ASSESSMENT OF POLLUTION OF WETLANDS NEAR THE OBLOGO LANDFILL SITE: A CASE STUDY OF THE DENSU DELTA WETLAND

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2008

ABSTRACT

The ecologically important wetland close to the confluence of the Densu River with the Atlantic Ocean in the Accra Metropolis has recently been the site of various forms of environmental degradation due to housing developments, subsistence farming activities, water pollution and dumping of household and other forms of waste. For example, the Oblogo landfill which is sited close to the wetland receives huge volumes of municipal waste from Accra. This study, resulting from fieldwork done during a six-month period from October 2007 to March 2008, investigated surface water, landfill leachate and few soil samples within the wetland area to assess possible pollution levels of the wetland. In all, twenty five (25) physico-chemical parameters were analyzed in water and landfill leachate samples and six (6) heavy metals in soil samples collected. Data obtained from water samples at various sites throughout the sampling period indicate wide variations in physico-chemical parameters. Temperature and pH varied from 25.8-30.7^{o}C and 6.2-9.5, respectively. Electrical conductivity (EC) and Total Dissolved Solids (TDS) also ranged from 235-60000µS/cm and 118-30000mg/l, respectively; salinity and turbidity from 0.03-40.6ppt and 11-241NTU, respectively. The high values in EC, TDS, salinity and turbidity were obtained in samples taken in areas close to the marine environment. Total Suspended Solids (TSS) ranged from 1-253mg/l.

Variations also occurred in the cations Na^{+}, K^{+}, Ca^{2+} and Mg^{2+} from 51.7-6670, 1.3-1340, 4.31-202.7 and 2.96-671mg/l, respectively. The anions Cl^{-} and HCO_3^{-} recorded values ranging from 53.18-2428 and 31.20-67.20mg/l, respectively; alkalinity from 25.57-55.11mg/l. Values for nutrients SO_4^{2-}, $PO_4^{-}P$ and $NO_3^{-}N$ were from 0.28-45.8, 0.009-0.432 and <0.001-0.444mg/l, respectively; BOD and COD from 0.25-63.33 and 1.25-95.00mg/l, respectively. Concentrations of the trace elements Pb, Cd, Cr, Co, Cu and Fe were, however, very low, generally below 0.3mg/l.

Appreciably high concentrations of Cu (0.43-7.98mg/l), Co (0.01-4.62mg/l), Fe (75-3260.54mg/l), Mn (0.44-114.49mg/l) and Cr (0.12-2.66mg/l) were obtained in soil samples taken from the wetland areas, Lead and chromium contents were, however, very low.

Two samples of leachate (from the Oblogo landfill site) which goes through the wetlands recorded the following significant values in some parameters: electrical conductivity: 1044 and 1534µS/cm, turbidity: 750 and 1490 NTU, Na: 1540 and 5490mg/l, K: 15 and 959mg/l, SO_4^{2-} : 0.35 and 1.17mg/l, PO_4^-P: 0.112-0.388 and NO_3^-N: 0.418 and 0.392mg/l.

Compared to WHO values, high concentrations of some parameters in the surface water and leachate samples are likely to affect the wetland environment. Because water from the Densu river and the leachate flow through or interact with the wetland, the high values of some parameters obtained could suggest the extent to which the wetland is being subjected to various forms of pollution. Some high trace metal contents in the soils may indicate the extent of vulnerability of the wetland area to pollution.

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