

DISTRIBUTIONAL STUDIES ON PHYTOPLANKTON ASSEMBLAGES ALONG  
ENVIRONMENTAL GRADIENTS IN SARONICOS GULF, GREECE

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Abstract

Distributional patterns in Saronicos Gulf, were studied during the summer of 1982. A number of stations were established along three environmental gradients and samples were collected once a week. A statistical measure of difference in cell number and diversity between stations showed that significant differences in cell number were observed more frequently than in diversity. This indicates that an increase in biomass due to eutrophication is not always followed by changes in community structure. An index of community difference used did not show any remarkable phytoplankton heterogeneity in Saronicos Gulf, the only exception being the station nearest to the sewage outfall.

Introduction

Environmental gradients induced by eutrophic conditions are of particular interest since information of the effects on the structure of phytoplankton community at various nutrient levels can be obtained. The present study is concerned with qualitative and quantitative analysis of phytoplankton in Saronicos Gulf, Aegean Sea, along three environmental gradients during the summer of 1982.

Materials and Methods

Surface samples of phytoplankton were collected by an NIO waterbottle at seven stations in Saronicos Gulf (Fig. 1). The stations were selected along three transects, station UK in the center of the Gulf being the control station. The samples collected at weekly intervals during July and August 1982 (8 weeks), were fixed with lugol and inspected with an inverted microscope.

The analysis of data involved the calculation of diversity according to the Shannon-Weaver formula (Poole 1974). The difference of measure (MacArthur 1965) was also used to compare the structure of all possible pairs of phytoplankton assemblages sampled on the same date.

The multiple range procedure described by Duncan (1955) was applied to evaluate the significance in cell number and diversity data between stations.

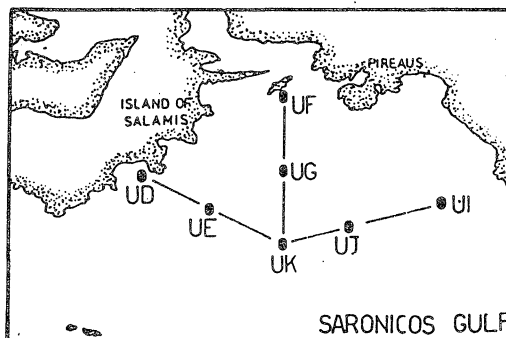


Fig. 1. Saronicos Gulf; station locations.

### Results and Discussion

Mean cell number and diversity are shown in Fig. 2. A high value of biomass was observed in UF, the station nearest to the sewage outfall of Athens; high cell number was also observed in UD a station possibly affected by eutrophication. Diversity did not show any remarkable varia-

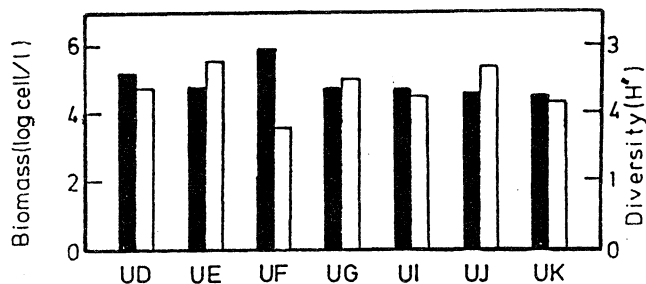


Fig. 2. Phytoplankton biomass (log cells/l) and diversity in Saronicos Gulf during the summer 1982. The values are the average of 8 weekly cruises. (Black bars: biomass, white bars: diversity).

It is obvious that the effects of eutrophication on the three environmental gradients were more pronounced on the biomass. Diversity as well as the measure of difference showed that there was no remarkable change on the community structure although the chemical gradient especially along UF-UD is particularly strong (Karydis et al 1983). These results suggest that quantitative effects are mainly induced on phytoplankton as a result of eutrophication, the community structure being affected at extreme conditions of nutrient supply; the latter indicates that phytoplanktonic systems can be remarkably stable if the nutrient load is not particularly high.

### References

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tions, the lowest value having been recorded in UF. The Duncan's multiple range test showed that station UF differed significantly in biomass (.05) from UK, UJ, UG, UI, UD; UD also showed significant difference from UK and UI. On the contrary significant differences in diversity were observed only between UF-UE and UF-UJ. The measure of difference showed the highest value between UF-UK as well as between UF-UI. The structure of phytoplankton community also showed remarkable differences between UF-UD and UF-UJ.

Table 1. Dhk values in seven stations. Each number is the average of 8 weekly samples. The values in the table are  $(Dhk - 1) \times 10^3$ .

St.	UE	UF	UG	UI	UJ	UK
UD	211	218	333	233	311	306
UE		391	206	255	205	244
UF			346	540	471	572
UG				238	289	294
UI					267	283
UJ						204