ASSESSMENT OF POLLUTION OF SEDIMENTS FROM SELECTED LAKE VICTORIA BAYS

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Abstract

Pollution of Lake Victoria is caused by a number of factors. Pollution increase, industrial and agricultural developments and general municipal and domestic wastes from the catchment areas of the lake are the major contributing factors. This study was carried out to assess and compare the levels of pollution in the lake sediments and suspended solids at Napoleon Gulf (N.G.), Jinja municipality; Murchison Bay (M.B.), near Kampala city and Sango Bay (S.B.) in Rakai district. The analysis were carried out for total Nitrogen and total Phosphorus, organic Carbon and heavy metals (Cu, Zn, Pb, Ni, and Cd). Physical properties like pH of the sediment slurries, dry weights (%), organic weights (%) and sediment particle size distribution were also analyzed.

The results obtained for pH showed that Napoleon Gulf is not statistically different from Murchison Bay (ANVA, $p=0.963$), but are both statistically different from Sango Bay ($p=0.009$ and 0.007 respectively). The respective pH ranges were 5.9 – 6.1, 6.2 – 6.4 and 6.7-6.8. The pH ranges in the Bays considered together revealed a highly significant difference (ANOVA, $p=0.009$). The percentage dry weights in the sediments reflected the water retention capacities of the sediments and showed the trend N.G. $<$M.B. $<$S.B., the respective mean values being 5.42

±0.43, 6.27 ± 0.16, 41.42 ± 2.19%. The mean organic weights (%) at the three Bays showed that S.B. is significantly less than M.B. and N.G. The latter two are not significantly different from each other. The respective mean value were 3.13 ± 0.50, 30.09 ± 0.66, and 30.48 ± 0.93%. The extent of pollution in terms of total Nitrogen showed the same trend as the mean organic weight with the respective mean values for total phosphorus showed the trend S.B. <M.B. <N.G. and were respectively 2.3 ± 0.1, 4.8 ± 0.7 and 10.7 ± 1.4 (g/kg), revealing that the Bays were significantly different (ANOVA, p=).007).

The concentrations of heavy metals at the three Bays varied considerably. The mean concentrations of Cu, Pb and Cd showed the trend S.B. <M.B. <N.G. The respective mean values were 9.44 ± 3.8, 24.54 ± 4.2, 105.2 ± 20.1 (ppm) for Copper; 16.31 ± 2.23, 22.76 ± 1.56, 31.42 ± 2.19 (ppm) for Pb and 0.83 ± 0.30, 1.61 ± 0.17, 2.03 ± 0.15 (ppm) for Cd. The concentrations of Zn and Ni in the three Bays showed no significant differences. The respective mean values were 63.66 ± 6.75, 68.17 ± 2.67, 94.73 ± 21.4 (ppm) for Zn and 28.67 + 2.28, 29.41 ± 2.24, 37.98 ± 12.7 (ppm) for Ni.

However, using the Dutch system of pollution classification the sediments of M.B. and S.B. are not yet polluted by Cu, while that of N.G. is moderately polluted. The sediments of all the three Bays are not yet polluted by Pb, Zn and Ni. In terms of Cd, N.G. is not yet polluted, while M.B. and S.B. are significantly polluted.

N.G. and M.B. sediments were generally fine in texture and black in colour while that of S.B. were brown and sandy. Fine particles are known to hold more pollutants than coarse particles (Twenhogen, 1950). This van be ascertained from the tables for total N, total P and C concentrations in Appendices 2. The practical size distribution pattern at N.G. and M.B. were similar as a result of the similarity in the texture of the sediments in the two Bays. S.B. sediments were sandy and coarse in texture and therefore had a slightly different particle size distribution pattern.