

TROPHIC CONDITIONS AND TRENDS IN NUTRIENT CONCENTRATIONS IN THESSALONIKI BAY

A. Pavlidou *, R. Psyllidou-Giouranovits

Hellenic Center for Marine Research, PO Box 712, GR 190 13, Anavyssos, Attica, Greece - *aleka@ncmr.gr

Abstract

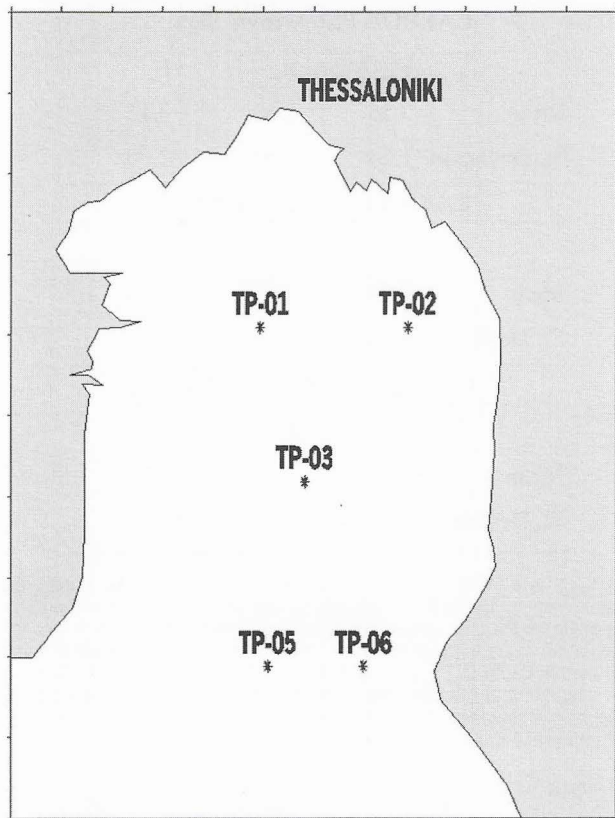
In this paper we present the results of nutrient measurements during the period 1995-2002, in order to define the ecological status of Thessaloniki Bay ecosystem.

This work contains an assessment of the eutrophication of coastal waters influenced by a sewage outfall in Thessaloniki Bay, for the period 1995-2002. A eutrophication scale has been applied for indicating four trophic levels in the marine environment (oligotrophic, lower mesotrophic, upper mesotrophic, eutrophic).

Keywords: Thessaloniki Bay, Eutrophication, Trophic Status.

Introduction

The study area is mainly affected by aquaculture activities, agriculture activities in the coastal zone and pollutants from the domestic and industrial effluents of Thessaloniki (partly treated). Sampling sites are shown in Figure 1.



Materials and methods

Nutrient data (nitrate, nitrite, silicate, ammonium and phosphate) have been collected during the period 1995-2002 (1,2).

The samples for the determination of nutrients were collected in 100 ml polyethylene bottles and kept continuously under deep freeze (-20 °C), until their analysis in the laboratory by a nutrient autoanalyser (3,4,5,6).

Results and discussion

During the period 1995-2002 the mean integrated nutrient concentrations in Thessaloniki Bay ranged as follows: Phosphate: 0.09 – 1.23 $\mu\text{mol/L}$; Silicate: 0.54 – 9.17 $\mu\text{mol/L}$; Nitrite: 0.04 – 1.55 $\mu\text{mol/L}$; Nitrate: 0.20 – 2.87 $\mu\text{mol/L}$; Ammonium: 0.08 – 4.14 $\mu\text{mol/L}$.

The temporal variability of nutrient concentrations in the study area is related with the Thessaloniki municipal sewage outfall, the agriculture and aquaculture activities in the area, the existence of the thermocline during the warm period, the enhanced anthropogenic activities and the various point sources, which enrich the study area in

pollutants, as well as the fluctuation of the flow rate of the main rivers affecting the study area.

The characterisation of the trophic level of the Thessaloniki bay is based on nutrient concentration scales evaluated for the greek coastal ecosystems (7). According to the mean integrated values of nutrients for the period 1995-2002, Thessaloniki Bay is characterised as an upper mesotrophic area.

Additionally, the stoichiometric balance criterion in the selected stations confirmed that the mean ratio for the nutrients calculated does not reach the Redfield ratio $\Sigma\text{N:P}$ of 16:1. The development of the $\Sigma\text{N:P}$ ratio indicates that during the last ten years nitrogen was developed towards the limiting nutrient in the area studied.

References

- 1 - Pavlidou, A., 2001. Dissolved Oxygen and nutrients in the inner Thermaikos Gulf. December 1999-November 2000. Proceedings of the 7th Conference of Chemistry Greece-Cyprus, pp. 49-51, Lefkosia, Cyprus.
- 2 - Pavlidou, A. and Psyllidou-Giouranovits, R., 2003. Monitoring of the temporal and spatial distribution of dissolved oxygen and nutrients in the Thermaikos Gulf. Proceedings of the 7th Hellenic Conference in Oceanography and Fishing, p. 252, Chersonissos, Krete, Greece.
- 3 - Koroleff, F., 1970. Revised version of "Direct determination of ammonia in natural waters as indophenol blue". Int. Con. Explor. Sea C. M. 1969/ C:9 ICES information on techniques and methods for sea water analysis. Interlab. Rep., 3: 19-22.
- 4 - Mullin, J.B., Riley, J.P., 1955. The colorimetric determination of silicate with special reference to sea and natural waters. *Anal. Chim. Acta*, 12: 162-176.
- 5 - Murphy, J., Riley, J. P. (1962). A modified single solution method for phosphate in natural waters. *Anal. Chim. Acta.*, 1: 162-176.
- 6 - Strickland, J.D.H., Parsons, T.R., 1968. A practical handbook of sea water analysis. *Bull. Fish. Res. Bd. Canada*, 167: 310.
- 7 - Karydis, M., 1999. Evaluation of the trophic levels in greek coastal ecosystems. Scientific Report, Univ. of Aegean, Lesvos Island, February 1999.