

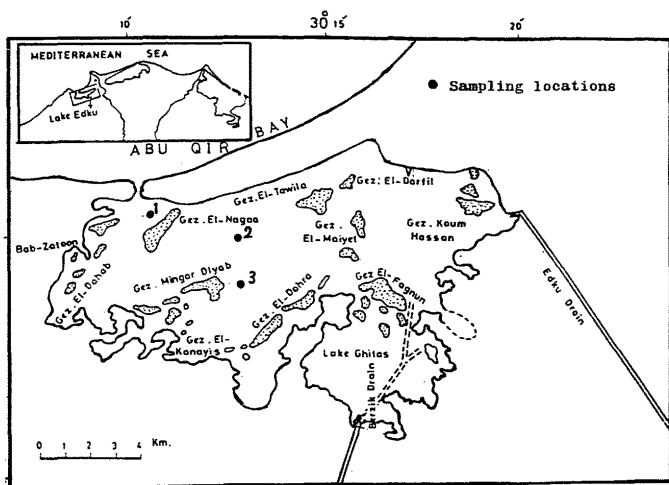
## Geochemistry of Fe, Mn, Zn, Cu, Pb and Cd in Sediment Cores from Lake Edku

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Lake Edku is one of the shallow, brackish-water coastal lagoons of the Nile Delta. The lake is separated from the Mediterranean Sea by a sandy coastal barrier, yet, lake-sea water exchange is kept through a narrow outlet.

The lake sediments are mostly derived from soil erosion in addition to contribution from indigenous plants and animals. On the average, the sediments compose of a mixture of 45% sand; 23% silt; and 32% clay. Mollusc shell fragments constitute in most cases the major part of sand. The clays and fine silt on the other hand compose of mixed layer smectite-illite, illite and subordinate kaolinite (Moussa and Saad, in preparation). X-ray amorphous Fe hydrous oxides seem to contribute to these fractions a lot.



For the present work we collected three sediment cores in a way to represent the three main subenvironments of the lake: 1- the lake-sea communication vicinage; 2- the central basin; 3- the area affected directly by drains.

In the laboratory, the sediment interstitial water were extracted by centrifugation. The sediments were then dried at 70 c. A carefully homogenized portion of each sediment was powdered for the determination of organic carbon, carbonate and total heavy metal concentrations. A 1.0 g cut of each nonpowdered sediment was taken for the extraction of labile elements by 1M HCl. Another suitable cut was taken for the determination of sand, silt and clay contents.

The element analysis were done by flame ASS. All the precautions of sample handling and analysis were taken in order to assure high quality of data.

The results showed that the lake average concentrations of the total Fe, Mn, Zn, Cu, Pb and Cd are: 57787, 943, 81, 55, 42, 3.4 ug/g respectively. The per cent leachable fractions of these elements in the given order are: 18, 64, 30, 53, 612, 30. The leachability of the elements decreases generally from top to bottom in the cores.

The correlation analysis of the total element concentrations with the other sediment parameters indicate two groups of element associations: a) Fe-Zn-Cu and b) Mn-Pb-Cd. The clay and to some degree the silt are the major sites for the first association, while, the calcareous shells (sand) are the sites for the second group.

The resolution of the total element concentrations into labile (HCl leachable) and residual (total - labile) gives a more clear picture.

In the labile phase, Zn of group (a) went out of the combination to become specifically correlated with organic carbon ( $r=0.75$ ) leaving Fe and Cu with clays. In group (b) association improved correlations are observed between Pb and Cd ( $r=0.96$ ) and between Mn, Pb and Cd ( $r=0.77$ ). Also their link to calcareous sand becomes more evident ( $r=0.82-0.87$ ).

In the residual phase all the elements are interrelated. About 70% of Fe and 50% of Pb are shown to be incorporated in the silt and clay minerals. The weak correlation between Zn, Cd, Cu and the silt and clay minerals suggests that these elements are most probably incorporated in heavy minerals.

### References

Moussa, A. A. and Saad, N. A., Mineral composition of Lake Edku sediments (in preparation)