



REST-COAST

Ebro Delta Pilot Fact Sheet

M. Mestres and rest of team (WP6)

Ecosystem type

Marine, Coastal lagoons, Wetlands, Beach/dune systems

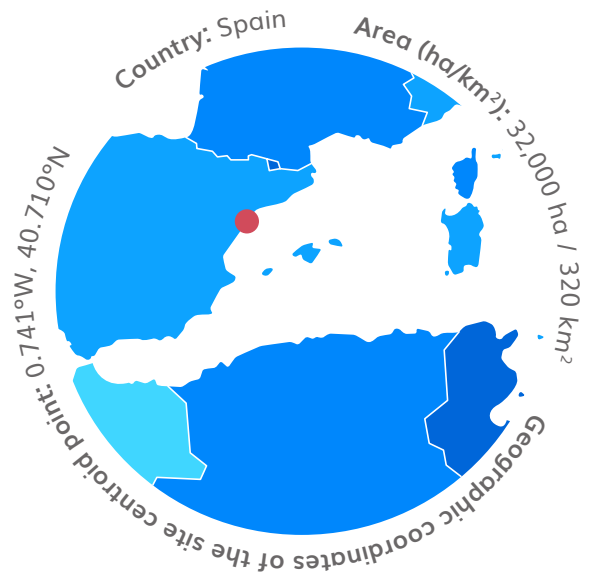
Key habitats

Sand beaches, wetlands, coastal lagoons

Key species

The most usual flora in the Delta is common reed (*Phragmites australis*), glasswort (*Arthrocnemum fruticosum*), tamarisk (*Tamarix sp.*), and sea rush (*Juncus maritimus*). In waterlogged land, reeds (*Phragmites communis* and *Phragmites communis isiacus*) and large bindweed (*Convolvulus sepium*) can be found, and in deeper, more permanent waters sedge (*Cladium mariscus* and *Carex sp.*) and reedmace (*Typha sp.*) are also present. Regarding the fauna, common fish include mullet (*Mugil cephalus*), cyprinids, serranids and eel (*Anguilla anguilla*), and the coast of the delta has won well-deserved fame for its sea species, which include gilthead (*Sparus aurata*), meagre (*Argyrosomus regius*) and red mullet (*Mullus surmuletus*). Birds make up the most striking aspect of the fauna in the Delta, with a population of 50,000 to 100,000 individuals belonging to over 300 species. The most common include mallards (*Anas platyrhynchos*), cattle egret (*Bubulcus ibis*), black-winged stilt (*Himantopus himantopus*), little egret (*Egretta garzetta*), grey heron (*Ardea cinerea*) and greater flamingos (*Phoenicopterus roseus*). In the Delta bays, aquaculture activity is focused on the Mediterranean mussel (*Mytilus galloprovincialis*) and the Pacific oyster (*Crassostrea gigas*), but other bivalves such as clams (e.g., *Ruditapes philippinarum*) and cockles (e.g., *Venus verrucosa*) are also harvested.

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Organisation responsible for the pilot

EURECAT and Universitat Politècnica de Catalunya



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Pressures, threats and issues

Despite the absence of coastal engineering structures, the Ebro Delta is a low-lying heavily anthropised environment whose evolution is conditioned by the balance between the sediment contribution from the Ebro river and wave (storm)-induced erosion.

In the last century, the sediment contribution from the river to the delta has decreased significantly (estimated at 99% reduction) due to the construction of numerous dams and weirs in the river basin, leading to an effective decoupling of the land-estuary-sea dynamics.

At the same time, natural erosion has been enhanced by increased storminess, with erosion rates exceeding 15 m/yr locally, particularly at the delta apex, more exposed to wave incidence. A significant fraction of the eroded sediment accumulates at the northern spit which separates the

Fangar bay from the sea. The spit growth reduces the bay's entrance, leading to longer water residence times and more frequent episodes of high water temperature and anoxia in the summer, thus affecting aquaculture activities.

The present level of conflicting uses (associated to the scarcity of water and sediment) will be aggravated with climate change and population dynamics, resulting in loss of territory and support for socio-economic activities. For instance, future changes in precipitation patterns may induce complex changes of the water management plan, sea level rise can lead to the permanent flooding of a relevant percentage of the Ebro delta, changes in wave direction may alter the coastal fringe shape; heat waves and droughts may require further control of the water uses.

With this in mind, the major risks the project will have to address include flooding/erosion and the improvement of water quality in the coastal lagoons.



Salicornia
Arthrocnemum fruticosum



Common reed
Phragmites australis



Mediterranean mussel
Mytilus galloprovincialis



Mallard
Anas platyrhynchos



Greater flamingo
Phoenicopterus roseus



Cattle egret *Bubulcus ibis*
Photo: Krista Lundgren/USFWS (c) CC-by-2.0

Expected impact of the project

- Partial restoration of riverine sediment fluxes by improving the river-coast-sea connectivity
- Reduction of coastal erosion risk linked to dune development and stabilisation.
- Improvement of the water quality in the coastal bay by using nature-based solutions to increase water renewal rates
- Restoration and conservation of coastal habitats (ESS, BDV)

Stakeholders

- Key decision-makers at National, Autonomic and Municipal levels
- Key policy makers (National and Autonomic)
- Land/sea/wetland and natural resource users
- Land/water and natural resources managers
- Delta Ebro Natural Park
- Conservation organisations
- Local businesses with direct impact/dependence on the site



Rigid coastal structure protecting the Vascos restaurant.
Photo: Taula de Consens, Aguaita.cat



Artisanal fishing in the Ebro Delta



Fangar Bay, in the northern hemidelta, with the bivalve farms

Key variables of relevance to REST-COAST

Key variables in the Ebro Delta pilot include water residence times in the deltaic bay (Fangar), erosion and flooding by wave action, flooding and land loss related to SLR, and accretion by longitudinal sediment transport, assessed in connection with the evolution of the Fangar sand spit and the reduction of the bay mouth's width. The use of site-specific numerical models will allow to foresee the evolution and effects of the selected restoration options upon the system under the different scenarios, measured in terms of the key variables, and their effect on the relevant ecosystem services. This is combined with the actual assessment of their impact using field monitoring of the relevant hydro-morpho-ecological processes

Out-and up-scaling implications

The environmental problems addressed at the Ebro Delta within REST-COAST are not specific to the selected study sites (Marquesa beach and Fangar Bay), but are common throughout the whole Delta. Erosion/flooding issues and coastal retreat are also hot topics at the southern hemidelta, where the narrow Trabucador barrier beach separating the Alfacs Bay from the open sea is subject to constant breaching linked to storm occurrence. As in Fangar Bay, the Alfacs lagoon also presents water quality issues that impact services such as fishing, mariculture and tourism. Thus, the solutions developed for the REST-COAST Ebro pilot are clearly out- and up-scalable to other sites within the Delta.