Hydrology and Phytoplankton in Greek Shoals

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The Messolonghi Lagoon (Fig. 1) borders the north-west side of the Patraikos Gulf, in the Ionian Sea. In the north, the Aitolikou Lagoon (st. 1 and 2) has a maximal depth of 28 m. It receives drain water pumped from the neighboring fields. Its salinity remains close to 14‰. A dam separates it from location 3 which has a depth of just 0.6 m and nearly double salinity. Farther south lies the central portion of the Messolonghi shallows (st. 4 to 11). It has depths between 0.2 and 1.2 m only. In the south, a barrier of elongated islets does not prevent some mixing with the open sea water. Its salinity exceeds slightly that of the Patraikos Gulf in summer, as a result of evaporation and falls well below it in winter owing to the inflow of fresh water or rain. The pier protected Palaiopotamos Lagoon (st. 12) has a depth of merely 0.3 m. The also well enclosed Kleissova Lagoon (st. 13 and 14) presents similar depths and salinity. The shallow (0.3 m) canal of station 15 receives the waste water from the Port of Messolonghi. As a result, it has a steady salinity of 24‰.

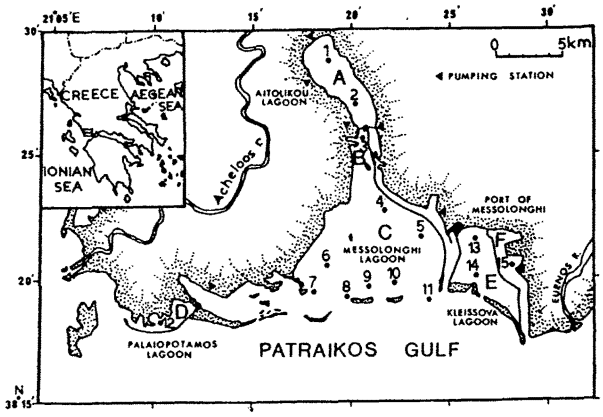

Fig. 1 Sampling locations in the Messolonghi Lagoon.

In June and December 1983, surface water samples were taken at 15 stations in the Messolonghi Lagoon. The examination concerned the phytoplankton, temperature, salinity, phosphate, silicate, ammonium, nitrite and nitrate. Phytoplankton samples were fixed with lugol solution and analysed by the Utermohl (1931) method. Nutrient analyses were made by the methods of Strickland and Parsons (1972). Also, the sediment was analysed for organic carbon. In June, the temperature varied from 21 to 28.0 C and the salinity from 13 to 51‰. In December, both temperature and salinity were reduced. The dissolved oxygen content was rather low (4.7 ml/l) and variable in June. It was higher (5.6 ml/l) and almost uniform in December. The concentration of nutrients were higher than those usually observed in the Mediterranean Sea and generally went up from June to December.

The variety of environmental conditions prevailing in the above six areas of the Messolonghi lagoon caused drastic changes in their phytoplankton compositions (Table 1). In June, the concentrations of diatoms reached enormous heights in A and E. The dinoflagellates also abounded there. The microflagellates were extremely dense in E. In December, the levels of the diatoms fell sharply to about one seventh, those of the dinoflagellates to a quarter, while the microflagellates decreased only marginally. The diatoms still proliferated in A, the dinoflagellates in B and F and the microflagellates in E. As a rule, the number of species did not rise with the number of individuals.

Table 1. Mean surface phytoplankton values (cell X 10^3/l) in the stations of the areas A-F

Time		June						December					
Area	A	B	C	D	E	F	A	B	C	D	E	F	
Taxa	St.	1-2	3	4-11	12	13-14	15	1-2	3	4-11	12	13-14	15
Diatoms	1122	35	25	71	2850	105	528	36	12	83	24	35	
Dinoflagellates	256	3.2	5.3	5	86	26	8.7	41	7	5.5	18	48	
Coccolithophores	-	-	0.1	-	-	-	1.2	-	0.2	-	0.5	-	
Silicoflagellates	1	-	0.1	-	-	-	-	-	0.1	-	-	-	
Total phytopl.	1379	38	30	76	2939	131	538	77	19.4	88	43	83	
μ-flagellates	513	2570	404	4750	832	44200	2660	195	2329	1080	3480	1160	
Dia/Tot.phyt.(%)	81	92	83	93	97	80	98	46	62	94	56	42	
μ-fl./Tot.phyt.	0.4	67	13	62	0.7	340	5	2	131	12	79	140	

The Aitolikou Lagoon, displayed a phytoplankton composition entirely unlike that of the other very shallow expanses. The semi-enclosed ponds (B, D, E, F) rich in organic matter, with sea water hardly getting into them, tended to hold more phytoplankton than the open shoals. The enormous microflagellate growth there in summer appears to denote a greater tolerance pollution, extreme salinity changes and turbidity. B, though much less brackish, resembled D whereas E and F had many species in common. The greater pollution in F explains the extreme multiplication of microflagellates of the expense of the larger cells. Great differences were also noticed in species composition: In June, Chaetoceros tortissimus, Rhizosolenia calcar avis, Gymnodinium sp. attained high concentrations in A, whereas in shallows certain genera belonging to pennates, such as Navicula, Nitzschia, Amphora, Synedra, predominated.

References

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