

EFFECTS OF OIL POLLUTION ON THE PHYTOPLANKTON COMMUNITY IN THE KUCUKCEKMECE BAY (NORTH-EASTERN SEA OF MARMARA, TURKEY)

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Abstract

Volgoneft tanker accident occurred at 29 December 1999. It was spilled 3.086 t of heavy fuel oil in the Küçükçekmece Bay. This area heavily affected by oil pollution. The phytoplankton community was investigated in water sample during January 2000 and April 2003. Its density was decreased after the oil spill and two years later, when oil concentration level felt the phytoplankton abundance and number of species increased.

Keywords : *Phytoplankton, Petroleum, Pollution, Sea Of Marmara.*

Küçükçekmece Bay located at the northeastern Sea of Marmara Sea. The analyses of phytoplankton were made in one liter sea water sample taken at surface and 10 m deep water in 7 stations during two years after spill (Figure 1).

In this study were identified 77 taxa at 5 taxonomic classes on the phytoplankton community. These taxa were constituted diatoms (52%), dinoflagellates (41.5%), silicoflagellates (4%), cyanobacterium and euglenophyte (2.5%). After the accident were identified 24 phytoplankton species, while two years later increased to 40. The highest phytoplankton density in the surface water was reached $87 \times 10^3 \text{ cells l}^{-1}$ in year 2000, $29.5 \times 10^3 \text{ cells l}^{-1}$ in 2001, $195 \times 10^3 \text{ cells l}^{-1}$ in 2002 and $5.4 \times 10^6 \text{ cells l}^{-1}$ in 2003. In January 2002, a diatom *Pseudo-nitzschia delicatissima* and in April 2003 an euglenophyte *Eutreptiella* sp. were dominated in the community. During the study period phytoplankton was mostly composed of dinoflagellates and diatom. In January 2000 dinoflagellates were the dominant groups, however diatoms were almost not observed. In the May 2000 dinoflagellates *Prorocentrum micans* ($70 \times 10^3 \text{ cells l}^{-1}$) and in August 2000 *Ceratium fusus* ($53 \times 10^3 \text{ cells l}^{-1}$) are dominant species. These results were indicated that dinoflagellates more tolerant than other phytoplankton.

The highest oil concentration at surface water was measured as $2178.5 \mu\text{g/L}$ in December 1999 and it was decreased to $0.06 \mu\text{g/L}$ in April 2003 [1]. It was reported that petroleum hydrocarbons reduced up to 36-40% photosynthesis in phytoplankton [2, 3]. The high oil concentration was inhibited the growth of *Prorocentrum micans*, while low concentrations stimulated [3]. The findings on the Sea Empress and the Tsesis oil spill no significant effect on phytoplankton development. It was suggested that the increase of phytoplankton due to decrease of zooplankton grazing pressure [4, 5]. We found that similar results with [2, 3], contrary to [4, 5] as high oil concentrations the growth of *Prorocentrum micans* was decreased, while at the low concentrations increased.

Figure 2 shows the relation of the oil pollution with the phytoplankton level. As can be seen in this graphical representation, when the oil concentration was increased the phytoplankton level decreased. According to these findings, it was concluded that the phytoplankton was reduced depending on the oil pollution level in sea water.

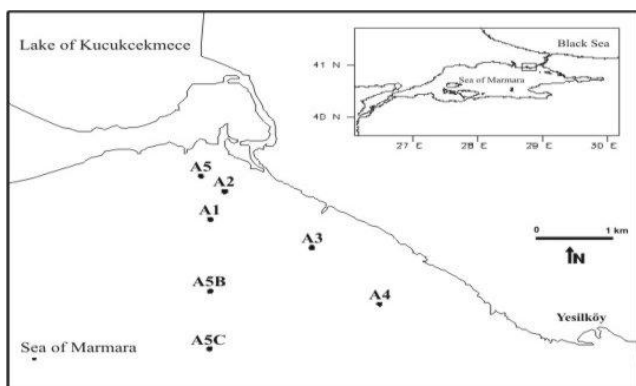


Fig. 1. The sampling stations.

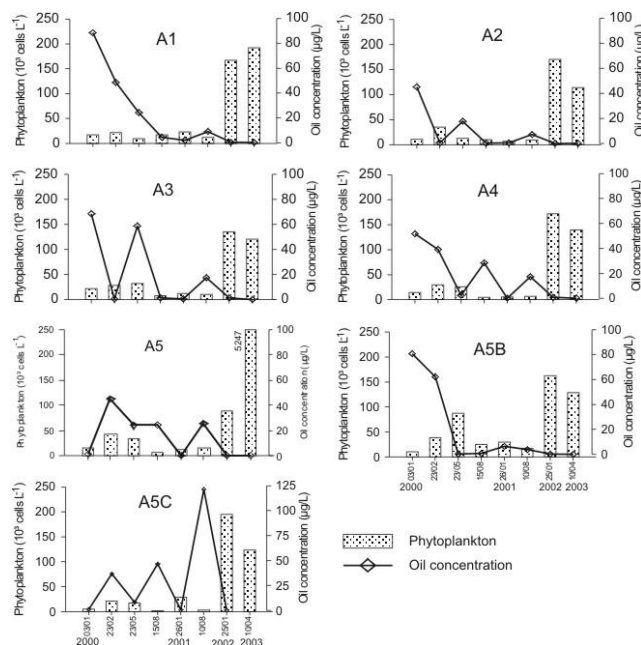


Fig. 2. The graphical representation of oil concentration and phytoplankton abundance in the surface water during the years 2000-2003.

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