

THE TRENDS OF PHYTOPLANKTON PRODUCTION IN THE
NORTHERN ADRIATIC SEA: A TWELVE YEAR SURVEY

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ABSTRACT

Data on chlorophyll a concentrations, primary production rates and other physico-chemical and biological parameters gathered in the Northern Adriatic from 1970 to 1981 were statistically analyzed and discussed. The data suggest a temporal increase in the standing crop and primary production. This increase, however, may be due to an unusual increase in one year rather than a long term increase in the nutrient loading of the environment.

RÉSUMÉ

Les données concernant les concentrations de chlorophylle a, soit les taux de production primaire et autres paramètres biologiques et physico-chimiques recueillis en Adriatique septentrionale entre 1970 et 1981, ont été statistiquement analysées et discutées. Les données suggèrent une croissance temporelle de la biomasse et de la production primaire. Cette croissance pourrait cependant être due à une augmentation annuelle inhabituelle plutôt qu'à une croissance à long terme de la masse nutritive de l'environnement.

The Northern Adriatic is a relatively shallow and dynamic part of the Adriatic Sea, strongly influenced by the freshwater discharge of the northern Italian rivers, particularly the Po. Due to the water column stability structure, the freshwater and associated nutrients tend to be concentrated in the surface layers, where pronounced changes in the biological parameters also occur.

The characteristics of primary production in the Northern Adriatic during the period from 1970 to 1981 were investigated along a transect from the Istrian peninsula in Yugoslavia to the Po delta in Italy. Some results have already been reported in the papers of Revelante and Gilmartin, 1976a, b; Gilmartin and Revelante, 1980.

For the evaluation of long term changes and statistical treatment, the data herewith presented have been separated in two periods: 1970-1975 and 1975-1981. Regionally, the stations were separated in

sets of eutrophic western stations (8, 9, 10, 11, 12) designated Region A and oligotrophic eastern stations (6, 7, 13) designated Region B. Seasonally, oceanographic characteristics were evaluated separately for the "mixed" and "stratified" water column periods.

The data analyzed show an increase in the mean chlorophyll a standing crop and production rates in the period 1975-1981 compared with the 1970-1975. In Region A the chlorophyll a standing crop increased during the "mixed" period from a mean of 2.7 to 3.7 mg m⁻³ and from 2.0 to 3.5 mg m⁻³ during the "stratified". In Region B the mean concentrations increased from 1.6 to 3.6 and from 2.0 to 5.4 mg m⁻³ respectively. Similarly, the primary production rates in Region A increased from a mean of 7.3 to 13.7 mg Cm⁻³ h⁻¹ during the "mixed" period and from 10.3 to 18.4 mg Cm⁻³ h⁻¹ during the "stratified". In Region B the mean production rates increased from 1.6 to 3.6 mg Cm⁻³ h⁻¹ and from 2.0 to 5.4 mg Cm⁻³ h⁻¹ respectively.

However, when detailed year by year variations are evaluated, the increases in the mean chlorophyll a standing crop and production rates in the 1975-1981 period could be substantially attributed to the unusual "bloom" increases in the biomass and production in the year 1977 (Degobbi et al., 1979). The decreases in the mean salinity and Secchi disc measurements observed in the 1975-1981 period, especially during "stratified" periods, may indicate that the increases in the mean chlorophyll a standing crop and production rates may be related to seasonal increases in freshwater discharge volumes and nutrient input, rather than an overall increase in eutrophication.

Even though the Northern Adriatic is under eutrophication pressure, these data do not document a progressive long term eutrophication. The increases in the standing crop and production rates may be a result of unusual seasonal events, rather than a long term increase in the nutrient loading of the environment.

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