CATALONIA, SPAIN 🚾

PONDSCAPE : LA PLETERA



Pond Ecosystems for Resilient Future Landscapes in a Changing Climate

Ponderful

PONDS FOR CLIMATE

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WHAT IS A PONDSCAPE ?

DEFINITION

A pondscape is a network of ponds with spatial proximity ("connectedness") and the surrounding landscape matrix.

The boundaries of a pondscape may be determined by physical or ecological settings (a valley, a catchment, a set of ponds in a nature reserve) or even determined by societal or political criteria (urban ponds, provincial or national boundaries).

PRESSURE/THREATS ON PONDS AND PONDSCAPES

50-90% of pond losses in European countries over the past century. Furthermore, ponds are largely neglected in water- and nature-related national and EU policies and strategies, including the EU-WFD.

WHY IS IT IMPORTANT TO PROMOTE THEM ?



BIODIVERSITY ENHANCEMENT

Largely neglected and generally undervalued, ponds are remarkably important for biodiversity conservation. Pondscapes represent biodiversity hotspots.



DISASTER RISK REDUCTION

Ponds and pondscapes play a fundamental role in mitigating flooding and also constitute a water reserve to fight fires.



HUMAN HEALTH

Ponds and pondscapes provide a wide range of co-benefits for human societies such as support for human health and quality of life, spaces for physical activities, or social interaction, but also aesthetic experiences and educational and recreational activities.



CLIMATE CHANGE MITIGATION AND ADAPTATION

Given their abundance and their high productivity, ponds influence markedly the carbon cycle by acting as both carbon sinks and sources.



WATER MANAGEMENT

Pondscapes provide a water reserve that is particularly important in the context of water scarcity. It is particularly useful for watering animals and for irrigation.



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CONTEXT



Name of the pondscape : La Pletera Name of neighboring large town (in a 15 km radius): Torroella de Montgr (12'000 habitants) Bioclimatic zone : Mediterranean

Dominant land use : pondscape - Coastal salt marshes surrounding environment - tourist residential estate, agriculture





Pondscape area : 0.6 km² Pond : number: 20 density: 33/km² surface areas : 150 to 17'000 m² depths : 0 to 4 m ages : 5 to 20 years (some natural ponds present)

Land owner : Gobierno de España Land manager : Parc Natural del Montgrí, les Illes Medes i el Baix Ter Public access : peripheral paths and the whole beach accessible Public amenities : several footpaths and some hides



A deconstruction project where a failed attempt of urbanization was substituted by a fully functional salt marsh ecosystem



Latitude : 42.032043° Longitude : 3.1090959°





LOCAL COMMUNITY EXPECTATIONS



LOCAL POLICIES

La Pletera pondscape has been the focus of two LIFE projects, which have restored c. **60 ha of saltmarsh** habitats, in particular coastal lagoons.

Two natural ponds were restored and 18 new seasonal lagoons were created. This is a key habitat for the endangered fish species *Aphanius iberus*.

natural areas by people (physical and psychological experiences).

The area has been partially urbanized in early 1990's. The restoration projects have removed the urban infrastructure, restored the ecological function of the saltmarsh, and created **12 ha of habitats of Community interest (priority).**

In the first two years after restoration actions, the dune system has increased an average of **71% of its sand volume and 1m in dune height.**

La Pletera has a strong legal protection status. 100 % is classified as a Partial Natural Reserve within the Montgrí, Medes Islands and Baix Ter Natural Park. It is also part of the Natura 2000 Network and included in the Spanish Maritime-terrestrial Public Domain (DPMT), that forbids urbanisation and agriculture use in the area. Furthermore, La Pletera is included in the Catalonian Plan for Spaces of Natural Interest.

The Natural Park board and the Town Council of Torroella de Montgrí are both responsible for managing the la Pletera area, including actions to control and adapt accesses, maintenance of infrastructures (paths, viewpoints, signage, etc.), management of protected species, environmental education and other outreach activities.

The persistence of various intensive land uses in its immediate environment, in particular tourism and agriculture, constitutes the main threat to the fulfillment of the conservation goals. The collaboration among the Natural Park, the Town Council of Torroella de Montgrí and the University of Girona is a key factor for the effective implementation of the NbS at the site.



18

12ha

71%

00%

MAIN CHALLENGES AND OBJECTIVES



NATURE BASED SOLUTIONS (NBS)

Change in land use, restoration of existing ponds and new pond creation are the Nature-based Solutions put in practice at La Pletera to address the four identified societal challenges.

TOURIST RESIDENTIAL ESTATE FUNCTIONAL COASTAL ECOSYSTEM 1983 1987-1993 1988-2001 1999-2002 2010 2014-2018 2004 C Second Declaration Construction Declaration Included in Revision of First LIFE Na-LIFE Nature of the first the urbanism ture project. of 60ha as the recently of 81ha as public zone Project for plan : declaracreated building Creation of urbanizable Natural Park definitive tion of natural some new restoration area coastal ponds PONDS AND PONDSCAPE MANAGEMENT - Protection status - Removal of unfinished Public use: building works Recovery of salt - Change in land use - Pond creation and marsh capacity to - Peripheral restoration prevent flooding footpaths and open - Recovery of a coastal during sea storms access to the beach, habitat parallel to the Prevention of beach but not to the dunes seashore, formed by lagoons erosion surrounded by salt marsh or the salt marsh Adaptation of the vegetation to prevent human coast line to climate - Restoration to a fullypressure in the change functional dune system natural areas - No human intervention in water and nutrient dynamics 4



TECHNICAL DESIGN

MAIN RESTORATION ACTIONS

1. Removal of the promenade and the breakwater

2. Removal of paved streets and accesses

3. Restoration of the front dune

4. Removal of the dams that limit lagoons overflow



ECOLOGICAL CRITERIA APPLIED IN RESTORATION DESIGN

- A. Recovery of the ecological functioning of the coastal ecosystem
- **B.** Improvement of the existing population of the endemic Iberian toothcarp (*Aphanius iberus*)
- C. Non-intervention in areas still maintaining salt marsh vegetation
- D. Recovery of the topographical levels existing before the urbanisation process

E. A design of the ponds distribution that recalls the existence of an unfinished urbanisation process in the area

POTENTIAL THREATS

Issues addressed by the restoration work

- Habitat destruction and degradation due to the presence building work.
- Reduction of run-off areas for seawater during sea storms, causing marine intrusion. Little capacity for lagoons to flood.
- Dune degradation and sand loss with risk of sand building up in the salt marsh.

Partly addressed and improving issues

- Water eutrophication and anoxic conditions due to confinement.
- Presence of invasive species, such as the Mosquitofish (Gambusia holbrooki).
- Over-frequentation.



SUCCESS STORY AND TRANSFERABILITY

1. HABITAT CREATION AND MAINTENANCE FOR THE CONSERVATION OF BIODIVERSITY





Aphanius iberus

The creation of several new lagoons favors the conservation of the populations of the endemic Iberian toothcarp (*Aphanius iberus*).

This species competes with the invasive mosquitofish (*Gambusia holbrooki*) in most lowland waterbodies. In La Pletera both species coexist, with high saline conditions favoring the Iberian toothcarp.



Charadrius alexandrinus

The Kentish Plover (*Charadrius alexandrinus*) is a bird that builds a cryptic nest on the sand. Overfrequentation and trampling caused a dramatic decrease on their populations that recovered after restoration.

Can you find the nest?





NATURE'S CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS



SPECIES RICHNESS

Aquatic plants : Water birds : Amphibians : Dragonflies : Families of invertebrates :

AMOUNT OF

Conservation priority species : **6** Species in the Directive Habitat Annexe : **6*** *Aphanius iberus, Epidalea calamita, Hyla meridionalis, Pelobates cultripes, Emys orbicularis, Mauremys leprosa.* Invasive alien species : **5**

CONTRIBUTION TO REGIONAL RICHNESS

Only few species adapted to the changing conditions of temperature, salinity and nutrient composition are able to colonize these salt marshes. These species, however, have a very reduced distribution due to the destruction and urbanization of these coastal habitats. With the presence of these rare species, these ecosystems make important contribution to regional diversity.



SUCCESS STORY AND TRANSFERABILITY

2.RECOVERY OF THE ECOLOGICAL FUNCTIONING AND ADAPTATION TO CLIMATE CHANGE





The restored saltmarsh has been built maintaining the characteristic hydrology and nutrient dynamics of these habitats, thus guaranteeing the conservation of the typical community structure of Mediterranean coastal ponds. The newly created habitat responds effectively to the predicted effects of climate change, that include higher sea levels and more frequent severe sea storms.

This recovery strategy is easily applicable to other degraded coastal areas.

La Pletera after a strong flooding event (January 2020), flooded but with no significant damage or erosion to the coast.

NATURE'S CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS

REGULATION OF SEA WATER FLOODINGS

Hydraulic model of sea water intrusions after a strong sea storm during urbanised (left) and after the removal of the indrastructures (right).

Sea water flooding (in blue) hardly breaches the saltmarsh limits (green dashed line) after restoration.

Before restoration, man made infrastructures forced sea water to flood fields beyond the saltmarsh.

Red line, limits of the Nature 2000 network.





SUCCESS STORY AND TRANSFERABILITY

3. COEXISTENCE OF NATURAL HABITATS AND TOURISM



The conservation of biodiversity is compatible with a high frequentation and the enjoyment of nature by people if they respect the limits of the protected areas.





NATURE'S CONTRIBUTIONS TO PEOPLE AND MEASURED INDICATORS



Number of people/walkers visiting the pondscape (leisure, tourism, fishing, nature 94'5000 watching etc.) (number/year)

31'600

Number of bicycles circulating per year

Self-reported satisfaction well-being (scale 1 to 5) before (2014), immediately after (2018) and 5 years after (2022) the restoration :







COSTS AND BENEFITS ANALYSIS





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PHOTOS CREDITS

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