Texture, Chemistry and mineralogy of Lake Manzalah sediments, Egypt

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Lake Manzalah is the largest of the four Delta lakes, with a surface area of about 60 % of their total area (1350 km2). The lake was connected to the River Nile (Fig. 1) by the fresh water Enaneya and Ratama canals. It has south western connections to the sea and sewage water flows into its south east basin (El Bakar canal) as well as into the south and south west basins (Ramsis and Hadous drains).

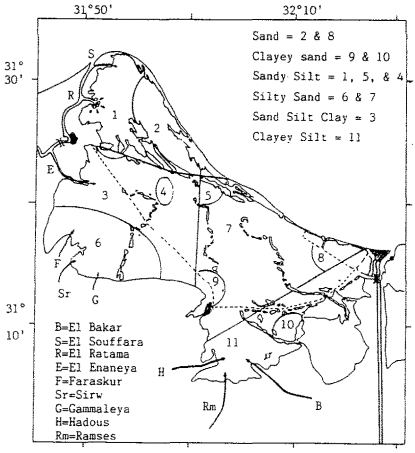

Figure (1): Area of Study

Sixty nine sediment samples were collected from the bottom surface of lake Manzalah and were subjected to mechanical, chemical and mineralogical analysis. Most samples are poorly to very poorly sorted. The predominant type of sediments is the silty sand type (zones 7 and 6) followed in abundance by the complex type sand-silt-clay (zone 3) and clayey silt (zone 11) respectively (Fig. 1). The sand fraction spreading along the northern and north eastern sides is mainly derived from the Mediterranean beach sand penetrating through the lake-sea connection (ElSouffara canal and El Gamil opening) as well as wind blown sand. Such distribution of sediment type reflects the hydrographical changes and the total absence of Nile sediment load - which previously used to enter the lake - after the construction of Aswan High Dam.

By comparing the present results with those of Port Fouad (EL SABROUTI *et al.*, 1989) and Bardawil (LEVY, 1974) lagoons we found that the difference in hydrographic conditions affected greatly the type and distribution of the sediments in all three areas. The coarse fractions occurred in the lagoons peripheries where as the central zones are covered with finer sediments. No drains flow into these two lagoons. The Mediterranean sea and Sinai are the main sediment source for Port Fouad lagoon, while the Mediterranean Sea is the only sediment source for the Bardawil lagoon.

The mineralogical analysis showed that the heavy minerals of the lake samples are similar to those of the Nile sediments. Amphiboles, opaques, pyroxenes and epidotes are the common heavy minerals derived from the Abyssinian plateau of the central African complex. Less frequent are garnet, rutile, zircon, tourmaline, kyanite and biotite. Aragonite is the dominant carbonate mineral with subordinarly high Mg-calcite and calcite. The areas covered by fine sediments have low carbonate content because fine sediments inhibit the flourishing of benthic fauna and because of the inorganic materials discharged into the lake by drains.

The average organic matter content is 5.2 % lower than that found by ABOUL DAHAB *et al.*(1990) for lake Mariut (average 14.1%). The organic matter, organic nitrogen and total phosphorus contents (averages = 5.2 %, 0.28 % and 0.02 % respectively) are higher in the peripheral zones eg. at El Bakar, Ramsis, Hadous and El Gamaleya drains, which may be attributed to the sewage drainage. The distribution of the organic matter, organic nitrogen and total phosphorous follows more or less the same pattern of sediment distribution in the lake, being highly found in the zones of silt and clay and lower in sandy areas.

The average $CaCO_3$ content is 14.25 %, while $MgC0_3$ content is 3.4 %. The relationship between Ca and Mg carbonates is not consistent, because Mg carbonate concentration depends on the type and nature of the calcareous organisms dominating in the sediments.

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