OYSTERS CYCLE - Assia Aceto

INTRODUCTION

What: Ostrea edulis (ostrica piatta), bival mollusk, native species of the Venice Lagoon is at risk because of the deterioration of seabed and wild fishing.

Where: they can be found in Venetian Barene (beach cultures), in aquacultures (off-bottom grow-out culture in Villa Falconera), start from a wet environment to the land, travelling to fish markets and may end up in public or private tables, houses and restaurants. Wetland ecosystem.

Who: fishermen, local and tourist consumers, but also object of academic research, like the MAREA project by Camilla Bertollini in the South of the Lagoon. Fish farming provided a decisive deterrent to the destruction of these extraordinary transitional environments, and the owners of these lands managed these ecosystems while preserving of a precious public asset, in a correctly balanced anthropic relationship.

When: oysters have been available till the end of XIX Century, symbols of ancient fishery. Time cycle is of 1,5 year circa (or longer), that makes them available in the Adriatic Sea for harvesting from October to April.

Why: they are important both for the biodiversity of the Venice lagoon and for carbon sequestration on a scientific level, but also useful for local traditional economy, they are the most expensive oysters on the market and the ones with the most delicate taste.

MAIN POINTS

- intersects with the tidal cycle
- land and water
- from the barena to the restaurant
- water-filtering capability
- GG mitigation

NEXT STEPS

- analyse the packaging
- monitor the availability of data
- map the restaurant use of local oysters

ECOLOGICAL NICHE

EXISTING EMPIRICAL MODELS

Living Breakwaters Project

- Oyster community restoration (Billion Oyster Project)
- Ecological design for risk reduction
- Waterfront and shoreline protection with green infrastructure
- Physical, social and ecological resilience
- Public engagement through education in schools

SCAPE is the multi-disciplinary team of architects and designers that proposed the winning project, in a design competition called "Rebuild By Design", launched by the U.S. Department of Housing and Urban Development (HUD) after Superstorm Sandy.

The breakwater system consists of rubble mound (rock) structures with a stone core, a base layer (bedding stone or marine mattress, depending on the breakwater) to protect against scour, and outer layers consisting of armour stones and ecologically enhanced concrete armour units. It is designed to:
- reduce the risks of storm wave attack and long-term erosion;
- hazards threaten the health, safety, quality of life, and sustained existence of the waterfront neighbourhoods;
- capture sediments along the shoreline, reducing historic shoreline erosion and in most places actually widening the beach over time.

The technology helps build up local marine life, supporting the food chain for top predators like seals, and mitigate climate change by storing carbon in calcitic organisms like oysters.

Once the breakwaters are constructed, the Billion Oyster Project will install five oysters on the breakwaters. Techniques may include placing spat (baby oysters) on some of the ecologically enhanced concrete units, installing oyster shell gabions (non-structural units), placing spat on shell in the reef streets, and in-situ setting pilots. The oyster gabions and spat-on-shell installation will use designs and techniques that have been employed on other oyster restoration projects throughout

ARE THERE SIMILARITIES TO THE VENICE CASE? YES. WHAT CAN WE LEARN AND IMPORT TO THE LAGOON?

ECOSYSTEM REGULATORS

Oyster reefs offer multiple ecosystem services, from regulation services to provisional.

Among the **regulation services**, we can list the abatement of suspended organic particulate matter by filtering seawater, resulting in the decrease of the water turbidity, and the sequestration of CO2 through the assimilation of calcium carbonate in their shell, important to counteract the process of marine acidification. The oyster feeds on phytoplankton by filtering seawater at a rate of a few litres per hour. Suspended particles are retained by all eyelashes of the gills.

Oysters can play an important role in the protection of the saltmarsh margins during storm surges, or from the erosive action of the waves.

Biogenic reefs provide support to life, expanding the three-dimensional structure of the substrate, thus promoting biodiversity by increasing habitat heterogeneity and suppling nursery areas.

Native vs. Invasive

Ponte Della Libertà is another place of transit for the oyster cycle, where the bivalves gain a more invasive quality, clogging up the canal and hindering the exchange of salty and fresh water, fundamental to the functioning and the equilibrium of the Lagoon ecosystem. The Municipality of Venice is trying to free the area of interests from the oysters with in-loco interventions but without permanent success, while investigating on the illegal practices that rise up in this context and the oysters' paradoxical thriving condition in this environment.
The molluscs that colonize the underlying part of the bridge connecting the historical city centre of Venice and the mainland are large in numbers but highly toxic for human consumption, due to the filter capability that makes them absorb all the toxins present in the polluted waters they are half-submerged in, due to anthropogenic impacts on the ecosystem.
Despite this danger, an illegal network has developed, contaminating the food chain of oyster consumption through forbidden harvesting and selling of the bivalves, that end up in unknown table destinations. The reasons for which the these criminal activities keep jeopardizing food safety in Venice, as many touristic restaurants serve this type of mollusc as traditional seafood dish, may be for criminal conspiracy but also inappropriate knowledge of the oyster. This is an example highlighting how food education and product transparency are much needed today.

TWO CULTURE METHODS IN THE LAGOON:

Off-bottom grow-out method (Falconera Fish Farming):

the oyster is placed in a mesh bag or cage, so that there's ample water circulation into the bag. Rack and bag culture refers to a system of polyethylene bags that are tied to racks raised several inches above the seafloor. This protects the oysters to an extent from predators and prevents them from being buried in mud. Every few weeks, the bags are turned to reposition the oysters and make sure they have equal access to food.

Bottom grow-out culture (Barene):

the oyster is touching the seafloor, one of the most popular methods of bottom culture. The seeds are spread on the surf
The oysters are periodically submerged and exposed as the t
move in and out, developing hard shells and strong adductor
muscles to stay shut during dry periods. This technique is be
protected areas with firm mud bottoms, where currents and w
are not too strong. It's low maintenance, involves little equipo
and doesn't require as much investment.

Restorage of Culinary Tradition and Economic Innovation

Integrated oyster mariculture is a tool for the diversification of production and the enhancement of fishery resource in the Veneto-East
coastal belt.
The market demand for the European flat oysters remains high and is not being fully met by the introduction of the exotic cupped oyste
Crassostrea gigas and the Japanese Oyster, which are more resilient to parasitic disease and exhibits faster growth rates than Ostrea

SMART COHABITATION - future perspectives

Capture fisheries and aquaculture can have important synergic effects to accelerate the drive to sustainability (Cataudella et al., 2005). When correctly managed, the interactions between fishermen and farmers supported good environmental, economical and social decisions.

This process generated suitable rules based on a better use of marine spaces and biodiversity for both production and conservation. To reach such aim, a correct planning in the use of marine spaces, correct policies for sea protection, an effective capability to evaluate the state of the environment to assess risks and to apply the precautionary approach whenever necessary and with no scientific evidence, is required. This process is still on-going and will occupy the agendas of fish farmers, fishermen and decision makers. In the case of mussels and Japanese carpet shell culture in Italy, a real competitor of Ostrea Odulis, development was entirely based on the interactions between fishermen and these new activities for example.

Shellfish culture has wide and encouraging development perspectives, if the policies towards sea protection will be implemented and not only announced. Indeed, shellfish culture does not require external trophic resources, as shellfish use natural resources. Therefore, if the water sanitary quality is controlled and the monitoring of toxicity is guaranteed, this type of culture has extraordinary perspectives, with important effects on the market both on the economic and the social side.