

REGIONAL VARIATIONS IN PHYTOPLANKTON STANDING CROPS
IN THE NORTHERN ADRIATIC SEA

Malvern GILMARTIN⁽¹⁾ and Noelia REVELANTE⁽²⁾

(1) Center for Marine Studies, University of Maine,
Orono, Maine 04469, USA

(2) Department of Oceanography, University of Maine,
Orono, Maine 04469, USA

SUMMARY

Northern Adriatic data identified persistent regional and temporal variations in the phytoplankton crop. A major region of high but variable production was quantified off the Po Delta. Smaller regions of high but less variable production occurred off the Gulf of Trieste and the Venice Lagoons. Five positions were identified which, if monitored regularly, would characterize the region.

RÉSUMÉ

Une analyse de données provenant de l'Adriatique septentrionale a permis de constater des variations régionales et temporelles persistantes dans la récolte du phytoplancton. On a quantifié une région importante de production élevée mais variable au large du delta de Po. Des régions moins étendues de production élevée mais moins variable ont été observées au large du golfe de Trieste et des lagunes de Venise. On a identifié cinq stations qui permettraient de caractériser cette région si on les inspectait régulièrement.

- 0 -

Data from the past decade suggest that eutrophication influences in the Northern Adriatic are increasing (Gilmartin and Revelante, 1981). These increases in phytoplankton processes are not uniformly distributed, and striking regional variations occur, both in space and time. Since such marked regional variations directly influence dependent food webs, they have been studied under an integrated research program by the Center for Marine Research since 1969.

Earlier cruises and publications focused on a strong east to west gradient in phytoplankton crop size and characteristics, a gradient driven by nutrient input from the Po River. These very high east to west gradients tended to mask important but smaller scale variations in phytoplankton activity, especially temporal variations. The present 10 year data set, unique in its geographical and temporal coverage of the Northern Adriatic, has identified consistent patterns of variations

subdividing the Northern Adriatic into four regions where the extant phytoplankton crops are primarily controlled by different sources of nutrient input. Furthermore, sufficient data now exist to identify stations "characteristic" of these subregions ... stations which, if monitored regularly, would provide data which could be weighted to accurately represent the entire region.

The southwest quadrant of the Northern Adriatic is the region with the lowest phytoplankton activities. It is dominated by oligotrophic water brought northward by the prevailing counterclockwise circulation pattern and is characterized by annual mean water column standing crops of 0.25 to 0.50 mgChl⁻¹m⁻³, crops two to four times those found in the Central Adriatic. Seasonal variation is low and data from a station at about 44°35'30" lat., 13°46'00" characterizes the region. In contrast, a west central region, under the direct influence of the Po River, has the highest phytoplankton activity with annual mean water column standing crops of 2.5 to 5.0 mgchl⁻¹m⁻³. In this subregion, seasonal variation is very high, and chemical and biological parameters are primarily correlated with river discharge pulses. Because of the high oceanographic gradients, combined with variable currents, the subregion is best represented by the mean conditions at stations located at 44°59'30" lat., 12°49'00" long., and 44°46'30" lat., 12°41'30" long. A third subregion, with phytoplankton characteristics different from that of the Po Delta is the coastal region under the direct influence of Italian coastal lagoons (especially the Venice lagoon complex). These data suggest that the high rates of primary production observed in this subregion were less related to variations in northern Italian river discharge than to spring tide periods that increased the rates of tidal flushing in the lagoons. A station located at 45°12'00" lat., 12°33'45" long. would represent the subregion. Lastly, a smaller subregion of higher phytoplankton activity, but relatively low variability is that of the Gulf of Trieste and immediate offshore waters, where high production rates were most likely driven by anthropomorphic nutrient input from the urban/industrial complex surrounding Trieste. A representative station for this subregion would be located at 45°30'45" lat., 13°15'15" long.

Only two of these five "representative" stations are currently being monitored. It is strongly recommended that efforts be made to monitor the remaining three in the future so that the five stations can be used to document a hypothesized long-term eutrophic trend in the Northern Adriatic.

- 0 -

- Gilmartin, M. and N. Revelante. 1981. Nutrient loading, stratification and mid-summer nanoplankton blooms in the Northern Adriatic. In Press.
- Gilmartin, M. et. al., 1972, et. seq. Hydrographic data collected during cruises in the Northern Adriatic, July-December, 1972. *Thalassia Jugosl.*, 8:149-213.