LAGO DI GANZIRRI, SICILY - ITALY

A. Bergamasco*, M. Azzaro*, G. Pulicanò°, G.Cortese°, M. Sanfilippo°, T. Maugeri° * CNR- Istituto per l'Ambiente Marino Costiero – Sezione di Messina ° Università di Messina – Dipartimento di Biologia Animale ed Ecologia Marina Italy

The Capo Peloro is a brackish system located on the north-eastern corner of Sicily, Italy. It consists of two basins, Ganzirri Lake (or Pantano Grande) and Faro Lake (or Pantano Piccolo), connected to each other by a channel. Both of them communicate with the Ionian Sea, moreover the Faro Lake occasionally exchanges water also with the Tyrrenian Sea (Fig. 1).





Ganzirri Lake (38,26 N, 15,62 E) is the largest one, with a surface area of $0,338 \text{ Km}^2$, a major axis of 1670m and an average width of 200m. Its maximum depth is 6,5mand its estimated volume $0.975 \times 10^6 \text{ m}^3$. Due to its location Ganzirri Lake gathers a considerable amount of freshwater from the land. As a consequence, ad also due to its high surface to volume rate, salinity and temperature variations induced by meteorological and climatic conditions are relevant.

The northern zone of the lake, which accounts for one fourth of the total surface area, is relatively shallow (maximum depth 1m). It features a sandy bottom and large mattes of the green alga *Chaetomorpha linum*, covered with dense tufts of epiphytes whose decomposition leads in summer to a significant oxygen uptake and hence to periodic dystrophic crises. Primary production in this zone is due to phytoplankton and to green and red algae as well.



Figure 2: Ganzirri Lake schematization and main assumptions for modeling. Estimated water exchange times in dry (wet) period are indicated for the two subbasins.

In the southern zone the human impact is more direct due to the presence of the urban settlement of Ganzirri (about 10,000 people). This zone has been extensively exploited for over a century for mussel culture. It is characterized by muddy sediments which become anoxic below the uppermost oxygenated layer. Primary production in the southern zone is performed essentially by phytoplankton.



Figure 3: Lago Ganzirri - Pantano grande Physical and chemical features of the lake were studied from May 1998 to April 1999 in order to evaluate water and nutrient budgets using a two boxes, single-layer

LOICZ model. Air temperature and rainfall records were obtained from the meteo station in Ganzirri.

Estimated water exchange time varied from approximately 10 days for the outer basin in wet period (oct-apr) to about 100 days for the inner basin in dry period (may-sept) according to the variability of the inputs.

Concerning the nutrient balance, the lake is a net exporter of DIP and DIN towards the sea in both periods. It seems to act as a net sink for dissolved inorganic phosphorous ($\Delta DIP < 0$). The lake as a whole is also slightly a sink of dissolved inorganic nitrogen (DIN), even if its inner part acts as a source of DIN in wet period.



Figure 4:Lago Faro, Pantano piccolo

On the basis of the available data, a first attempt was made to quantify the nutrient loads to the Lake.

For **nitrogen** a yearly load of 0.52 Tons/year was estimated, which corresponds to a specific load of 1.5 g-N/m²/year; for **phosphorus** a yearly load of 0.04 Tons/year was estimated, which corresponds to a specific load of 0.1 g-P/m^2 /year.

The system is a net producer [$\Delta DIP < 0$ and NEM>0] of organic matter; this applies to both sub-basins and particularly during dry period. Processes of nitrogen removal generally prevailed over nitrogen storage [(*nfix-denit*)<0].

LaguNet (<u>http://www.dsa.unipr.it/lagunet/</u>) 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 saltmash 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 peninsula

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 Person

A. Bergamasco CNR- Istituto per l'Ambiente Marino Costiero – Sezione di Messina Spianata S. Raineri, 86 – 98122 Messina

Tel: +39-090-669003 Fax: +39-090-669007 E-mails: <u>bergamasco@ist.me.cnr.it</u>