# NUTRIENT SALTS OF LAKE EDKU (EGYPT) BEFORE AND AFTER THE ASSWAN HIGHDAM (1958 - 1969)

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Lake Edku (Egypt), a 100 $km^2$, shallow brackish-water lagoon, connects to the Mideterranean sea through a narrow strait at Maadia, which flushs western-Delta drain-water into the Abukir bay. Since the construction of the Asswan high-damm, the lagoons freshwater-imput has doubled causing changes in its major and minor (nutrient) salts which seem to bear on the lagoons productivity and community structure.

Le lac Edku (Égypte) un étang de 100 $km^2$ de surface, de faible profondeur et déau saumatre est liẽ a la Mediterranée par un dẽtroit â Maadia. Par ce dernièr l'eau de drainage de la partie occidental du Delta est chassée dans le baie d'Abukir. Aprẽs la construction de la barrage d'Asswan l'affluence d'eau douce a doublée entrainant des changements des sels nutritifs les plus importantes ce qui a influencẽ la productivitẽ de l'etang.

Lake Edku a shallow lagoon, averages 1 m deep, connects to the mideterranean sea by a strait 100 m long and 20-30 m broad at Maadia. It received freshwater from the western-Delta drains which increased from 1216.8 to 2062.6 millions cubic meters in 1958 and 1969 respectively (Saad, 1976). Sea-water forces itself into the lagoon and may be traced up to 6 km inside it. This occured several times a year before the construction of the high-dam. After the dam the frequency of invasions might have diminished (Saad, 1976), although the average chlorosity-gradient in the lagoon remained more or less unchanged (Banoub, 1979). The invasion by sea-water seem to be enhanced by diminished drainage input, tidal changes causing increase in lake level and prolonged north winds. Temperature differences between sea-water and drain-waters, macrophytes density in the lagoon etc. seem to affect not only the frequency of invasion but

also the extension of the salt wedge into the lagoon. Salinity distribution inside the lagoon caused biotopic zonation ranging from limnetic conditions near the drains, where Eichornia-Ceratophyllum plants dominate (Elster and Vollenweider, 1961), through areas dominated by Potamogeton-Lemna, untill very near the lake-sea connection where eel-grass and Ectocarpus were found. Migrant euryhaline fishes like; Anguilla, Mugil, Sciena, as well as crustaceans Penaeius, Portunus and Calinectes found temporary abode in this lagoon during their feeding migritions. Lagoon fishermen knew approximately the periods of these migrations and were prepared for it with their gears. As these migrations took place generally during storms (Nawat), where massive water-transportation in between sea and lagoon took place, it would be of econommic importance to be able to forcast or regulate such periods, and to make most benefit of these fish-excoduses. The presence of dense and extensive macrophytic zones in the lagoon did not prevent sea-water from reaching considerable distances inside it.

However on a yearly average the chlorides at 0 km, 2 km, 6 km and 12 km inside the lagoon were 4.8, 2.6, 1.1 and 0.4 g/l i.e. at lagoon-sea connection, free water, dense Potamogeton zone and at the Edku-drain crossing. The major changes in the hydrology and hydrochemistry of the lagoon as derived from Saad (1976 and 1978), Banoub (1979, unpublished) and Elster & Vollenweider (1961) may be sammerized in the following; 1-The lake-level changed in amplitude (from 20 cm to 5 cm) and in phase (the August peak in 1958 coinside with minimum in 1969). 2- The average chlorides peaked in the lagoon in July in 1958 as against February in 1969 indicating that the major period of sea water invasion has changed from summer to winter. 3- The temperature average seasonal variation is lesser in amplitude in 1969 than in 1958 which may be due to a

decrease in macrophytic density and/or the change in drain as well as sea water inputs. 4- Averages of lagoon pH decreased 0.7 between 1958 and 1969, at the same time alkalinity increased about 1 meq/l probably for the same above reasons. 5- Phosphates on the average increased from 36 to 81 ug P/l in 1958 and 1969 respectively, at the same time the spring-summer minimum of 1958 is replaced by 2 high peaks (180 ug P/l) in 1969. 6- Silicates on the other hand decreased from an average of 4.5 to 1.4 mg Si/l in 1958 and 1969 respectively, this may indicate a change in drain water quality from that of 1958 where considerable amounts of colloidal oxides of Si and Fe were flushed into the lagoon during flood time. 7- Nitrites increased from traces to 10 ug N/l in 1958 and 1969 respectively, this may be due to an accompanying increase in nitrates in drain waters (no data from 1969, whereas it averaged in 1958 in the whole lagoon 38 ug N/l).

While the average nutrient salts have either increased or decreased by more than 100 %, the real input is actually more as the drainage discharge has 70 % increased. The above changes in nutrients, pH, alkalinity and temperature suggest that the macrophyte biotope might have changed in quality or quantity. The effects of this on the productivity of the lagoon-fishery is yetto be known.

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