
STAGNONE DI MARSALA, SICILY - ITALY

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The Stagnone di Marsala is a 20 km² extensive (about 1.8 km wide by 11 km long) lagoon on the North-western coast of Sicily (Italy). The lagoon has a northern narrow and shallow mouth to the sea (400 m wide, 0.3-0.4 m deep) and another wider and deeper to the south (1200 m wide, 1.0-1.5 m deep). At the eastern end of the northern opening a 20 m wide, 1 m deep channel was dredged, somehow enhancing the local flushing capability. Inside the lagoon, beside the islands of Motia and Santa Maria, there is a slightly submerged relict Phoenician road, which is effective in reducing flow, thus creating a low-flushing sub-basin to the North-East, see Figure 1.



Figure 1: Location and map of the Stagnone di Marsala

In the presence of a small tidal range (about 0.3 m of astronomical component at spring tide), the lagoon flushing is expected to be mainly due to wind. The climate of the region is Mediterranean. Precipitation is approximately 600 mm yr⁻¹, with early spring and late autumn peaks. Water temperatures (min. ~10°C, max. ~30°C) and salinities (min. ~33‰, max. 48‰) have larger annual amplitudes than in the surrounding sea (Sarà et al., 1999).

The basin is oligotrophic with chlorophyll-a values ranging around 1.0 µg l⁻¹ (Sarà et al., 1999). No freshwater input is present. Seagrasses (*Posidonia oceanica* in the central-southern area and *Cymodocea nodosa* in the northern) cover the sand-muddy bottom. *Cymodocea nodosa* and *Caulerpa prolifera* prairies are probably related to both low hydrodynamic conditions and different sedimentological regime. In particular, in the northern basin of the lagoon a discontinuous *P. oceanica* meadow shows surfacing reef formations ~2-3 m wide and atolls (10-20 m of diameter), both representing about 12% of the total coverage (Calvo et al., 1996).

The dependence of the varying coverage of *P. oceanica* on the different flushing capabilities of the lagoon has also been confirmed by a previous numerical investigation carried out by a 2D depth-averaged model (Balzano et al., 2000).

The lagoon represents a biotype of great naturalistic relevance in the Mediterranean area, due to the characteristics of the vegetal and animal species living in it. In particular, of utmost importance from the ecological point of view are the *P. oceanica* meadows (plateau reef and barrier reef) located in the vicinities of the coastal zone, which largely contribute to the maintenance of natural lagoon ecosystem. Qualitative hypotheses based on *in situ* observations have given indications about the lagoon circulation (Mazzola and Sarà, 1995).



Figure 2: Saltworks are an important traditional and economic activity in the lagoon

Recently a slow but progressive solid sedimentation has been detected in the openings between the lagoon and the sea (Agnesi et al., 1993). This occurs because of natural events (like littoral drift and subsidence phenomena) and human interventions (waste material along the shoreline).

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.

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.



Figure 3: LaguNet sites around the Italian peninsular

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