

INFLUENCE OF POLLUTION ON LAKE MARIUT, EGYPT

I. ENVIRONMENTAL CHARACTERISTICS

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SUMMARY : - *Variations of some environmental characteristics in lake Mariut, a heavily polluted coastal lake in Egypt, were studied and discussed. The lowest air and water temperatures were recorded in January and the highest in July. The lowest average Secchi values in the northern side of the lake suggest the direct effect of pollution. The minimum average values of pH and dissolved oxygen in Qala Drain accompanied by the maximum average value of hydrogen sulphide show that this drain supplies lake Mariut with heavily polluted water.*

Lake Mariut, the smallest brackish-water lake adjoining the Mediterranean Coast of Egypt, has suffered much from intensive pollution. Large areas of this lake were reclaimed for agriculture and the lake is now divided into four parts. The lake proper, selected for the present study, has an area of about 2730 hectares and water depth ranging from 90-150 cm. The lake receives large amounts of drainage waters from Qala Drain and small amounts from Umum Drain. Untreated domestic and industrial wastes are discharged mainly into the northern side of the lake. Mex-pumps discharge the surplus water from the lake into the sea to maintain the lake water level at about 2.8 m below sea level. The present study, which represents a part of a pilot project on pollution of lake Mariut supported by IAEA, deals with the effect of pollution on the environmental characteristics of this lake. Field observations and surface water sampling were carried out seasonally at 8 selected stations during October 1979 - April 1981.

Lake Mariut being shallow, its water temperature usually follows that of the air. The seasonal average air temperature varied from 12.9°C in January 1981 to 30.3°C in July 1980. The seasonal average water temperature ranged from 14.3°C in January 1981 to 29.5°C in July 1980. The seasonal averages of air and water temperatures showed another drop in January 1980 and gave intermediate readings in April and October.

The lowest regional average Secchi value of 32 cm obtained in the northern side of the lake suggests the direct effect of pollution with sewage and industrial wastes (SAAD, 1978, 1980). The average Secchi value calculated for lake Mariut was 41 cm.

The minimum regional average pH value of 7.34 found in Qala Drain at its connection with the lake coincides with the type of this water, which is highly polluted as indicated by the minimum regional average value of dissolved oxygen (0.10 ml/l). SAAD (1973) gave an average pH value of 8.00 for lake Mariut. This is relatively higher than that average value calculated in the present study (7.56). The progressive decrease in pH values in lake Mariut illustrates the corresponding increase in the effect of pollution.

Dissolved oxygen was depleted at different stations in October 1979 and during April 1980 - April 1981, mainly in the north eastern side of the lake and in Qala Drain. The maximum regional average value (4.64 ml/l) obtained in Umum Drain at its connection with the lake is due to the type of this water, which was well oxygenated and far away from the direct effect of wastes outfalls. This maximum was accompanied by the maximum regional average pH value. The highest values of dissolved oxygen obtained in January are attributed mainly to continuous mixing of the lake water by wind action and the relative decrease in the rate of oxygen consumption due to the drop of temperature (ALEEM and SAMAAAN, 1969). The average value of dissolved oxygen for lake Mariut was 2.25 ml/l.

Hydrogen sulphide disappeared at different stations during January 1980 - April 1981. The regional average values of H₂S ranged from 0.18 ml/l in the southern region of the lake to 21.59 ml/l in Qala Drain. This maximum illustrates that Qala Drain supplies lake Mariut with heavily polluted water. The average value of H₂S for the whole lake was 7.64 ml/l.

The regional average chlorosity values ranged from 1.08 g/l in Qala Drain to 2.09 g/l in Umum Drain. This maximum value shows that the water of Umum Drain entering into lake Mariut increases its chlorosity. The seasonal average chlorosity values varied from 0.55 g/l in October 1979 to 1.88 g/l in July 1980. This maximum value coincides with accumulation of salts in the lake due to the increase in the rate of evaporation by elevation of water temperature in summer. The average value of chlorosity for the whole lake was 1.42 g/l.

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