# LESINA LAGOON - ITALY

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Lesina lagoon is located in the southern Adriatic coast (Apulia region, Italy) on the northern coast of the Gargano promontory (41,88°N; 15,45°E; Figure 1). This ecosystem displays an extended and narrow shape elongated in the east to west direction and it is connected with the Adriatic Sea by means of natural and artificial canals interspersed with sand-dunes.
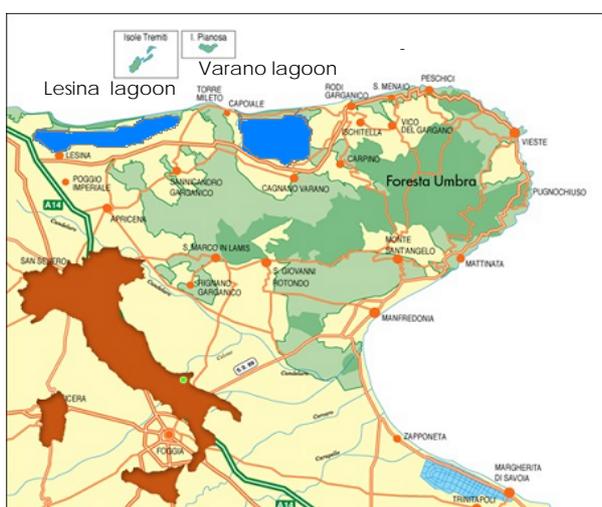


**Figure 1:** *Location of Lesina lagoon*

Lesina lagoon covers an area of 5,100 ha with an average depth of 0.8 m and a volume of 41.2 x10^6 m^3. The lagoon is connected to the sea through two canals called "Schiapparo" at the eastern side and "Acquarotta" at the western side. The western area of the lagoon displays lower salinities due to freshwater inputs coming from both domestic and agricultural effluents.

Since 1997 the "Schiapparo" canal has been partially obstructed by wooden barriers, while the "Acquarotta" canal has been completely closed by means of a sand barrier. These barriers prevented the adequate exchange of water masses and the fry reassemble in the lagoon, but have been removed in April 2000. Protective grids (10 mm) were deployed to retain fish into the lagoon and to avoid escaping. Numerous small fish and fry species are now visible near these structures indicating a massive immigration from the sea.

The south-eastern side of the lagoon receives freshwater inputs with flows characterised by seasonal peaks during the rainfall winter period. These canals collect agricultural drainage water from 2 pumping stations located south of Lesina where the land is lower than the average sea level. No freshwater inputs are present in the south-western part of the lagoon, and this part receives only water drained by the intensive aquaculture farms (3 Km far from the lagoon), which rear freshwater (*Cyprinus sp.*) and marine (*Anguilla anguilla*) species.

The economic relevance of this lagoon is mostly related to fishing activity and extensive aquaculture farming (figure 2) although it is internationally known also as breeding area for many migratory bird species (figure 3).



**Figure 2:** *Fishing is an important economic activity of the lagoon*



**Figure 3:** *Breeding area of many migratory bird species*

The low tide excursion occurring in the southern Adriatic Sea, the moderate freshwater input and the low efficiency of water exchanges with the sea suggest that the hydrological balance in the Lesina lagoon is strongly affected by atmospheric conditions.

Lesina is an eutrophic lagoon; nutrient concentrations are influenced by the reduced water exchange after the closure of the canals, which were opened again after the April 2000. The lagoon exhibits strong seasonal variations of physical factors such as temperature (ranging from 7°C in winter to 26°C in summer) and salinity (between 11 and 34 psu). Moreover, the western part of the lagoon generally exhibits higher salinity values compared the eastern area.

Primary producers include phytoplankton and the macrophytes: *Valonia utricularis, Zostera noltii, Ruppia sp.*. The primary production is strongly phosphorus limited, as suggested by very high N/P ratio (annual average: 199). The lagoon acts as a sink for dissolved inorganic nitrogen.



***Figure 4**: view of village*

**LaguNet** (http://www.dsa.unipr.it/lagunet/) is a scientific observational network studying the fluxes of nutrients and other contaminants from lagoon catchments to the near coastal environment. The objectives of LaguNet are to support and encourage co-operation of research groups studying lagoons, wetlands and saltmarsh systems situated along the Italian coast and to evaluate the application of the LOICZ (Land Ocean Interactions in Coastal Zones, a core project of IGBP) biogeochemical flux model and typology classification to such sites.

The methodology has been applied by LOICZ to approximately 170 coastal environments worldwide; it is based on a mass balance approach and provides important information on the flux of nutrients and ecosystem functions; the approach used is applicable to a majority of coastal ecosystems with data that are normally available from conventional monitoring campaigns. In this way it is possible to compare and to group aquatic systems having different characteristics based on properties related to biogeochemical cycles and to the ecosystem functions that result from these processes.



***Figure 5:** LaguNet sites around the Italian peninsular*

On the basis of this experience and considering the paucity of LOICZ sites in the Mediterranean and Southern Europe it was decided to apply this methodology to a series of Italian coastal environments where sufficient data are available.

**Contact Persons**

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