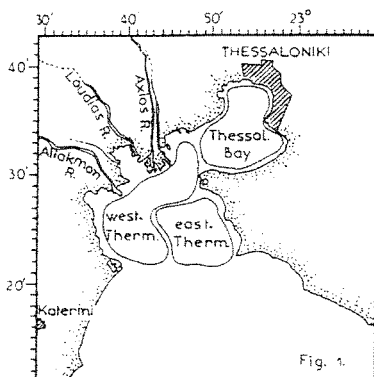


ASSESSMENT OF THE NUTRIENT LOADS RECEIVED BY THERMAIKOS GULF, N.W. AEGEAN SEA

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Thermaikos Gulf, a shallow (max depth 40 m) semi-enclosed water embayment in the Northwestern Aegean Sea, is of particular environmental interest for both scientists



and authorities. It is exposed to the domestic wastes of the city of Thessaloniki (approx. 1,200,000 inhab.) as well as the industrial effluents of the nearby industrial zone. Moreover the estuaries of three rivers Axios, Loudias and Aliakmon are influencing the hydrological regime of the area. Previous oceanographic studies concerning eutrophication conditions of the Gulf were carried out during the years 1975-76 and 1985-86. The aim of this study is to investigate the present eutrophication conditions and to compare them with those of the previous studies. Water samples were collected during four cruises from September 1992 to August 1993 at standard depths in 19 stations. The methodology used

was the same as in the 1975-1976 study. The Gulf was divided into three water masses (subareas): the Thessaloniki bay (A), the Western (B) and the Eastern (C) gulf (BALOPOULOS, 1985). The sampling stations as well as the above mentioned subareas are shown in Figure 1. Table 1 shows the integrated mean values of nutrients and the $\Sigma N/P$ ratio at the four cruises. It also gives the mean value of every constituent in each subarea. The relatively higher concentrations especially of PO_4 but also of NH_4 and NO_3 are measured in Thessaloniki bay, while NO_2 and SiO_4 values are relatively low.

Area	Sampling	PO_4-P	SiO_4-Si	NH_4-N	NO_2-N	NO_3-N	$\Sigma N/P$
Thessaloniki Bay	9/1992	0.10	0.92	0.16	0.05	0.06	3.66
	1/1993	0.54	1.02	0.93	0.32	1.22	3.95
	4/1993	0.63	0.99	0.51	0.09	0.50	1.85
	8/1993	0.34	0.67	0.69	0.09	0.43	6.10
	Mean	0.40	0.90	0.57	0.14	0.55	3.89
Western Thermaikos	9/1992	0.06	1.11	0.16	0.04	0.12	5.89
	1/1993	0.24	0.64	0.41	0.25	0.75	5.92
	4/1993	0.18	1.03	0.22	0.04	0.34	3.13
	8/1993	0.09	0.76	0.14	0.06	0.18	6.01
	Mean	0.14	0.89	0.23	0.10	0.35	5.24
Eastern Thermaikos	9/1992	0.07	1.42	0.20	0.10	0.20	5.87
	1/1993	0.18	0.59	0.36	0.26	0.55	6.37
	4/1993	0.11	0.76	0.18	0.03	0.19	3.58
	8/1993	0.06	0.56	0.18	0.07	0.32	9.52
	Mean	0.11	0.83	0.23	0.12	0.32	6.34

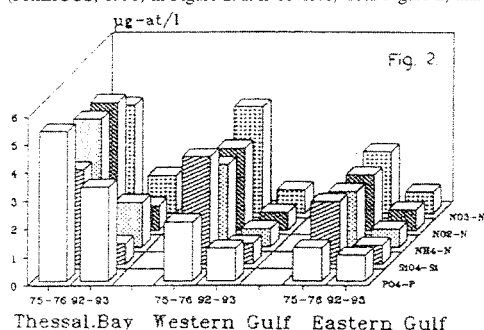
Table 1. Integrated mean values of nutrients ($\mu g-at/l$) of the three subareas.

These high concentrations are due to the untreated wastes that are discharged into the bay near the city of Thessaloniki through the central sewage outfall. Moreover the mean values of the three subareas are multiplied with the volume of the water masses to calculate the total amount of nutrient loads in $g-at \cdot 10^6$. These amounts are divided by the reference amounts for the same volume of the water masses (concentrations characterizing the oligotrophic Aegean waters (FRILIGOS, 1981) multiplied with the volume of the three water masses) to give the degree of eutrophication of each subarea (Table 2).

Table 2. Eutrophication degree of the three subareas.

Area	PO_4-P	SiO_4-Si	NH_4-N	NO_2-N	NO_3-N
Thessaloniki bay	3.33	0.74	1.59	0.88	1.31
Western Thermaikos	1.17	0.73	0.64	0.63	0.83
Eastern Thermaikos	0.93	0.68	0.64	0.74	0.76

The present eutrophication conditions are compared with those of the 1975-76 study (FRILIGOS, 1990) in Figure 2. It is obvious, from Figure 2, that the present conditions



are better than those which existed about twenty years ago. This must be due to the reduction of the load of the wastes after the operation of the Sewage Treatment Plant. Also the diminution of the rain-falls has as a consequence the decrease of the nutrients originating from the fertilizers used for

agricultural purposes at the surrounding areas. The results reported in this study can be used as reference values in the future when the Treatment Plant will be in full operation.

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