

## IRREGULAR PHYTOPLANKTON BLOOMS IN THE KAŠTELA BAY (Central Adriatic)

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Dans le présent travail on a examiné l'écologie de la poussée estivale phytoplanctonique au cours de plusieurs années consécutives (baie de Kaštela, Adriatique centrale).

This communication is in a way a continuation of our earlier study which dealt with the problem of eutrophication of the Kaštela Bay near Split (Central Adriatic). From the long-term data series it was possible to establish some changes in the phytoplankton community which had taken place for the last ten years and which were held to be a consequence of the eutrophication processes. Our first results were based on the 1962 - 1977 data series and this communication includes the 1977 - 1980 period. A comparison of data showed that somewhere from the 1969 on, the two normal and regular phytoplankton blooms in spring and autumn, were accompanied with a third bloom in summer, which otherwise is the period of phytoplankton density minimum. Thus, this summer bloom is rather unusual and even more so since it was caused by diatoms, which are normally not abundant in the summer period. Three diatom species, Skeletonema costatum, Nitzschia seriata and Leptocylindrus danicus were established to be responsible for this irregular summer bloom. These three species have been established by Blanc et al. to be characteristic for an eutrophic environment. This situation was repeated every year up to 1976, when the summer phytoplankton minimum was again recorded.

This summer minimum, which was rather surprising, was clearly marked in 1977 and 1978 and we have not found any reasonable explanation for it. It was even more strange since in 1979 and 1980 summer maxima occurred again. However, these two new summer blooms were not any more due to the earlier recorded species but to the diatom Thalassionema nitzschioides in 1979 and Chaetoceros compressus in 1980.

In analysing and comparing the data for all these years we made an effort either to find out the causes or at least to determine the conditions under which the summer maxima or minima occurred. It was found that summer minimum occurred in years with lower percentage of diatoms in the total phytoplankton, irrespective of the annual phytoplankton density (No cells/l). This would mean that the structure of phytoplankton community is more responsible for the occurrence of summer phytoplankton maxima or minima than the phytoplankton density in the same year (Table 1.)

We tried also to establish the correlation between phosphate concentration and summer phytoplankton peaks during these years. Some coincidences were recorded in the years 1976, 1977 and 1978 when phosphate

concentrations were much lower than they were in 1979 and 1980 during the same period. Diatom summer peaks in the first period were probably due to higher phosphate values since diatoms require high concentrations of nutrients for their development (Table 2.).

Tab. 1. Annual fluctuations of phytoplankton quantities (No cells/l), relative diatom abundance and phosphate levels in the Kaštela Bay

Years	Total phytopl. No cells/l	Diatom. percentages in total phytopl.	P-PO <sub>4</sub> µg at/l
1973	436637	93,1	0,090
1974	948189	86,0	0,095
1975	795953	81,0	0,079
1976	409729	70,7	0,063
1977	827196	79,0	0,073
1978	623805	75,4	0,068
1979	923709	92,6	0,096
1980	494981	85,2	0,087

Tab. 2. Summer phosphate (P-PO<sub>4</sub> µg.at/l) levels in the Kaštela Bay during 5 years

Month	P-PO <sub>4</sub> µg at/l				
	1976	1977	1978	1979	1980
VI	0,056	0,056	-	0,162	0,059
VII	0,080	0,068	0,070	0,125	0,091
VIII	0,096	0,076	0,056	0,107	0,113
IX	0,051	0,074	-	0,061	0,083
X					0,099

In trying to explain all this we assume that even though the study area shows already marked signs of eutrophication, natural fluctuations are still significantly pronounced. Thus the repeated occurrence of summer minimum is likely to be the result of the prevailing influence of mediterranean water, which in 1976 inflowed deeply into the Adriatic.