

## **Eutrophication Problem in the Western Harbour of Alexandria, Egypt.**

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The problem of eutrophication in the Western Harbour of Alexandria was studied monthly from April 1999 to March 2000. The parameters related to this problem were followed up in the surface and near bottom waters, including water temperature, salinity, pH, dissolved oxygen, transparency, nitrate, ammonia, phosphate and silicate. Phytoplankton chlorophyll-a and zooplankton stock were also measured. Water circulation and land-based effluents discharged directly and indirectly to the harbour appeared to cause pronouncedly wide variations in the measured parameters. The results indicated that surface water temperature followed the seasonal changes experienced in the southeastern Mediterranean (14-29°C), while near the bottom it was lower by 0.5- 2°C. Surface salinity was usually lower than the Mediterranean Sea water, attaining an annual average of 35.3 ppt and decreasing sometimes near the bottom to 36.3 ppt. The oxygen concentrations indicated relatively bad aeration of the water column in the Western Harbour, having averages of 3.4 and 2.3 mg/l in the surface and near bottom waters respectively, and the absolute values decreased occasionally to 0.14-0.55 mg/l. This was reflected on the pH values, which ranged from 7.71 to 8.68 at the surface and 7.48 to 8.29 near the bottom. Nutrient contents provided abnormally wide variability in both surface and bottom waters, usually with wider ranges in the surface except for silicate, which showed higher values in the bottom water. NO<sub>3</sub> varied between 0.21 and 20.46 µM at the surface and 0.25-18.12 µM near the bottom, NH<sub>3</sub>: 1.97-57.46 µM at the surface and 2.32-43.73 µM near the bottom, PO<sub>4</sub>: 0.12-5.7 µM at the surface and 0.0-2.6 µM near the bottom, and Si: 0.9-36.3 µM at the surface and 1.26-38.4 µM near the bottom. Chlorophyll-a attained also markedly high values (annual average: 33.82 µg/l), varying from a minimum of 1.89 and a maximum of 219.41 µg/l. The phaeopigments demonstrated also high concentrations (0.05-105.88 µg/l) with an annual average of 10.39 µg/l. The high levels of nutrients and chlorophyll-a serve together as a good indication of pronounced conditions of eutrophication in the Western Harbour throughout the year. These conditions affected clearly the zooplankton stock, which mostly showed low values (annual average: 26728 ind./m<sup>3</sup>). Salinity seems to be the most effective factor governing the different measured parameters since it showed significant correlation with several parameters.