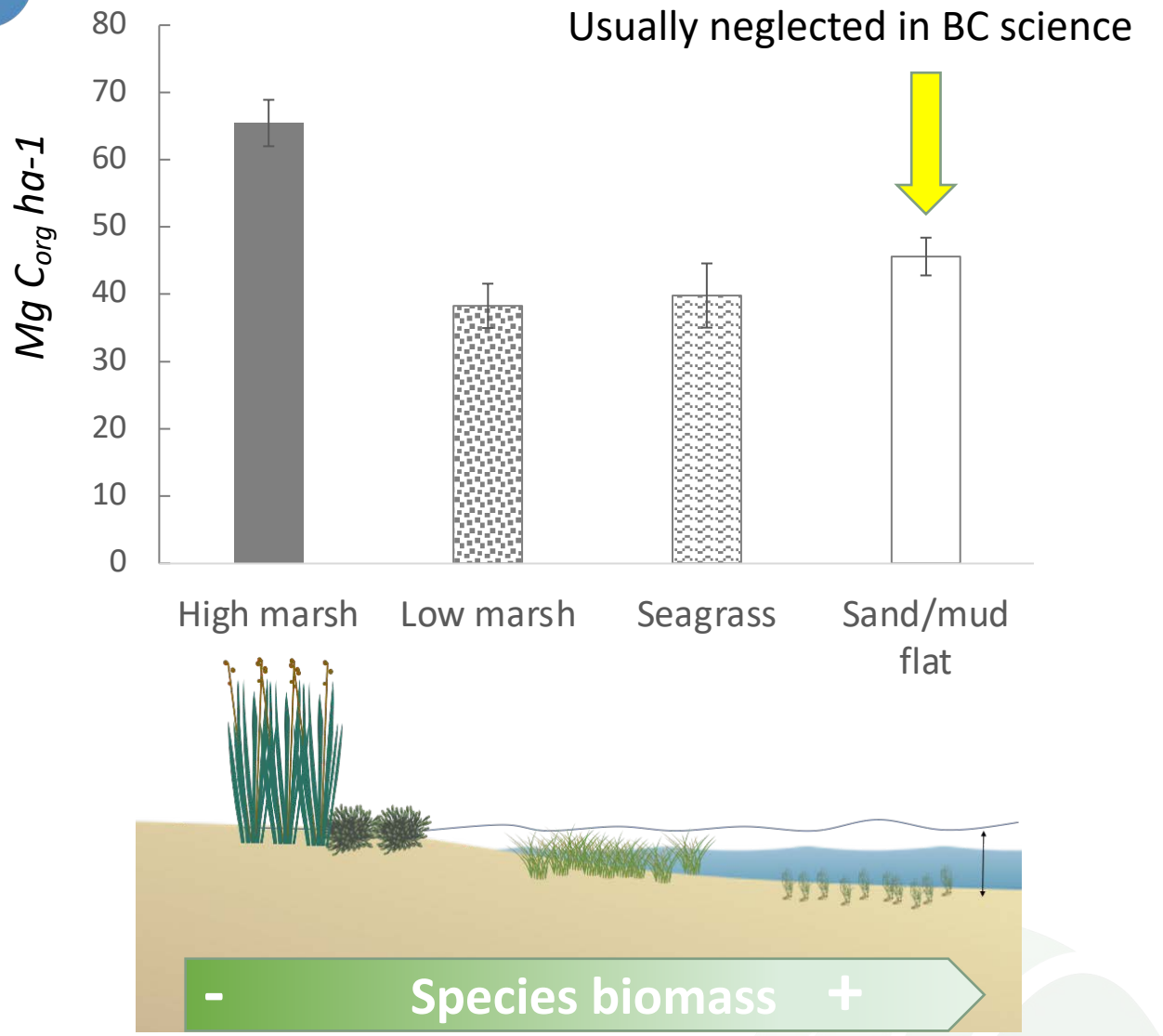
Carbon Sinks capacity

Larger stocks were usually found in large species located in the high marsh zone





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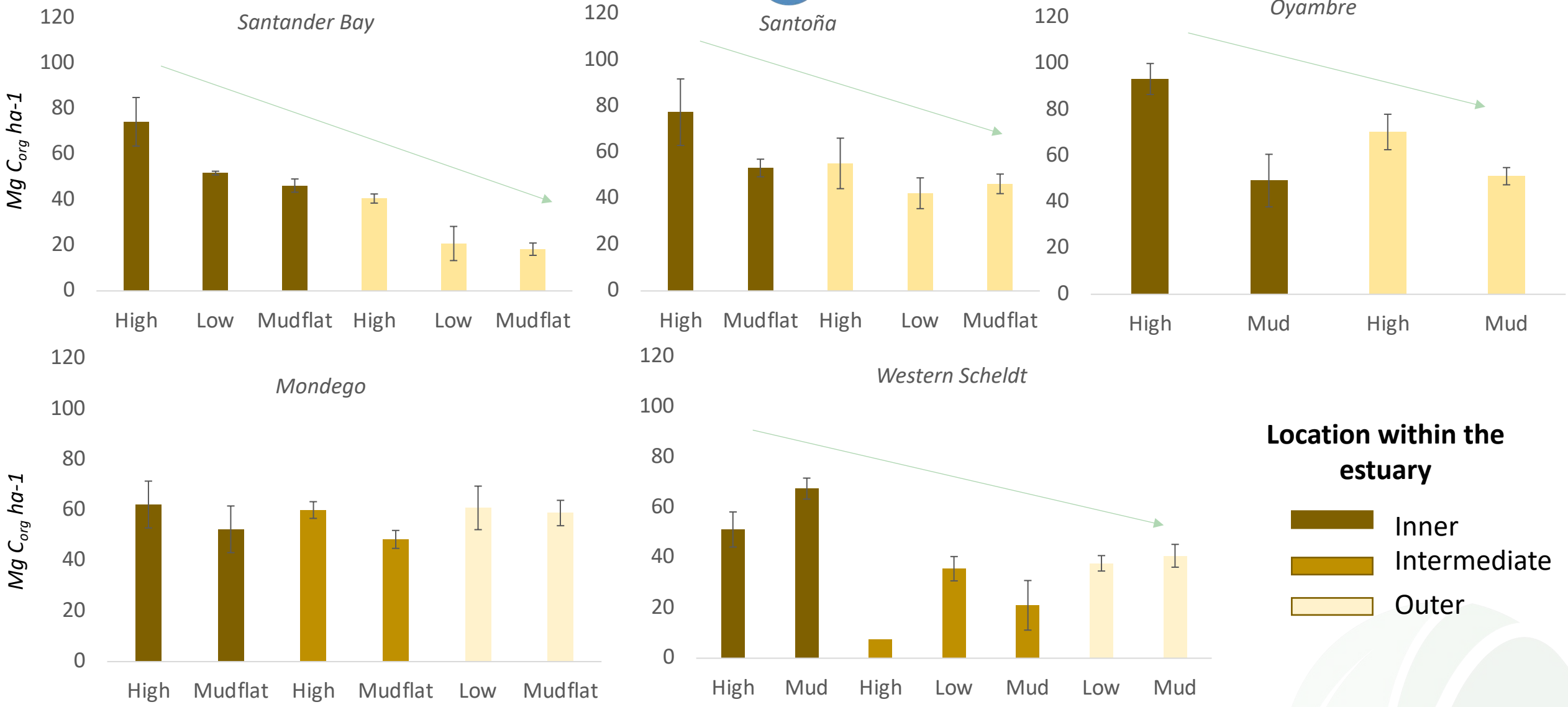
Carbon Sinks capacity



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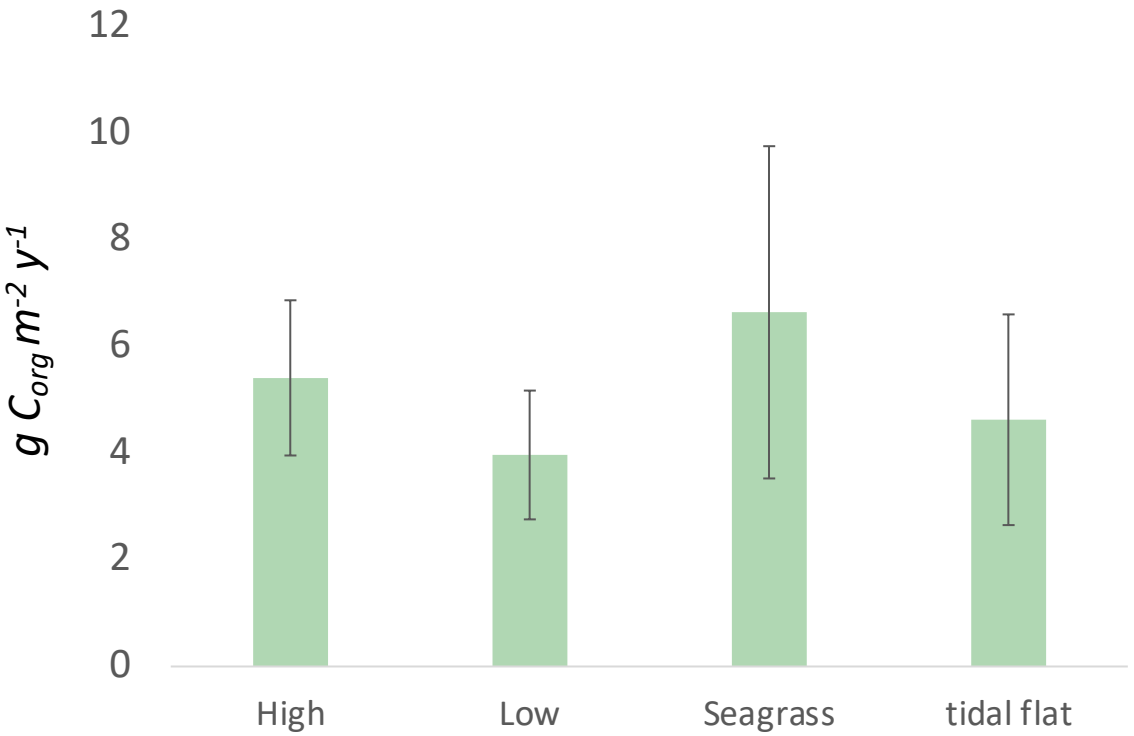
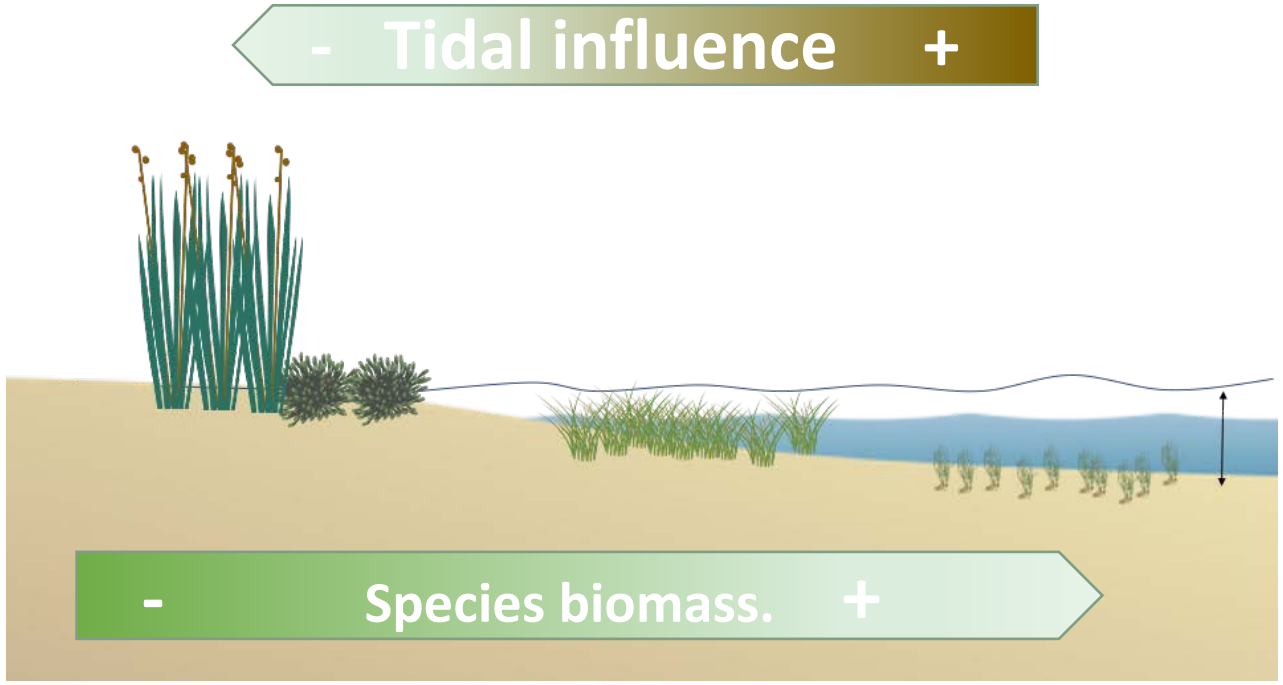
Carbon Sinks capacity

C_{org} burial since 1950 across marsh zones





C_{org} burial is similar across habitats despite different biomass due to the higher influence of the tide in lower intertidal areas where seagrass meadows and tidal flats are located.

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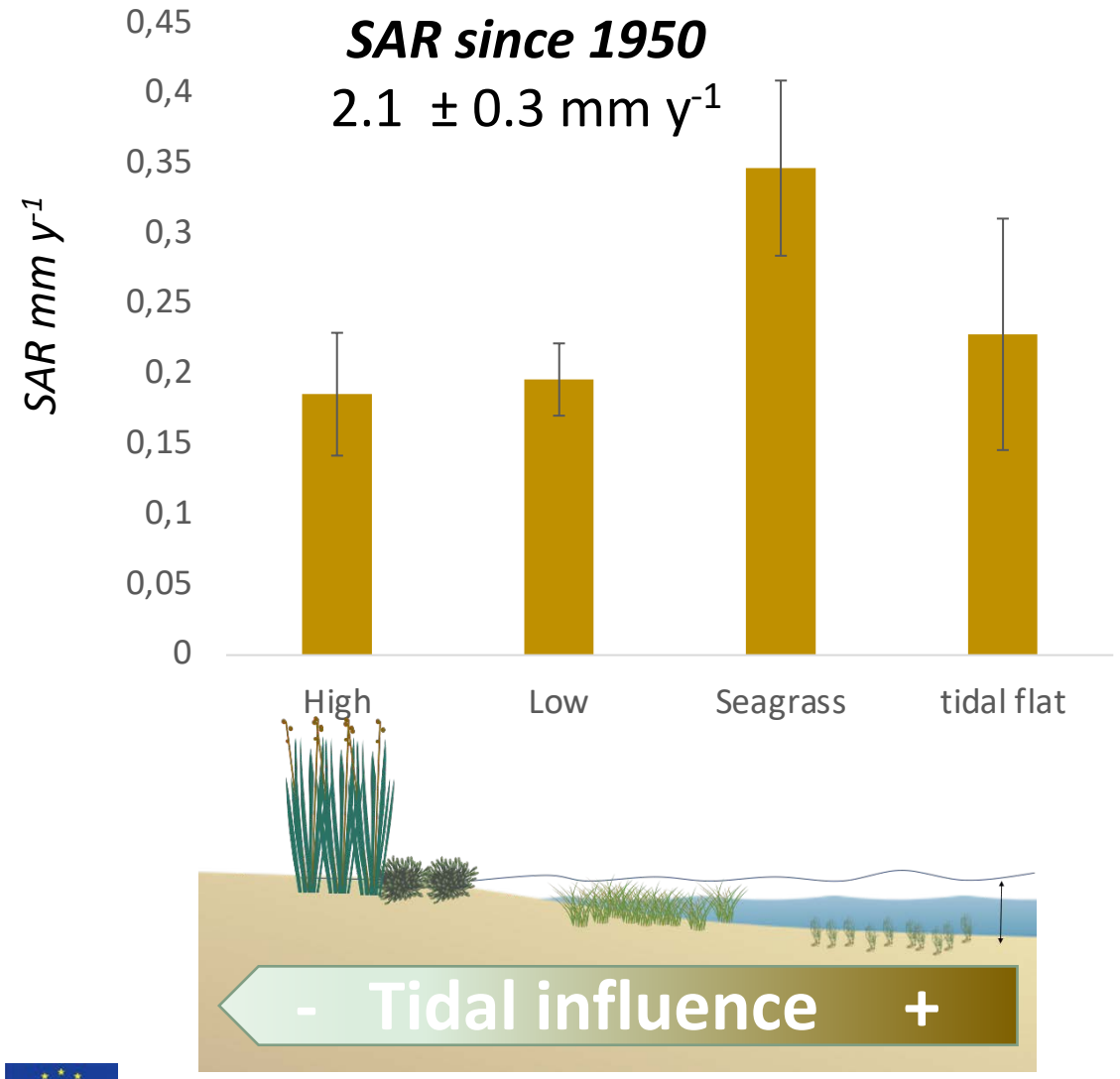
Sediment vertical accretion ratesince 1950 across marsh zones



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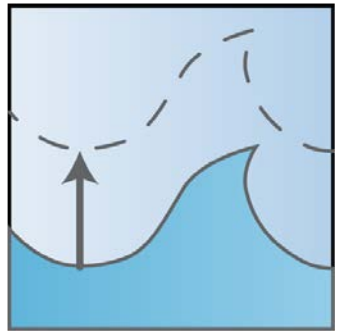
SLR since 1993

1-3 mm y^{-1}

(EEA, 2019l



SAR is higher in habitats located at lower intertidal range, subject to higher hydroperiods

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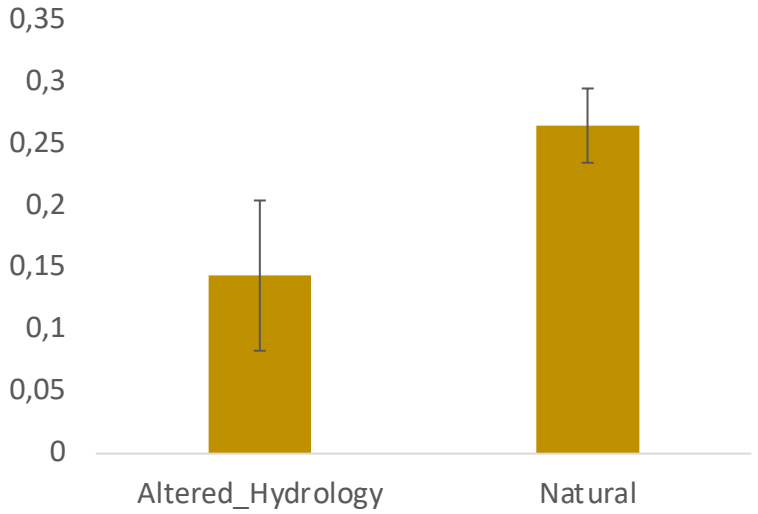
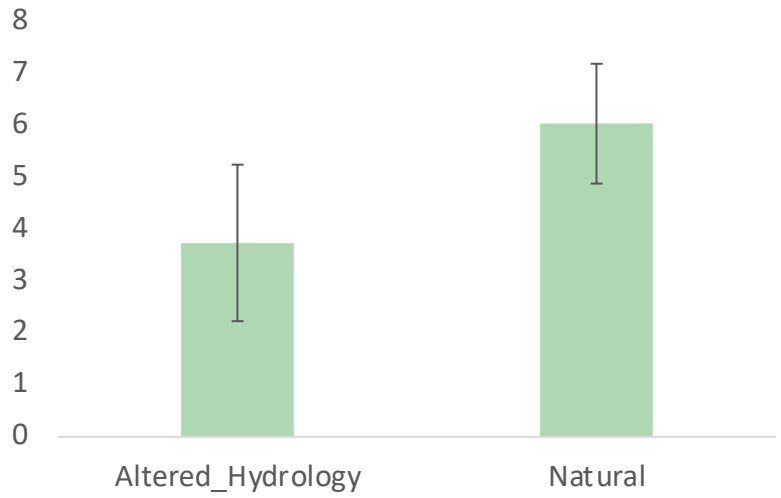
Carbon Sinks capacity

Impact of tidal restrictions





By Falk Arnhold
https://commons.wikimedia.org/wiki/File:J23_124_Marisma_de_Oyambre,_Trennungsdamm.jpg

→Lower C_{org} burial rates
→ Lower SAR

Natural tidal flow is key for C_{org} sequestration and sediment vertical accretion in estuarine habitats

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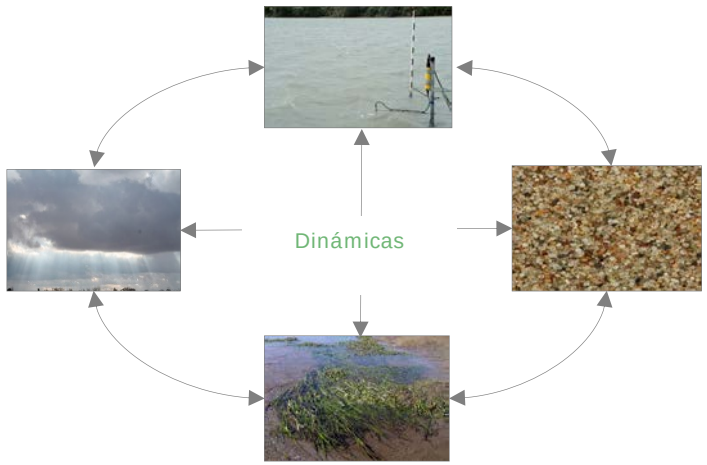
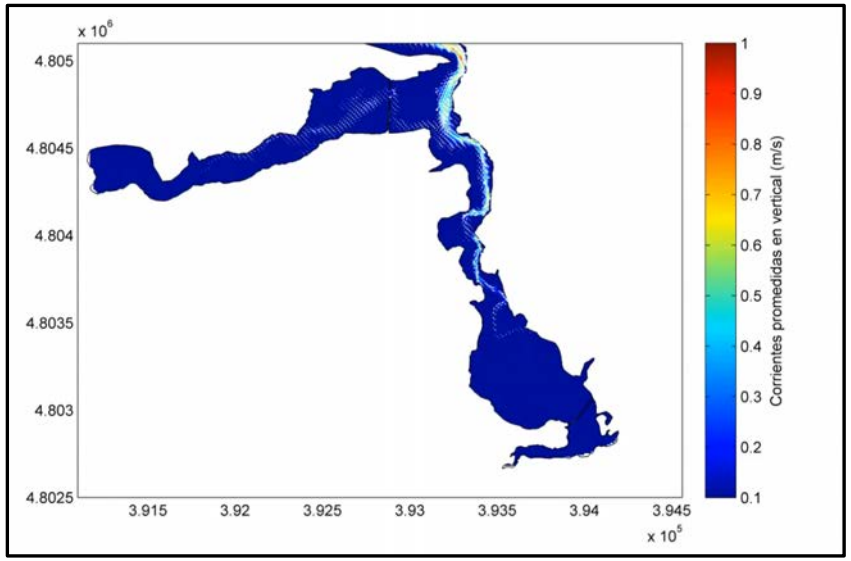
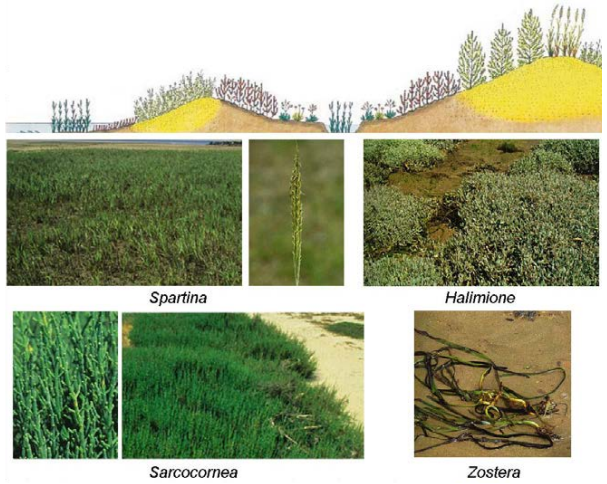
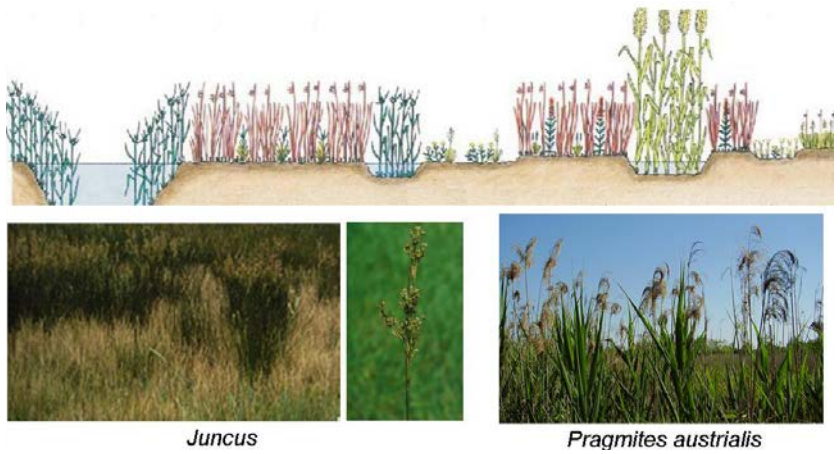
Coastal protection service



MODELO NUMÉRICO
(Delft3D)







- Height
- Coefficient friction
- Density

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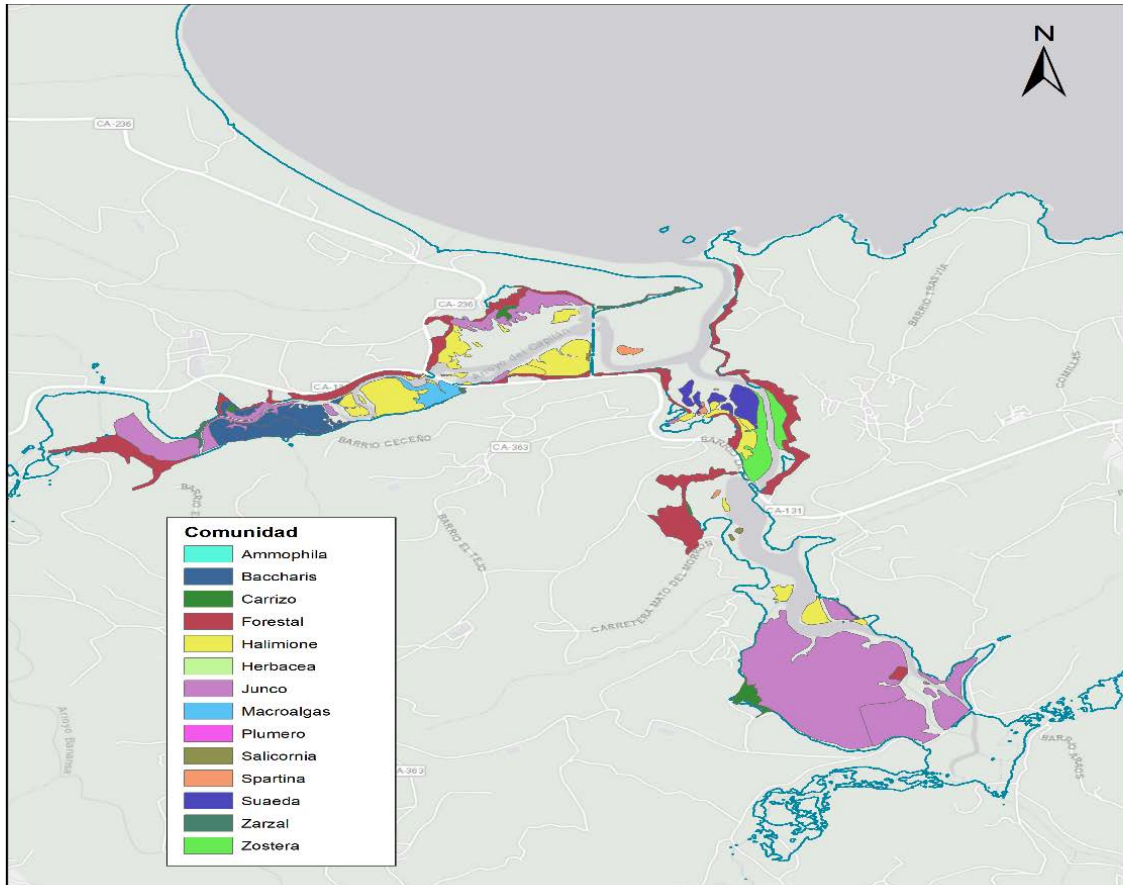
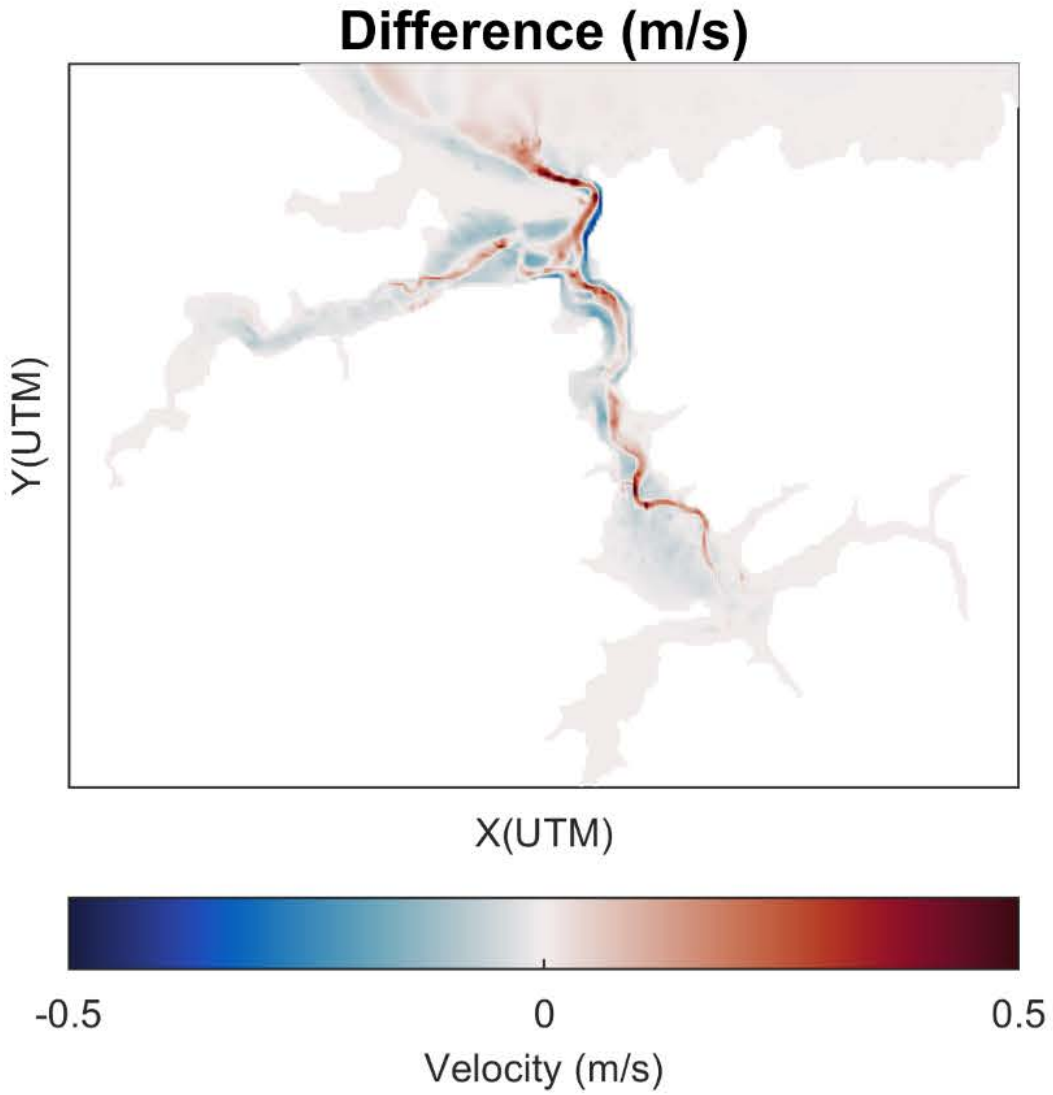
Effect on Water velocity: vegetation decreases water current velocity



Estuarine habitats distribution



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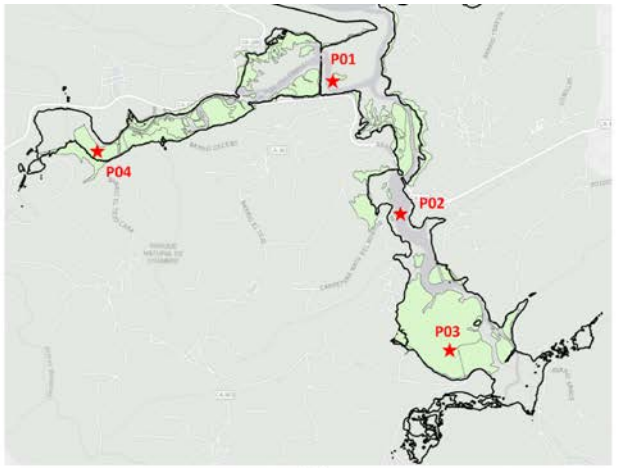
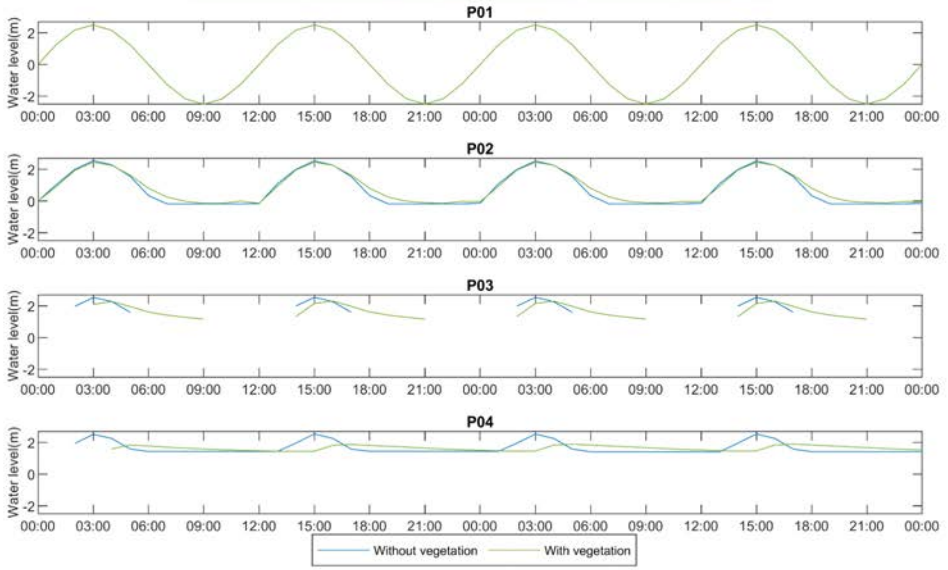
Effect on Water level: vegetation decreases water level





Higher effect at inner estuary sections

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Salt pond → Saltmarsh

- **Barriers**
- **Transplantations**
- **Wooden walkways**

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THANK YOU!

ANY QUESTIONS?

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www.. https://lifeadaptablues.eu/es/

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Symbols courtesy of the Integration and Application Network (ian.umces.edu/symbols/).