

# Doñana Mediterranean wetlands: a case study for ILTER Ecosystem Services Exercise

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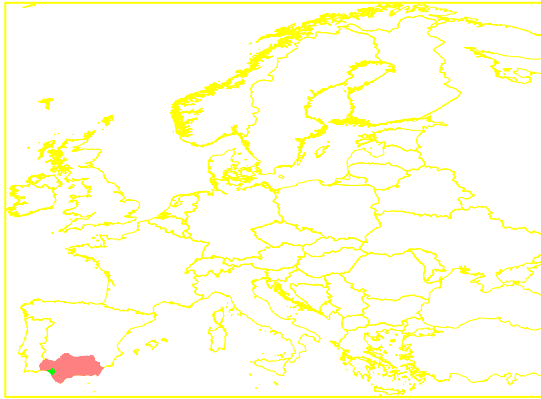


**LAST-EBD**

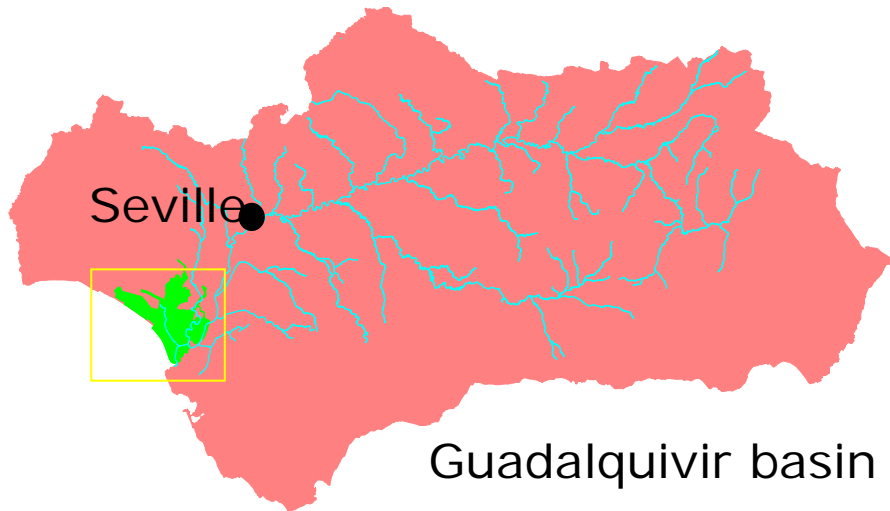
LABORATORIO DE SIG Y TELEDETECCIÓN  
ESTACIÓN BIOLÓGICA DE DOÑANA



# Doñana: location



Spain  
Andalouisie

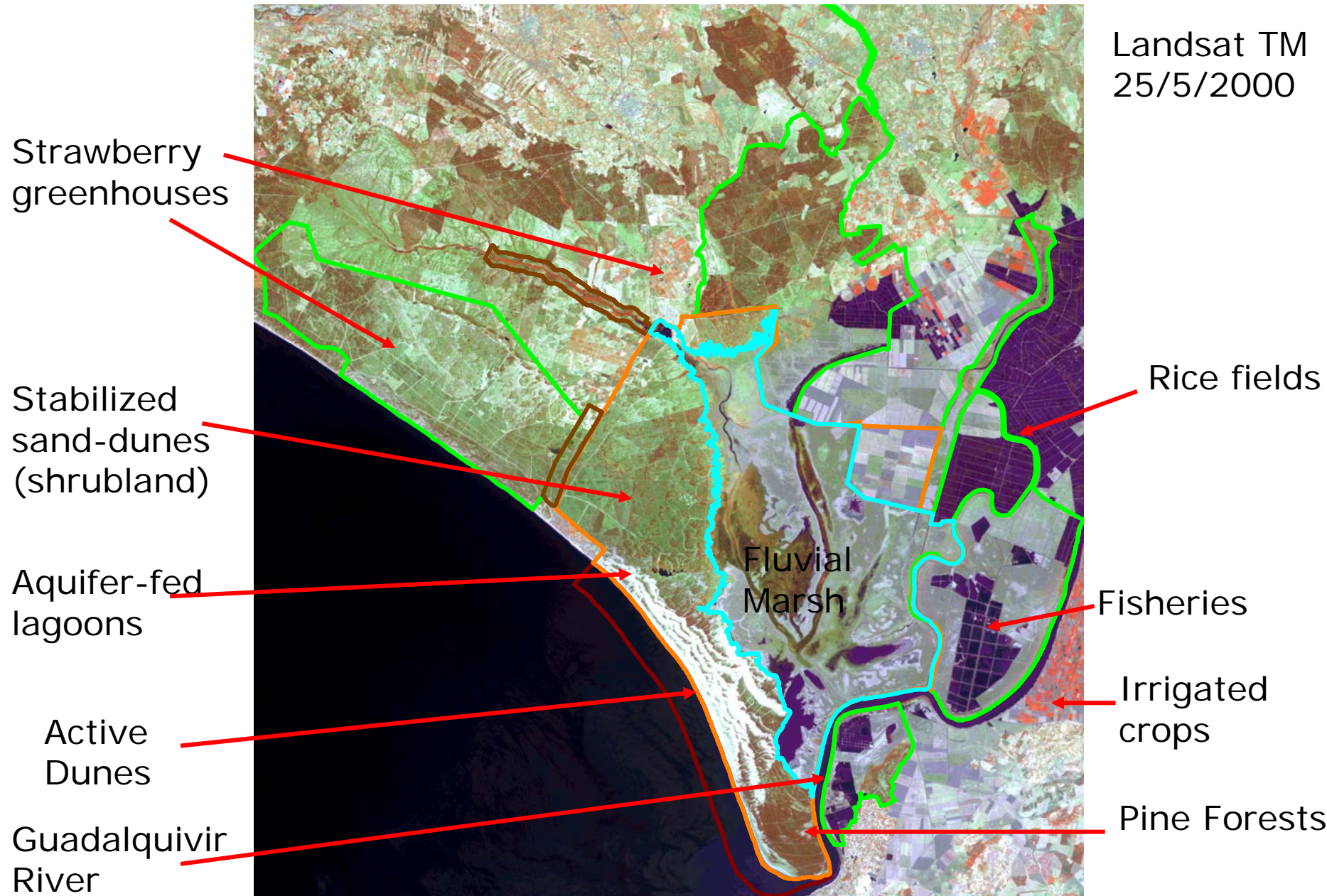


Guadalquivir basin

■ Doñana Natural Space (1130 km<sup>2</sup>)

■ LTSER platform (2736 km<sup>2</sup>)

# Doñana: Human land uses vs. Natural covers



Landsat TM  
25/5/2000

# Ecosystem services in Doñana LTSER Platform as Mediterranean wetland

Ecosystem Service	Direction of change	Primary drivers of change	Public awareness of service	Institutions that manage this service
Fresh Water	Degrading	human	High	CHG (Guadalquivir River Administration) & CMA-JA (Environmental Administration)
Intensive farming	Improving	human	High	CMA-JA, EU-CAP, Min. Of Agric
Fish & Aquaculture	Improving	human	Low	CMA-JA, EU-CAP
Cattle	Same	human	Low	CMA-JA, EU-CAP
Water regulation (Flood & Estuarine Control)	Degrading	Climate change; human	Low	CHG, CMA-JA
Natural hazard regulation (flooding, meteotsunamis)	Degrading	Landuse change	Low	CHG, CMA-JA
Air quality regulation	Degrading	Emissions	Medium	CMA-JA
Climate regulation	Degrading	Climate change	Low	CMA-JA
Pollination	Same	Climate change; Landuse change	Low	CMA-JA
Disease regulation	Same	Climate Change; Landuse change	Low	CMA-JA
Pest regulation	Degrading	Landuse change	Low	CMA-JA
Recreation and ecotourism	Degrading	Landuse change; Urbanization	High	Local
Spiritual and religious values	Improving	human	High	Local
Aesthetic values	Same	Landuse change; Urbanization	High	?
Cultural diversity	Same	Landuse change; Inmigration	Low	Local
Cultural heritage values	Improving	Landuse change	High	JA, Min. Of Culture
Educational values	Improving	Research & Outreach	Medium	JA, Min. Of Environment
Nutrients retention	Improving	Climate change	Low	CMA-JA
Primary production	Degrading	Landuse change	Low	CMA-JA
Photosynthesis	Degrading	Landuse change	Low	CMA-JA
Water cycling	Degrading	Climate change; human	Low	CMA-JA



# List of 6 critical ES that Mediterranean wetland ecosystems provide in Doñana LTSER Platform:

- Provisioning ES: *Fresh water, Food (Intensive Farming, Fish & Aquaculture)*
- Regulating ES: *Water regulation (marshland, river, groundwater), Natural hazard regulation (flooding, meteotsunami)*
- Cultural ES: *Recreation/tourism*
- Supporting ES: *Nutrient cycling*

# The 6 critical Ecosystem Services in Doñana LTSER Platform as Mediterranean wetland

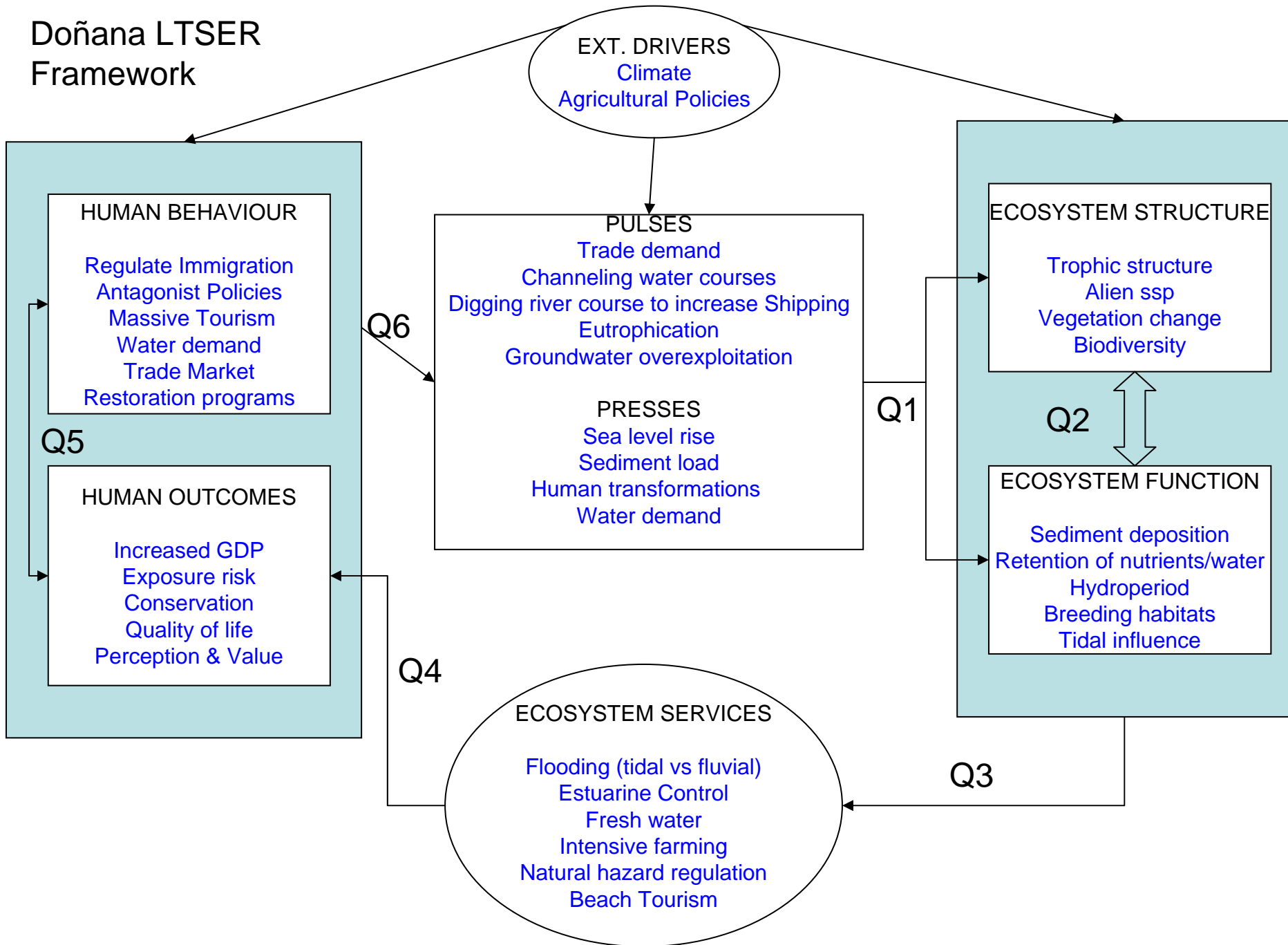
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# **Proposed 3 clusters of interactions among 3 ES:**

- Fresh water supply (and use) x intensive farming x recreation/tourism
- Water regulation x food (rice & aquiculture) x nutrient retention
- Natural hazard regulation x water regulation x recreation/tourism

Most critical ES of Doñana LTSER Platform as Mediterranean wetland:  
**Water regulation (Flooding and Estuarine Control)**

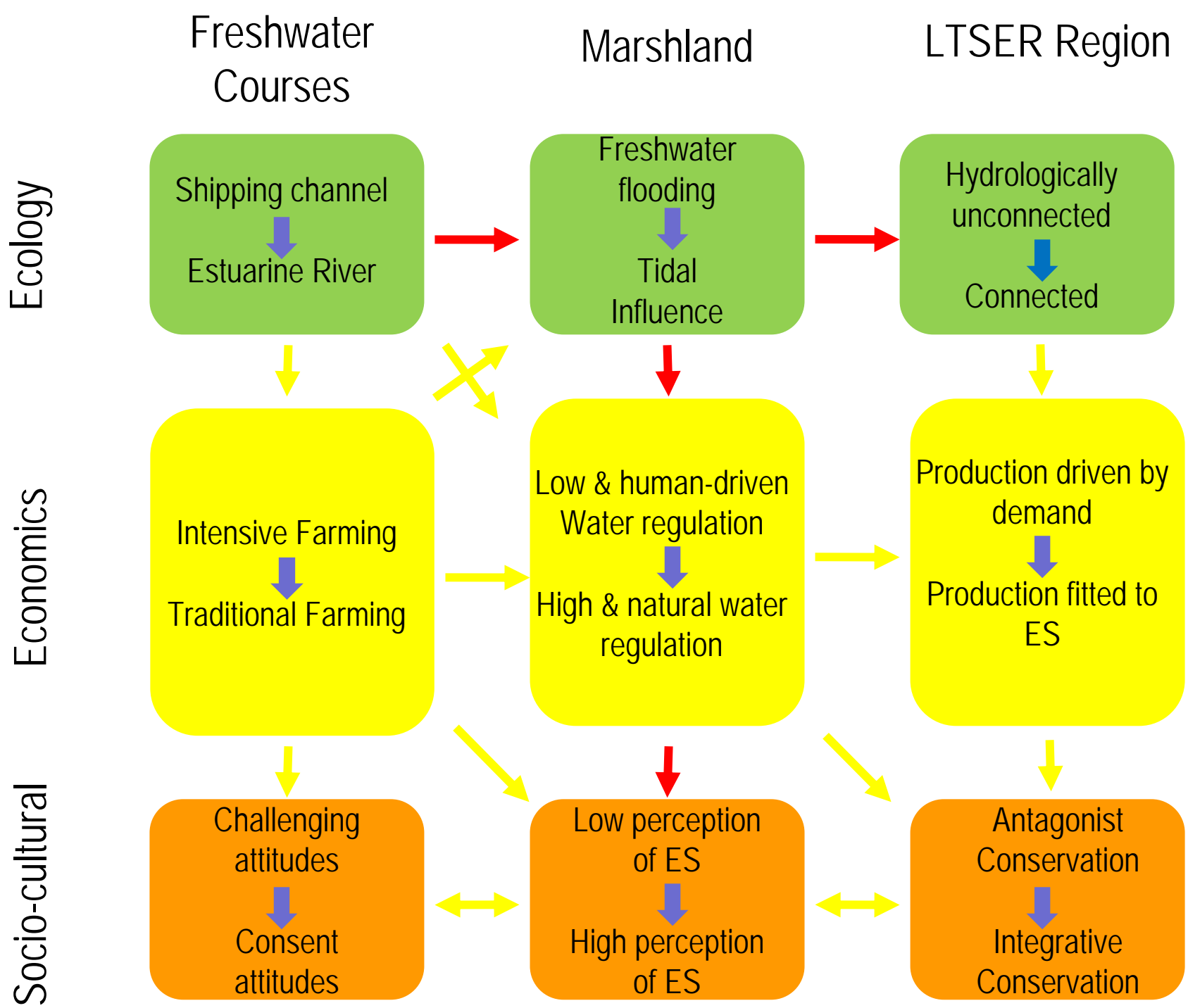
# Doñana LTSER Framework





# *Questions*

- **Q1:** How increased river water demand and shipping traffic alter ecosystem structure and function (by modifying estuarine functioning & favoring alien ssp introduction)?
- **Q2:** How are biotic communities (composition, trophic structure, alien ssp, ssp richness) affected by and interact with changes on hydroperiod, increased tidal influence and high sediment loads?
- **Q3:** How changes on marshland functioning (tidal influence, sediment deposition, availability of breeding habitats) affect flooding regulation, estuarine control and water demand for rice farming and aquaculture?
- **Q4:** How do changes in water availability and regulation modify conservation policies and affect basic economic activities (tourism, farming)?
- **Q5:** How do policies may play antagonist roles and immigration have to be regulated according to trade market?
- **Q6:** How the combination of trade, conservation and tourism policies influence the Doñana marshland flooding regime, both quantitative and qualitatively, and what are the main causes leading to match policies goals?



# Current and Possible Future States in the Doñana LTSER Platform

## *Current State*

### **Freshwater marshland**

No tidal influence  
No estuarine control  
Turbid water events  
Overflooding  
Low exposure risk  
Isolation  
Hydrologically Unconnected

## *Possible future states*

### **Business as usual**

- Bad river water quality
- Avoid marshland pollution
- Limit alien ssp
- Freshwater habitats & communities

### **Permeability restoration**

- Retrieval of Estuarine control
- High exposure risk
- Prevention against alien ssp
- Breeding habitats diversification

### **Active Conservation Policy**

- Control of pollution events
- Cautious decision-making
- Adaptive management
- Upscaling of policies to whole region based on ES