

TEMPORAL VARIATIONS OF NUTRIENTS AND CHLOROPHYLL A IN URLA COAST (IZMIR BAY-AEGEAN SEA-TURKIYE)

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Abstract

The aim of this research is to determine the temporal changes of physico-chemical environmental parameters and chlorophyll a concentrations. For this purpose, water samples were taken from Urla coast weekly period in 1999-2000.

Keywords : *Nutrients, chlorophyll a, Izmir Bay*

Marginal marine environments including estuaries, lagoons, bays, gulfs, etc., are especially sensitive to long and short term external factors. In particularly coastal areas are subject to diverse antropogenic influences including industrial development domestic wastes, maritime transport and agricultural activities. In addition, the effects of the nearby soils also have to be considered. For all these reasons water analysis of coastal areas play a very important role in the quality assessment of the marine environment. The domestic and industrial wastes of this densely populated settlement discharge through the bay water. Hence, Izmir Bay has become an important focal point for potential marine pollution in Türkiye. The aim of this study is to investigate the temporal changes of physico-chemical environmental parameters and chlorophyll a concentrations and to assess the environmental state of the Urla coast.

Study area

Izmir Bay, situated in the western coast of Anatolia, lies between 38° 20'-38° 42' N latitude and 29° 25'-27° 10' E longitude. From topographic and hydrographic point of view, it is divided into the inner, middle and outer bay regions. (1) (Fig.1). Urla coast is located at the middle part of Izmir Bay.

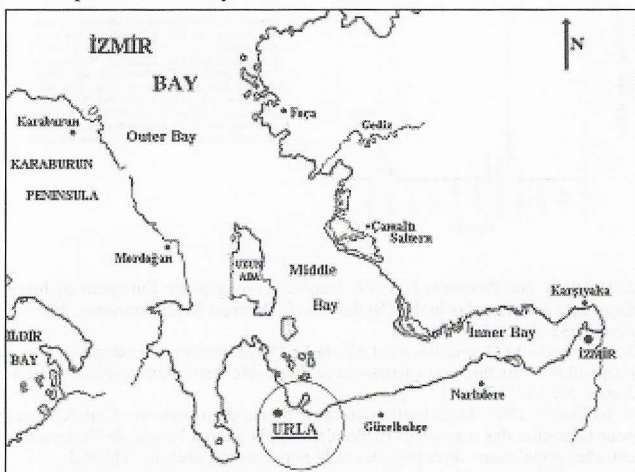


Fig. 1. Map of sampling location.

Material and method

Water samples were taken weekly during the period October, 1999 to October 2000 from Urla coast. Salinity were analysed in the base of Mohr-Knudsen method, temperature has been measured by 0.1°C sensitive electronic thermometer and pH values were measured by pH-ep pH Electronic Papier (Hanna Ins.). Nutrients were estimated by standard methods (2,3). These were carried out by using Hach-DR2000 UVD model spektrophotometer and also chlorophyll a analysis were performed by using Turner 10-AU model Fluorometer.

Results and discussion

In this study, minimum maximum and average concentrations of temperature, pH and salinity have been given in Table 1. Rainfall, evaporation, streams and land-base discharge affect the variations of salinity in Urla coast. As a result of rain, salinity has decreased to 33.93 ‰. pH values measured at Urla coast are relatively higher in comparison with the other regions of the Izmir Bay (4). The land-base discharges, biological activities and water temperature affects the values along the shore. Minimum, maximum and average values of nitrogen forms have been given in Table 1. Nitrite has one major peak at the end of the April. During this sampling time nitrate and ammonium values decreased significantly. At the beginning of the April, nitrate and ammonium concentrations were low. But one week later these nutrients' concentrations increased remarkably caused by rainfall. At

Table 1. Minimum, maximum and average values of physico-chemical parameters from Urla coast.

Parameters	Minimum	Maximum	Average
Temperature (°C)	9.00	26.50	17.96
pH	6.41	8.09	7.81
Salinity (‰)	33.93	40.36	36.99
NO ₂ -N (µM)	0.00	4.14	0.56
NO ₃ -N (µM)	0.00	23.57	6.68
NH ₄ ⁺ -N (µM)	0.00	6.85	2.27
PO ₄ -3-P (µM)	0.32	23.52	6.40
SiO ₂ -Si (µM)	0.00	29.85	11.27
Chlorophyll a (µg/l)	0.00	1.75	0.21

Table 2. Minimum and maximum nutrient concentrations from different regions of Urla.

Nutrients Regions	NO ₂ -N (µM)	NO ₃ -N (µM)	NH ₄ ⁺ -N (µM)	PO ₄ ³⁻ -P (µM)	SiO ₂ -Si (µM)	Ref
Urla coast	0.00-0.15	0.08-1.34	0.00-32.14	0.14-6.07	-	5
Urla coast	0.00-0.82	0.00-5.4	0.00-15.00	0.02-4.00	-	6
Urla coast	0.02-0.28	0.00-2.39	0.18-6.43	0.20-6.00	0.36-23.85	7
Urla offshore	0.08-0.18	0.03-3.58	0.60-1.52	0.08-0.75	-	8
Urla coast	0.00-4.14	0.00-23.57	0.00-6.85	0.32-26.52	0.00-79.85	*

* this study

the end of the April nitrate and ammonium concentrations decreased depending on phytoplanktonic activity. For nitrate and ammonium values, from the early spring to the end of the May, great fluctuations have observed. During this period chlorophyll a concentrations have also showed fluctuations. At the summer period nitrite was below the detection limit. But from the beginning of the July, nitrite concentration was increased. At this period, ammonium and nitrate concentrations decreased. In winter period the phosphate concentrations were almost in the same level. In early spring phosphate concentrations increased. At the beginning of the April PO₄³⁻-P decreased but chlorophyll a concentrations increased and showed great peak. Silicate concentrations were high in early spring. At the beginning of the April, silicate levels decreased gradually except some fluctuations. These are the indirect proofs of phytoplanktonic activity.

This study indicates that significant long-term changes of nutrient compounds have occurred in Urla coast due to changes of their content inner part of Izmir Bay. Since the mid-1980's nutrient concentrations in sea water have increased remarkably in Urla coast. The detected increase of nutrients have resulted in a higher primary production in this region and consequently in a higher degree of eutrophication in inner part of Izmir Bay. This is very important because eutrophication of the inner part of the Izmir Bay represents a serious regional problem. Recent years this problem has spread over the Urla coast.

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