# STATISTICAL INTERELATIONSHIPS AMONG PHYSICAL AND CHEMICAL PARAMETERS IN THE COASTAL LAGOON OF CULLERA (SPAIN)

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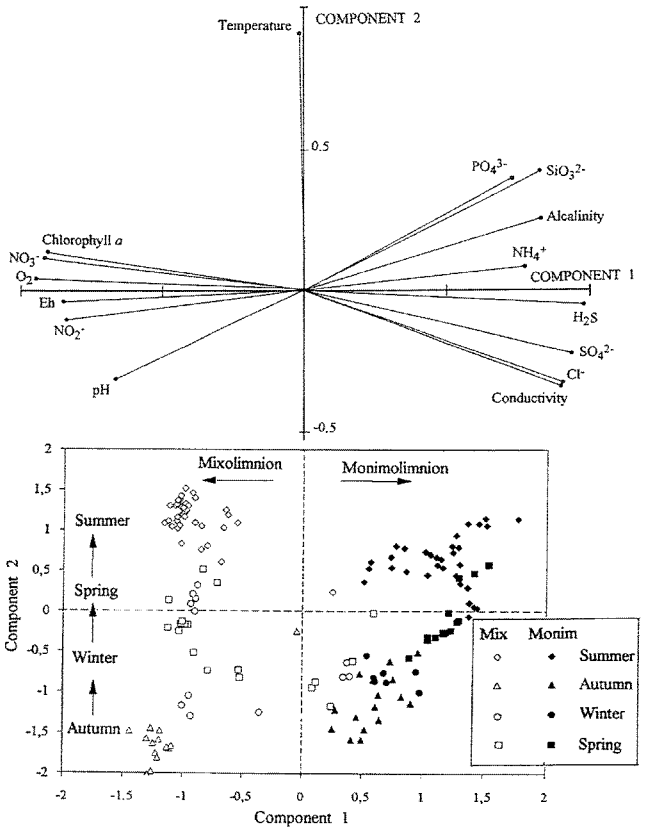
The lagoon of Cullera, 37 Km south of València, is an elongated lagoon (2.3 Km long and 7.5 m of maximum depth) with estuarine water circulation, which has varied a lot depending on the changes in its communication with the sea (RODRIGO *et al.* 1992). During the years 1980-81, a sand bar was well establi-shed at its mouth. Then, a permanent sea water wedge was found at the bottom of the basin and an oxicline was implan-ted between 3 and 5 m of depth. Several prin-cipal components analyses (PCA) have been done, using physico-chemical data from samples taken bimonthly during these years in the vertical profile of three locations (mouth, centre and source) and at different times of the day (usually early morning, midday and midnight) in the central point. The analysis with all the samples shows that, in the factorial plane of Components 1 and 2 (Fig. 1), the axis Component 1 (69% variance explained) clearly separates two groups of parameters and samples, which correspond to the sharp stratification of the water layers due to the marine water intrusion, that constituted an anoxic monimolimnion in those years. Thus, the parameters associated with the salinity of the waters, as well as phosphate, ammonia and sulphide, with high values in the bottom waters of the monimolimnion, are opposed to those associated with the aerobic conditions and the development of algal populations in the mixolimnion. Component 2 (11% variance explained) is a function of the seasonal variation; it is correlated positively with temperature and negatively with the parameters associated with salinity. The seasonal cycle of the lagoon is influenced by the fluctuation of the fresh-water inflow, due to irrigation of surrounding lands or rain periods. Thus, from spring to autumn a freshwater flow prevails, while during winter sea influence is more important. In winter, the marine water wedge arrived at the sampling station located near the source and an halocline was formed close to the surface, several meters above the oxic-anoxic interface. In spring, the wedge begins to retreat, but remains in the other sampling points located at the centre and mouth. During summer a sharp halocline coincident with the oxicline determines a strong stratification of the waters in the last mentioned sampling stations. All parameters showed strong gradients in the vertical profile. The results of the PCA analyses with all and part of the samples, confirmed that the depth variation of the physico-chemical parameters was much more important than their seasonal variation and that the three localities were much alike. The distribution of the planktonic communities (MIRACLE and VICENTE, 1983; ROJO and MIRACLE, 1989; OLTRA and MIRACLE, 1992) in this lagoon was concordant with the variation of these environmental parameters.

Fig.1. Results from a PCA analysis. Top: Correlation coeficients of the physico-chemical variates with the first two principal components. Bottom: Ordination of the samples in the plane defined by these components.

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