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CONTENTS

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Efforts will be made to report activities related to Aquatic resources through KENYA AQUATIC. This will include scientific communications, critical reviews, seminar proceeding and other publications. This comprehensive coverage will be possible only through co-operative of various institutions, Departments, universities, societies and individuals who are concerned with aquatic resources.

KENYA AQUATICA is a technical and extension series for rapid dissemination of information on aquatic resources and allied information from Research Officers, Fisheries Officers and any individual for transfer of Technology to the fishermen and industry and any other relevant information needed for National Development.

The Editor wishes to invite comments and suggestions from readers with a view to improving the bulletin in the choice and arrangement of the articles, notes, summary, news briefs etc. It is our aim to see that this publication receives wide acceptance from the reading public and those interested in aquatic both within the country and abroad. It is hoped that this issue will stimulate further contributions from the readers.

We appeal to all concerned to send us regularly such Publications, at the following address:-

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A REVIEW OF SOME LIMNOLOGICAL ASPECTS OF LAKE TURKANA

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HYDROLOGICAL BALANCE

The influence of the inflow from river Omo on the general Lake level is very significant since in a year when its discharge is of low magnitude or even short duration, the Lake may rise slightly or remain stationery, and when the discharge is high as was the case in 1961 a rise in level of as much as 100/cm may be observed, reports Butzer (1971).

In general however, observations of the years 1949-1962 (Butzer 1971) and 1972-1973 (Hopson 1974 indicate that the Lake drops at a rate of 17-18/cm a Month from July to december, this is most likely due to evaporation and underground trickling since no surface outflow exists. If the figure of 18/cm is extrapolated to cover the whole year, it is envisaged that there is a loss of water of approximately 16 x 10 /m per annum and therefore river Omo, being the biggest source of discharge, should discharge into the Lake a volume of similar magnitude every year to counter the loss.

From this figure of discharge, it is calculated that the residence time of Lake Turkana is approximately 13 years. And the critical residence time is about 1.4 years. On the basis of these information one can predict that, if the discharge from river Omo is held back, as is partially the case at the moment, then it will take a little over 13 years for the Lake to dry out completely. An indicator to the fast drying out can be about 2/3 in the last eight years from a size of 35 sq. km reported by Hopson in 1974.

LAKE TEMPERATURE

Lake Turkana with its great depth shows a small range of water temperature between the surface and the bottom as shown below:-

Temperature Range (C)		
Surface	*(0.5 m)*	*27 - 28.9*
Subsurface	*(5.0 m)*	*26 - 27.7*
Bottom	*(80 m)*	*25.5 - 26.1*

Surface temperature are however greatly influenced by insolataion and wind induced turbulence so fluctuations may be very high even within two successive days. Thermal stratification is occasionally observed, but the thermoclines are usually temporary, forming quickly on calm days and breaking up rapidly when the conditions are rough.

The absence of chemical stratification in the Lake is manifested of the polymictic nature of Lake Turkana. The only exception, however is the Ferguson Gulf which is protected from wind disturbances and is therefore permanently stratified.

LAKE CONDUCTIVITY

Lake Turkana does not exhibit a big conductivity gradient from one portion of the lake to the other. Vertical stratifications are also absent. There is however seasonal variation in conductivity due to the influx of water from river Omo at flood time in which case the values of conductivity particularly in the Northern part of the Lake may drop considerably. The freshwater then spreads gradually Southward thus affecting the conductivities of the Central and Southern portions of the Lake.

The mean values of conductivity are between 3400-3700 uS/cm, but the Ferguson's Gulf maintains a value of 4700uS/cm. The Northern sector during the flood period records as low as 200uS/cm. (Hopson 1982). Compared to other alkaline saline Lakes in Rift Valley, namely Bogoria, Elmenteita and Sonachi, it is found that conductivity values of Lake Turkana are very low.

These three shallow Lakes have similar hydrological patterns as Lake Turkana and also share a similar range of PH, and sodium is the principal as in Lake Turkana (Mellack et.al 1982). Below is a comparison of mean value of PH and conductance of the four Lakes.

	PH	*CONDUCTANCE (uS/cm)*
Lake Sonachi	*9.6*	*4650*
Lake Bogoria	*10.1*	*18,800*
Lake Elmenteita	*10.4*	*71,000*
Lake Turkana	*9.3*	*3,500*

For a Lake that has an enclosed basin like Lake Turkana and which has been in existence for over 7500 years, very high conductivity values would be expected. Infact derivation from residence time of the Lake and ionic loading into the Lake by river Omo, suggests that there is supposed to be annual increase of conductivity in the Lake of 6 us/cm/year. Geological evidence however reveals that the rate is in the region of 0.45 us/cm/year (Hopson 1975), which infact is more realistic. That the rate is curtailed from 6 uS/cm/year may be attributed to excessive infiltration of ions into the Lake sediments and therefore maintaining a relatively low Lake conductivity level.

Bouchardeau (1962) reports that a similar phenomenon was observed in Lake Chad which also has an enclosed basin. The rate of increase in conductivity of 0.45 uS cm year is considered to be very minimal and is unlikely to affect the Lake fishery in the near future.

LAKE WATER CHEMISTRY

Lake Turkana is regarded as an alkaline saline Lake because of its sodium, carbonate, and chloride dominated nature (Beadles 1932, Talling & Talling 1965, Fish 1954, Mellack 1981). The sodium ions form 95% of the major cations, followed by Potassium, Calcium and Magnesium in that order. It may be of interest to note that the Sodium dominated nature of the Lake owes its origin from the river Omo whose catchment area produces water rich in Sodium (Hopson 1982). Being a closed basin, it is likely that salinity of Lake Turkana will continue to increase, but it is difficult to predict what changes will occur due to the increase and at what rate the changes will take place. Like many alkaline Lakes in E.Africa the anionic composition of Lake Turkana is predominated by bicarbonate and carbonate (Mellack 1982). About 90% of the inorganic carbon must therefore be in the form of bicarbonate since the Lake Turkana PH is about 9.3 (Hutchison 1957).
Chloride is the other important anion but sulphate, phosphate and floride are in minute quantities

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