

Temporal Heterogeneity, Zooplankton Composition and Fish Food supply in the Albufera of Minorca, a highly fluctuant environment

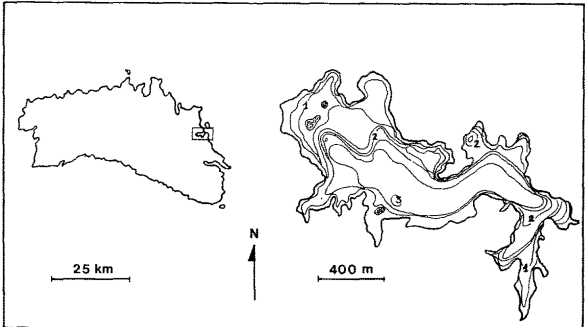
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The Albufera of Minorca coastal lagoon is located in the NE cost of the island (fig.1), and its hydrological cycle depends upon a small basin ca. 25 Km². Some morphometrical parameters relevant to the following discussion are summarized in table 1. A tentative scheme of the long term changes in salinity of surface waters is presented in table 2.

Fig.1 Situation of the Albufera of Minorca and bathimetric map



For the 1983-84 period and to the descriptive purposes of this paper, a summary of its biophysical variation is derived following the results of a PCA of the main conservative (depth of the tube, temperature, evaporation, rainfall, mean monthly wind, alkalinity, SO₄, Cl, Ca, Mg, Na, K) and biologically dependent parameters (Secchi depth, surface and bottom oxygen content, pH, NO₂, NO₃, Fe, PO₄). Indeed, additional ecological information is achieved in the PCA because the Secchi depth (D) and PO₄ (P) contents of surface water showed strong correlation with Chlorophyll of water column ($D = 6.44 \text{ Chl}^{0.525}$ $r = -0.998$ $p < 0.01$; $\text{Chl} = 17.71 \text{ P}^{1.135}$ $r = 0.983$ $p < 0.01$). As a result, two main factors contribute largely to the overall ecological variability: trophic level and salinity. The evolution of the lagoon, based in the position of the loading scores on the plane of these two factors, allows a typification of at least three situations. Always mesopolyhaline salinities are concerned: the high relative depth of the lagoon minimizes the interference and mixing between fall-winter freshwater inputs with "old" summer-fall polyhaline waters, making the occurrence of oligohaline states rather improbable (Pretus, 1989).

The three states are commented in the following lines:

Case 1. A winter-spring water, with salinities covering a range of 10 - 25 g/l. Microphytoplankton density increases until 10⁶ cells/ml (*Nannochloris* sp.), this high density prevents, because of high turbidity, the development of macrophytes.

Case 2. A winter-spring water of similar salinity than in case 1, but with clean oligotrophic water column, controlled by a dense covering of *Chaetomorpha*, or a combination of this species with *Gracillaria*, adding *Rupia cirrhosa* in spring.

Case 3. Polyhaline summer-fall water, easily reaching 30°C in August. Seawater intrusions are frequent in this period, but usually mixed by the wind. Then the mean salinity of the lagoon remains between 22 - 30 g/l. This situation develops a mature covering of *Rupia* with peaks of phytoplankton (*Chaetoceros* spp.), and clean waters with *Prorocentrum scutellum*.

Tab. 1. Morphometric parameters.

Surface	72.4 Ha
Maximum length	1700 m
Maximum depth	3 m
Mean depth	1.37 m
Relative depth	0.312 %

Tab. 2. Salinity (g/l) ranges and month measured

	Minimum	Maximum
1983	12.9 (III)	29.1 (XI)
1984	14.6 (IV)	>28.5 (VIII)
1987	3.7 (II)	29.4 (XI)
1988	11.6 (III)	27 (XI)
1989	23.0 (II)	33.2 (XII)

15 rotifera species were found, 5 of them were new records for the Balearic archipelago: *Notholca bipalium* (Müll.), *Proales reinhardtii* (Ehrb.), *Synchaeta kitina* Rousselet, *Ecentrum marinum* Dujardin and *Hexarthra oxyuris* (Sernov). *Brachionus plicatilis* Müll. was the most abundant species, and the only rotifer found in hipereutrophic states, with densities up to 2500 ind/l. Rotifer populations decreased and were controlled because of salinity, which affects fecundity rates more than other factors (Miracle & Serra, 1989). Relatively diverse rotifer communities occurred in winter-spring waters.

Crustacea species found were: *Acartia latisetosa* Kritsch., *Halicyclops neglectus* Kief., *Ectinosoma* sp., *Euterpina* sp., *Ergasilus sieboldii* Nordm., *Nitocra lacustris* (Schmank.), *Mesochra heldtii* Monard, *Tisbe longicornis* T. & A. Scott, *Cyprideis torosa* (Brady), *Cypridopsis* sp., *Mesopodopsis slabberi* (van Beneden), *Corophium insidiosum* Crawford, *Gammarus aequicauda* Martynov, *Lekanesphaera hookeri* (Leach), *Palaemon serratus* (Pennant), and *Carcinus aestuarii* Czerniavsky. *Acartia latisetosa* behaves as a true planktonic species, and its densities increased in the hipereutrophic state of the lagoon. The harpacticoida were found mainly close to the bottom algal and macrophytic communities, and occurred from June onward in the summer. Several species disappeared during the hipereutrophic period and reappeared later: *Mesopodopsis slabberi*, *Cyprideis torosa* and *Corophium insidiosum*.

Five grey mullets were found in the lagoon: *Mugil cephalus* (L.), *Chelon labrosus* (Risso), *Liza (Liza) ramada* (Risso), *Liza (Liza) aurata* (Risso), and *Liza (Protomugil) saliens* (Risso). Gut contents analysis revealed an occasional intake of small organisms as *Brachionus* and some harpacticoida, whilst ostracoda, *Gammarus*, and *Corophium* are more common preys. That pattern shows a high selectivity of food supply by grey mullets.

REFERENCES:

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