Chlorophylls' distributions in the polluted bay of Keratsini, Saronikos Gulf, Greece

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Summary

The distributions of chlorophylls a b and c, dissolved oxygen and Secchi disk were studied in the Keratsini bay, at various depths for a year long period (1980-1981). The highest chlorophyll a values (27 µg l^{-1}) were found very near the sewage outfalls and at the surface water layer. At the same station the lowest dissolved oxygen concentrations and Secchi disk values were recorded. The seasonal peaks in the polluted part of the area were observed during July, October and March; however interesting deviations in the seasonal chlorophyll fluctuation were noticed between the northern and southern part of the bay.

Résumé

Les distributions des chlorophylles a, b et c, d'oxygène dissous et des valeurs de Secchi disk ont éte étudiées dans la baie de Keratsini pendant une période d'un an (1980-1981). Les valeurs les plus élevées de chlorophylle a (27 µg l^{-1}) ont été rencontrées prés du couloir d'écoulement de la ville d'Athènes et dans la couche d'eau supérieure. Dans la même station, les concentrations les moins élevées d'oxygène dissous et la moindre valeur de Secchi disk ont été notées. Les maxima saisoniers dans la partie polluée de cette région ont été observés pendant les mois de Juillet, Octobre et Mars.

The purpose of the present investigation was to study the chlorophyll a, b and c distributions in connection with the dissolved oxygen and Secchi disk values, in the polluted Keratsini bay. The latter receives very high loads of nutrients from the 450 x 10^3 m^3/d of untreated sewage of the Athens area and connects the enclosed, heavily industrialized gulf of Elefsis with the rest of the Saronikos.

Four representative stations (three in the polluted part and one in

the rather "control" one) were sampled at 1,2.5, 5,10,15,20,25 and 40 m, monthly for a year long period (July 1980-June 1981) The SCOP/UNESCO (1966) equations and a modification of the Winkler method were used for the determination of the chlorophylls and the dissolved oxygen respectively.

Some very high chlorophyll concentrations were determined and the peaks were reached during July 1980 (highest Chl a value recorded 27 $\mu g.l^{-1}$),October 1980 and March 1981. In the immediate vicinity of the sewage outfalls the values found were greater during the summer months whereas at the Elefsis gulf station during the winter period.This phenomenon can be probably explained by taking into account both the nutrient loads and the circulation patterns of the two distinctly different water masses, namely that of the Gulf of Elefsis and the one generated in the area of the outfalls (Hopkins and Becakos-Kontos, 1972; Scoullos and Riley, 1978). The seasonal chlorophyll peak at the less affected by the eutrophication waters of the Saronikos was observed during May 1981.

There are few characteristic profiles of the chlorophyll concentrations, depending on the season and the locality examined.Some interesting correlations were found among chlorophyll a concentrations, Secchi disk values and dissolved oxygen content at the various depths,particularly at the most polluted section, where below the very intense chlorophyll maximum at the surface layer (also paralleled by an oxygen maximum),a very low dissolved oxygen content was found at the bottom layers due to the lack of photosynthetic activity, and decomposition of the abundant organic matter. Further processing of the data collected and supplementary investigations are being carried out in order to better understand these phenomena.

Bibliography

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