



LAYMAN'S REPORT

LIFE12 NAT/IT/000331



**“Habitat 1150* (Coastal lagoon) recovery by
SEagrass RESTOration.
A new strategic approach to meet
HD & WFD objectives”**

THE PROBLEM

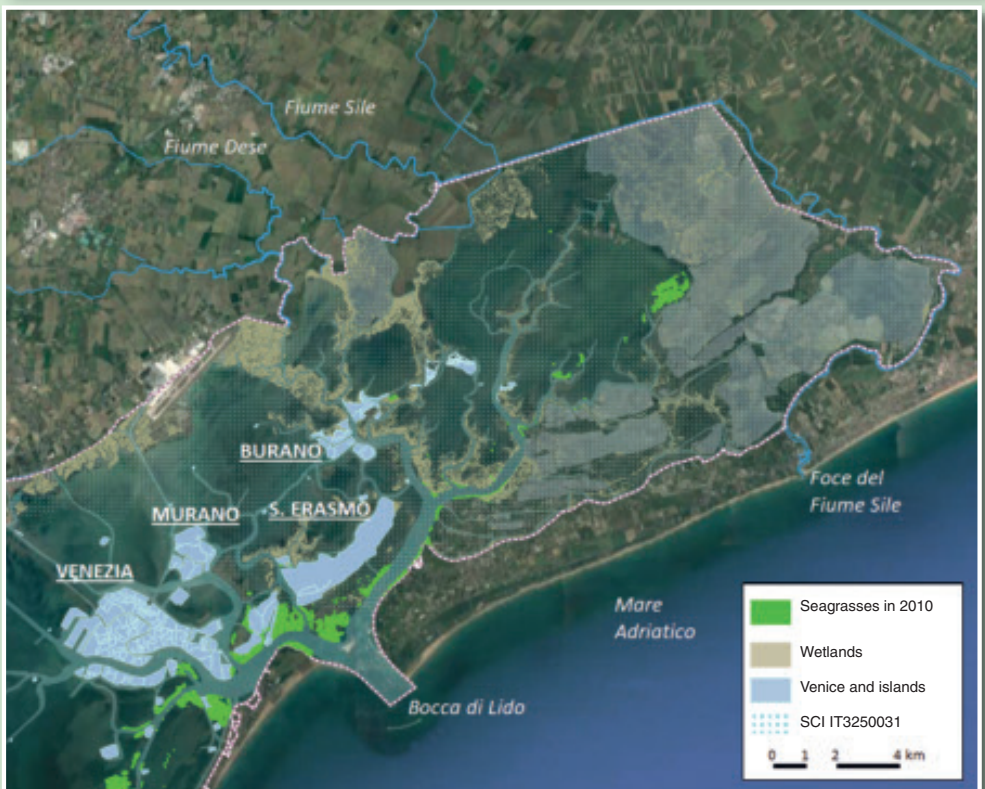
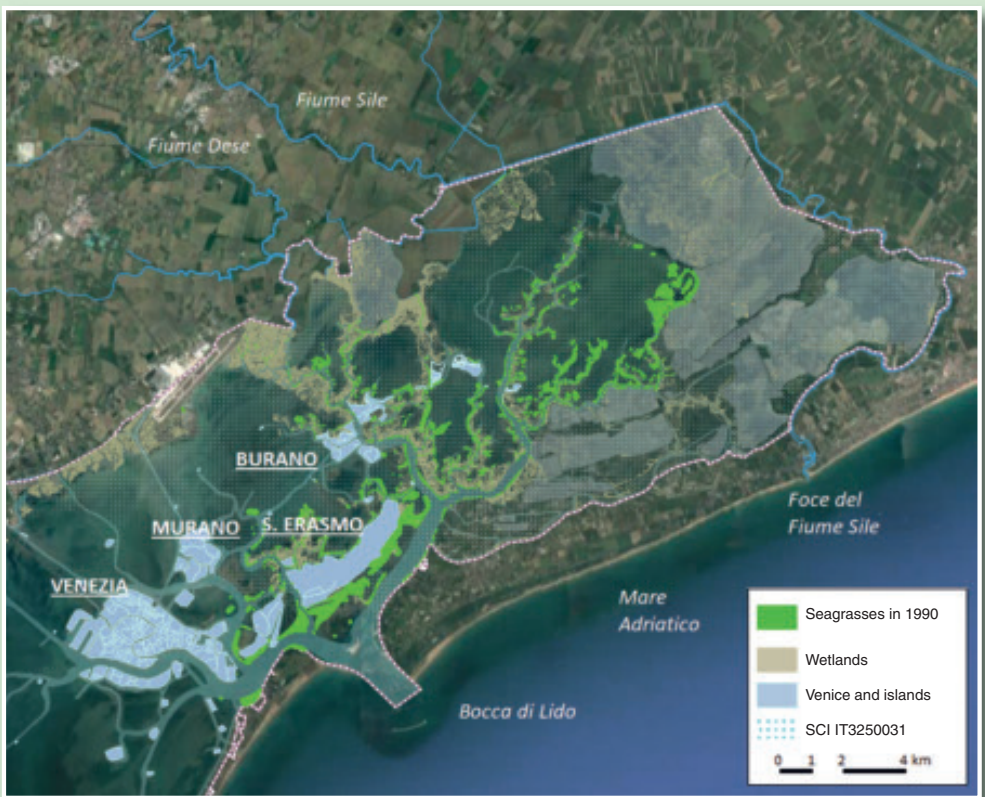
Seagrass beds underwent a marked reduction worldwide during the last decades of the 20th century. Also in Venice lagoon the seagrass cover almost disappeared in large parts of the central and northern basins. The main causes have been the eutrophication phenomena occurred in the 1980s and 1990s, turbidity and sedimentation rate increases, and bottom erosion related to anthropogenic activities such as mechanical clam collection, naval traffic and sediment dredging.

From 2011/2012, the ecological conditions of the Northern lagoon displayed an improvement, thanks to interventions and rules aiming at reducing nutrient concentrations and clam harvesting with mechanical dredging systems. The conditions then seemed favourable to allow seagrass re-colonization, but the natural process was hampered by low hydrodynamism and exchanges with the rest of the lagoon.

Ca' Foscari University of Venice, together with local and national authorities (PROVV OOPP, ISPRA) and stakeholders (Laguna Venexiana ONLUS), promoted the LIFE SeResto project to trigger the seagrass re-colonization by means of small, low-cost and efficient transplantation activities.



Zostera marina

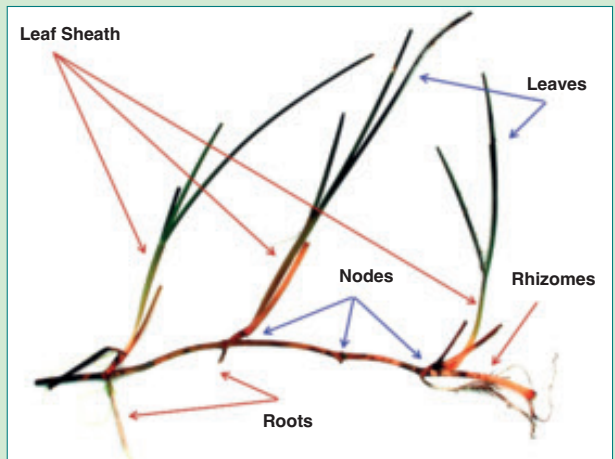


The maps illustrate the seagrass cover distribution in 1990 and in 2010 (courtesy of PROVV OOPP). The marked regression in the Northern lagoon basin is clearly evident.

WHAT ARE SEAGRASSES?

They are flowering plants with **roots, stems/rhizomes and leaves**. Seagrasses can reproduce sexually by means of flowers and seed dispersion and asexually by means of rhizome growth. They live underwater in marine ecosystems and can be pluriannual or perennial.

Cymodocea nodosa



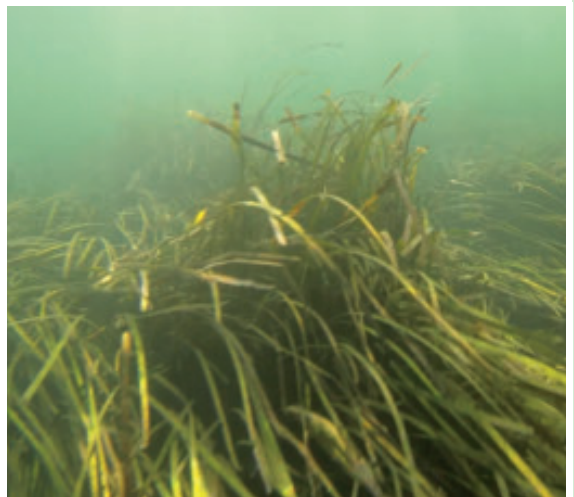
WHAT ARE SEaweeds?

They are organisms with an undifferentiated structure (thallus): Laminar, filamentous, crustose, etc. Seaweed reproduction occurs by means of spores and gametes with dimensions of a few microns produced in single cells or multicellular organs. The seaweeds colonizing degraded environment have a seasonal life cycle.

Ulva thallus

WHY ARE SEAGRASSES IMPORTANT?

Seagrasses are ecosystem engineers and the habitat they form is suitable as nursery, shelter and grazing area for macrozoobenthos and fish fauna. Moreover, they contribute to stabilize the sea bottoms, reduce erosion processes and wave actions, and trap permanently high CO₂ amounts.





WHAT IS HABITAT 1150* «COASTAL LAGOONS»?

Habitats 1150* «Coastal lagoons» include expenses of shallow coastal salt water, of varying salinity and water volume, wholly or partially separated from the sea by sand banks or shingle. Salinity may vary from brackish conditions to hypersalinity depending upon rainfall, evaporation and inputs of both freshwater from rivers and seawater from storms, temporary winter flooding and tidal exchange. Being located between the land and the sea, these habitats have peculiar ecological conditions and a marked spatio-temporal variability of physico-chemical parameters (e.g. salinity, nutrients), hydrodynamism and morphology.

The presence of seagrasses in coastal lagoons is indicative of high ecological and conservation status.

WHAT ARE THE *SITES OF COMMUNITY IMPORTANCE (SCI)* AND THE *NATURA 2000 NETWORK*?

Natura 2000 sites have been designated specifically to protect core areas for a sub-set of species or habitat types listed in the Habitats (92/43/EEC) and Birds (79/409/EEC) Directives. Natura 2000 network includes the **Sites of Community Importance (SCI)**, that contribute significantly to the maintenance or restoration at a favorable conservation status of natural habitat types and/or species.



OBJECTIVES

The main objective of LIFE SeResto (LIFE12 NAT/IT/000331) is to recover the environment and the Ecological Status of SCI IT3250031 ("Northern Lagoon of Venice") by restoring habitat 1150* and its associated flora and fauna.

The project activities were addressed at:

- Consolidating and restoring aquatic habitat 1150* via the transplantation of submerged aquatic angiosperms;
- Contributing to the achievement of good Ecological Status in transitional water bodies, demonstrating the effectiveness of the proposed measures in meeting the objectives of the Water Framework Directive (Dir. 2000/60/EC Article 4);
- Quantifying and making good use of the ecosystem services provided by the lagoon environment and the aquatic angiosperms of habitat 1150* in particular.





INTERVENTION STRATEGY

The project interventions are planned to trigger a process of aquatic angiosperm recolonization, mainly through the transplantation of *Zostera marina* and *Zostera noltei* at small sites distributed throughout a large area. The proposed intervention technique involves the transplanting of a small number of plants, with lower costs and impact on the donor sites, but with a positive impact at large scale. The strategy is to exploit the natural dispersion of plants, starting a self-sustaining process.

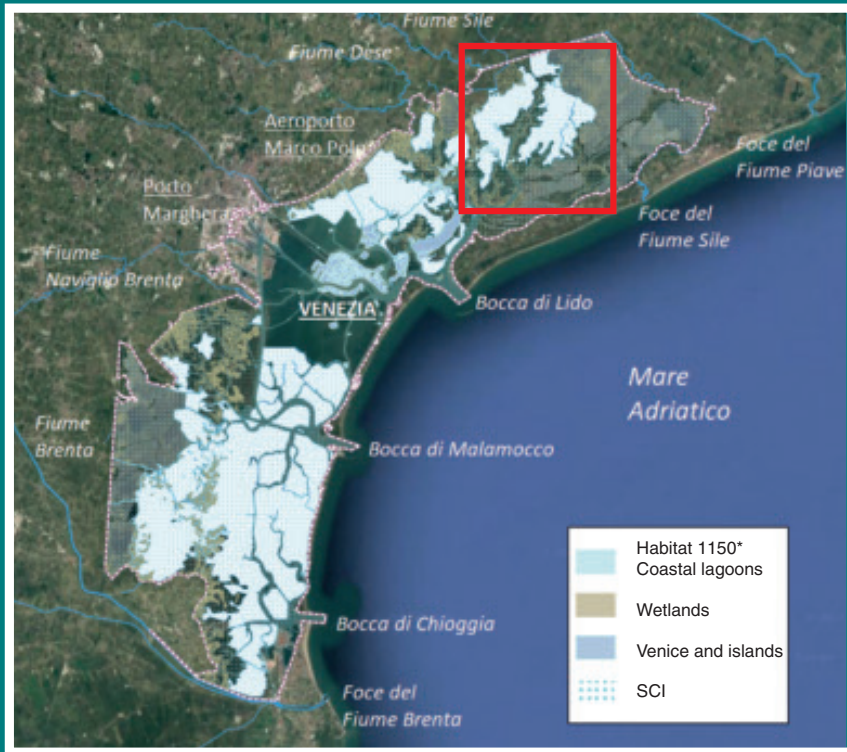
Don't replace nature but work with nature!

The main project guidelines are:

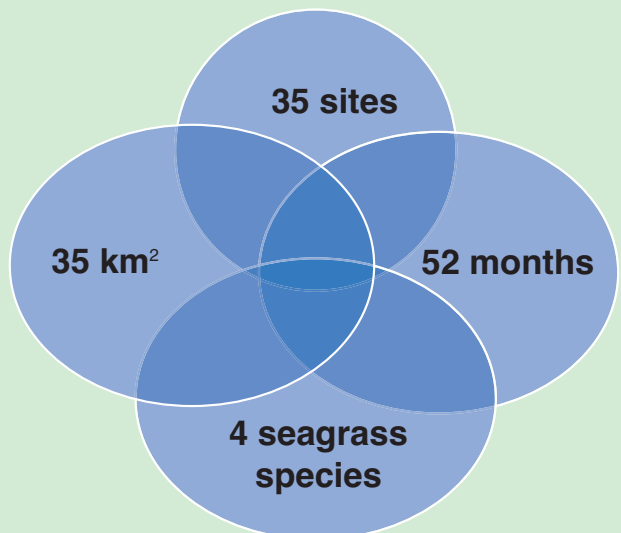
- Choosing several small sites in a large intervention area
- Using small amounts of plants (maximum sod diameter 25-30 cm) and mainly rhizomes, which collection has no significant impacts on donor sites (most of the plants were donated by northern lagoon fish farmers)
- Employing manual work, which requires no mechanical means and keeps costs low
- Involving local operators (**fishermen, hunters, rowers, naturalists**), who know and live the lagoon on a daily basis and work respecting the environment.



INTERVENTION



**Projects
numbers**



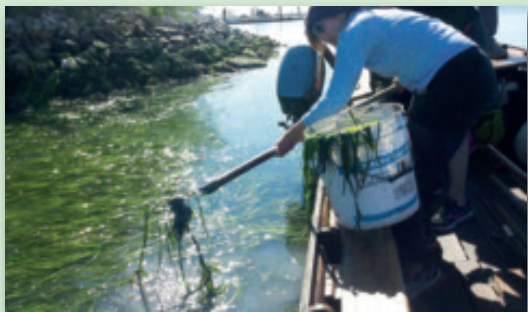
TRANSPLANTATION ACTIVITIES



**330 sods transplanted
23.3 m²: sods collected from donor sites**



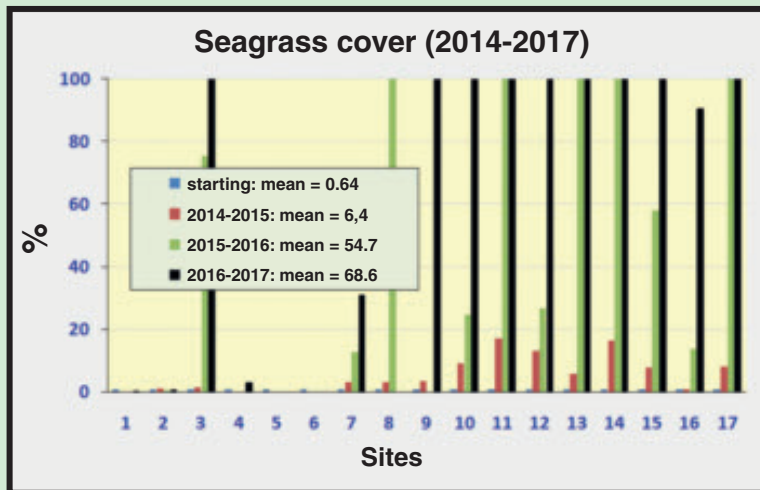
In cooperation with fish farmers, fishermen, hunters and sport clubs



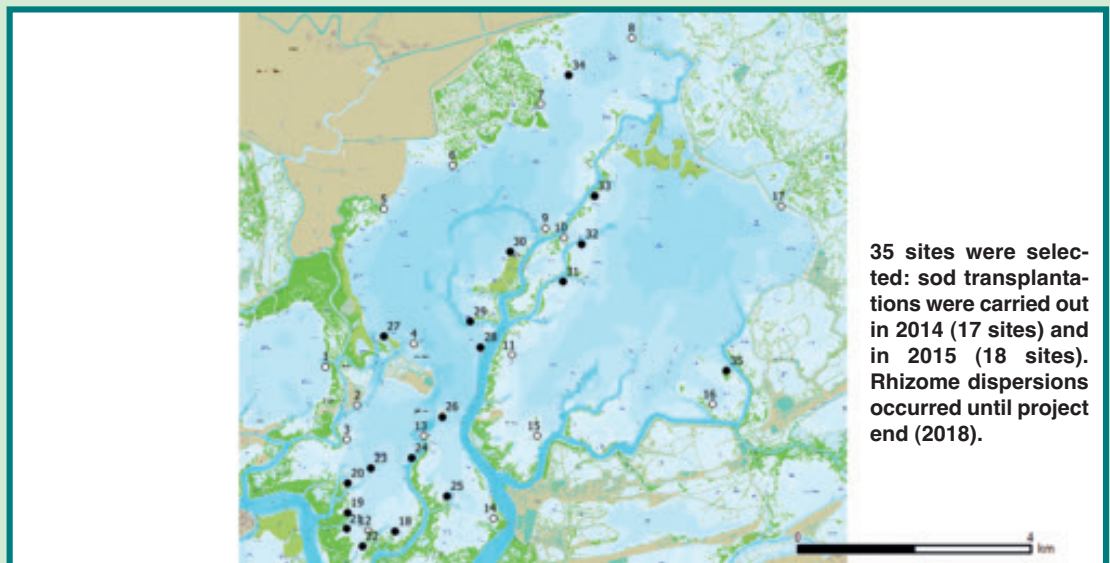
65000 rhizomes transplanted!



HOW MUCH DID SEAGRASS COVER CHANGE DURING THE PROJECT ACTIVITIES?

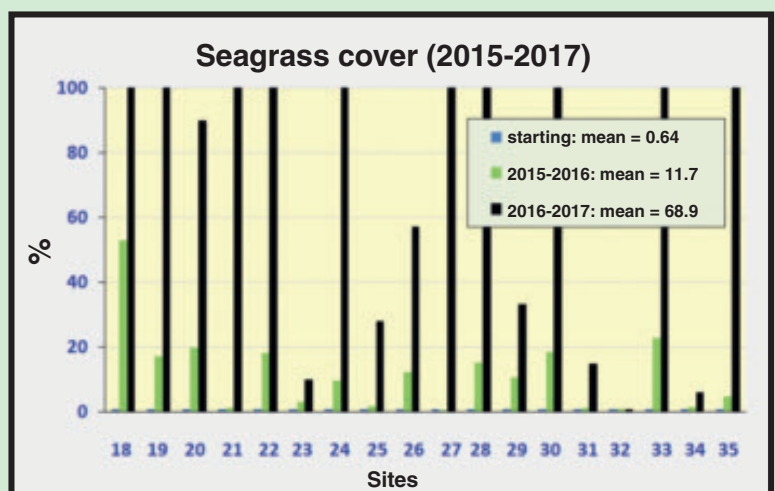


Three years after the first transplantations, seagrass cover, on average, has reached 68.6% of site area.



35 sites were selected: sod transplantations were carried out in 2014 (17 sites) and in 2015 (18 sites). Rhizome dispersions occurred until project end (2018).

In 22 sites, the seagrass cover is 90-100%, and the beds extend for 20-30 meters towards the nearby wetlands.





- ◆ Intervention sites
- Seagrass cover

Seagrasses cover about 406 ha of the area, equivalent to 11% of the entire Site of Community Importance!

Assuming the present colonization trend, it can be foreseen that seagrasses will cover 25-30% of the intervention area within 10 years after the first transplantations.



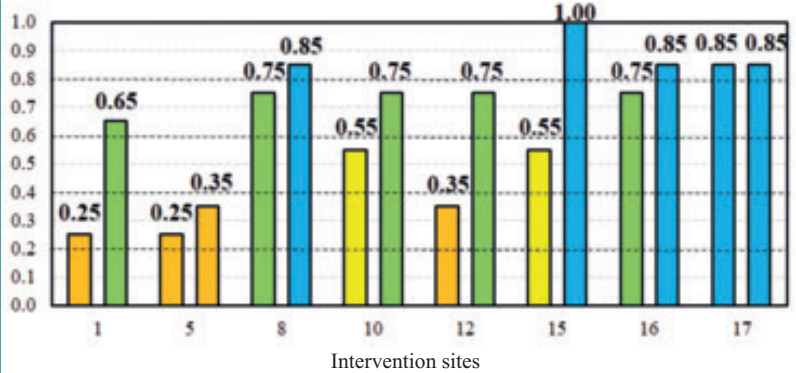
HOW DID THE ECOLOGICAL STATUS VARY?

Environmental monitoring highlighted an improvement of the overall Ecological Status.

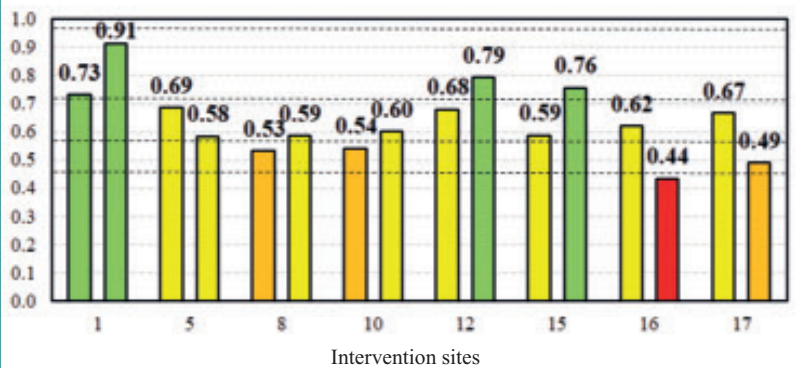
Macrophytobenthos (seagrass and seaweeds), macrozoobenthos (organisms living on the bottom) and fish samples were collected during the project monitoring activities, according to the Water Framework Directive (WFD 2000/60/EC).

These data were used to assess the Ecological Status by applying WFD-compliant quality indices to the three biological components. In the graphs, the improvement achieved during the project activities is ranked in five quality classes (Bad, Poor, Moderate, Good, High). For each intervention site, the histogram on the left refers to 2014 and the one on the right to 2017.

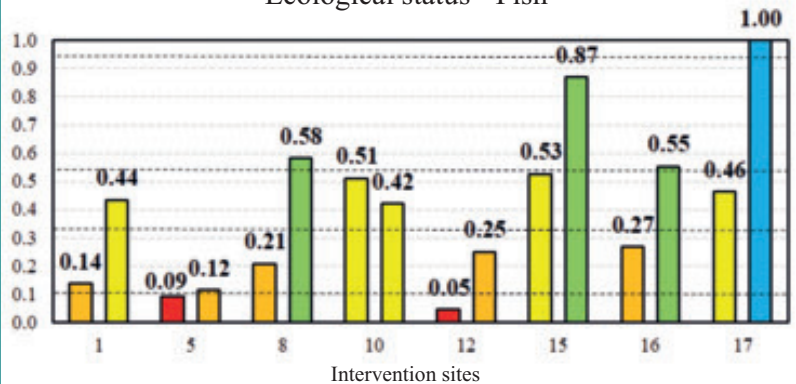
Ecological status - Macrophytes



Ecological status - Macrozoobenthos



Ecological status - Fish

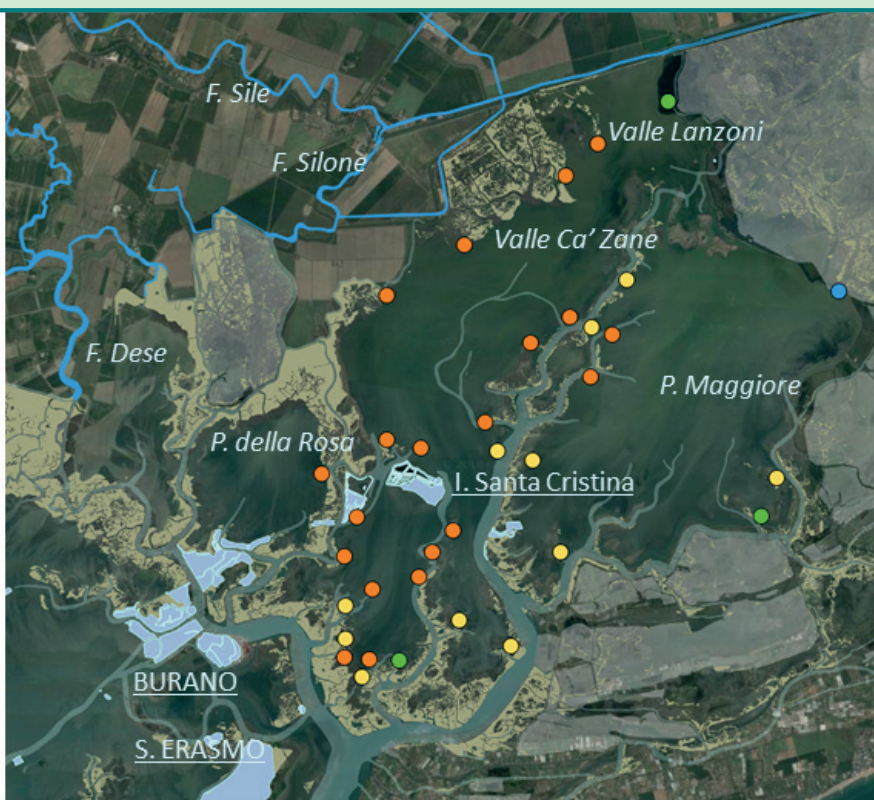


Bad Scasso Moderate Good High

Ecological status by means of Macrophyte quality Index (MaQI)

- High
- Good
- Moderate
- Poor
- Bad

First year of intervention (2014-2015)



Project end (2017)



ECOSYSTEM SERVICES

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Biodiversity increase



CO₂ permanent trapping



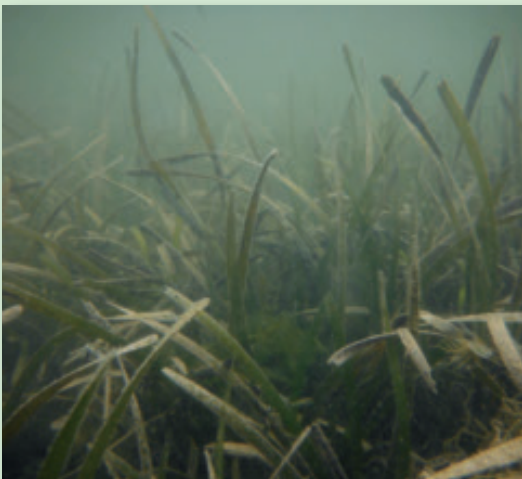
Increase of traditional fishing activities



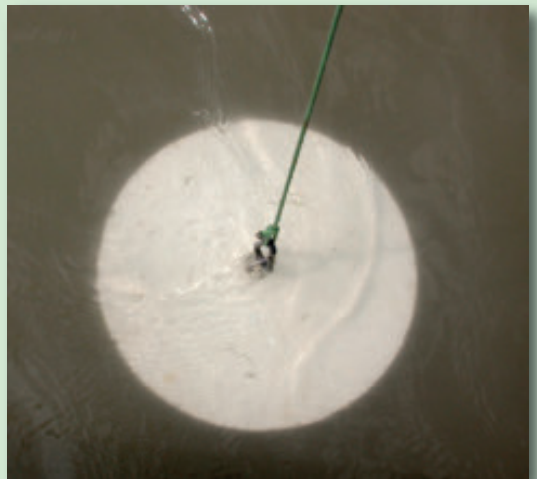
Sedimentation rate lowering



Erosion reduction



Water transparency increase



DISSEMINATION



Conferences, noticeboards, National and International Congresses, field excursions, primary and high school lessons, academic lectures, networking, website and social media.

Website
www.lifeseresto.eu



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The LIFE SeResto project aims at consolidating and restoring aquatic habitat 1150* via the transplantation of submerged aquatic angiosperms in the Northern Venice lagoon. Seagrasses create habitats suitable for the survival of several animals (fish, birds, clams, shellfish, etc.)

Project duration:

52 months (January 1st 2014 - April 30th 2018),

Budget:

1,563,898 €

European Union contribution: 75% (1.172.923 €).

Beneficiary coordinator:

Ca' Foscari University of Venice

Dipartimento di Scienze Ambientali, Informatica e Statistica (DAIS).

Prof. Adriano Sfriso – sfrisoa@unive.it – serestoinlife@unive.it



Associate beneficiaries

Istituto Superiore per la Ricerca
e la Protezione Ambientale (ISPRA).



Provveditorato Interregionale
per le Opere Pubbliche (PROVV OOPP).



Associazione Laguna Venexiana onlus



This project, code LIFE12 NAT/IT/000331, is funded by European Union's LIFE+ financial instrument and contributes to the environmental recovery of a Natura 2000 site (SCI IT3250031- Northern Venice Lagoon).