LIMNOLOGICAL ASPECTS AND TRACE ELEMENT ANALYSIS OF SOME SELECTED KENYAN NATURAL INLAND WATERS

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SUMMARY

This thesis reports the study of trace elements:
Ag, Cd, Co, Cr, Cu, Mn, Ni, Pb, Sn and Zn, and some
limnological factors in surface water and sediments in
some selected natural inland waters in Kenya. The
observed levels are compared with those that are
reported in literature to cause interference in
biological processes in aquatic environments and human
beings. There are little previous data and none that
are coherent. These data allow for a preliminary
assessment of the significance of each element and
limnological parameters in the long term stability of
the environments in which they occur.

XRFA and AAS have been used in the trace
elements analysis and the former proved superior in
the sediment (solid) samples analysis due to better
accuracy and precision of less than 10%. Trace metals
concentration (ppb) in the surface inland waters
(rivers and lakes) ranged as follows: Ag (1-75),
Cd (2-8), Co (6-23.2), Cr (25-50), Cu (5-57.6),
Mn (50-3276±450), Ni (13-34.1), Pb (7-93.6),
Sn (300-500) and Zn (25 - 124.8). Lake sediments had
the following concentration (ppm) ranges:
Ag (0.098-20.58), Cd (0.188-1.345), Co (0.166-1.632),

Cr (1.462-57.310), Cu (1.949-44.350), Mn (667.670-4713), Ni (11.694-56.710), Pb (10.920-192), Sn (17.210-234) and Zn (76.210-229.60). Results show that, a part from the Rift Valley saline lakes, Kenyan natural inland waters meet the WHO (1971) drinking water standards, and standards related to the aquatic living environments. Concentrations of some trace metals: Ag, Cd, Cu, Mn and Zn change upon raw water treatments.

Preconcentration techniques have been attempted in which preconcentration by evaporation followed by lyophilization of the liquid (water) samples was found more suitable. Bioavailable (total exchangeable) metal concentrations compared very well with the concentrations in the fish muscles.

Comparison with the analysis made by earlier investigators indicated a remarkable constancy over time in the chemistry of Lake Victoria and its affluent rivers. Kenyan natural inland waters have been divided limnologically into dilute (with conductivities less than $1000 \mu S \ cm^{-1}$) and saline (with conductivities more than $12500 \ \mu S \ cm^{-1}$) groups on the basis of the amounts of dissolved salts (electrical conductivities). The true status of

biologically valuable electrolytes in the lakes has been found much lower than it might first appear from electrical conductivity measurements. Diel changes of some limnological parameters are also reported.