COUNCIL FOR SCIENTIC AND INDUSTRIAL RESEARCH (CSIR)
WATER QUALITY ASSESSMENT OF SAKUMO II AND MUNI LAGOONS

TECHNICAL REPORT

BY

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Abstract

A comparative study of some chemical water quality parameters of the Sakumo II and Muni Lagoons along the coast of Ghana was conducted. The study was aimed at comparing the pollution status in respect of chemical water quality parameters of the Sakumo II and Muni Lagoons as well as the Mamahuma and Gbagbla Ankonu feeder streams, which feed the Sakumo II Lagoon. As expected of saline waters, the pH's in both lagoons showed slightly neutral to basic waters, with 95% of pH's in the range 8.0 to 9.5 (pH units) for the Muni Lagoon and 90% of pH's in the range 8.0 to 9.0 (pH units) for the Sakumo II Lagoon. The Mamahuma and Gbagbla Ankonu Feeder streams had pH values ranging from 7.1 to 8.7 (pH units). The conductivity distribution in the lagoons also showed that, the water's are saline (>5000µScm $^{-1}$), while waters of the Mamahuma and Gbagbla Ankonu feeder streams are brackish (1500- 5000 µScm $^{-1}$). The Muni Lagoon had conductivity values ranging from 3930 to 84800µScm $^{-1}$, with about 95% of the water samples recording conductivity values > 5000 µScm^{-1} while, the Sakumo II Lagoon had conductivity values ranging from 2341to 69304 µScm, with about 91% of the water samples recording conductivity values > 5000 µScm^{-1} Dissolved oxygen concentrations of the waters in both lagoons (range 3.8 – 9.8 mgL $^{-}$, and 5.5 to 12.1mgL $^{-1}$ for Muni and Sakumo II Lagoons respectively) were generally outside the DO concentrations in unpolluted water (normally about 8 to 10 mgL $^{-1}$), high biological oxygen demand concentrations in the Sakumo II (with BOD values ranging from 11 to 58 mgL^{-1}) and the Mamahuma and Gbagbla Ankonu feeder streams (with BOD values

ranging from 12 to 55mgL^{-1}) suggest that, the Sakumo II Lagoon and its feeder stream are moderately to grossly polluted. This physico-chemical regime is an indication of the deteriorating water quality of the Sakumo II Lagoon. On the contrary, the Muni Lagoon was characterized by low BOD concentrations (ranging from 0.5 to 6.3 mgL-$^{-1}$). Further pollution assessment of the lagoons using weighted Water Quality Index (WQI) showed that, the Sakumo II Lagoon is grossly polluted and requires monitoring, while, the Muni Lagoon is of fairly good quality. The hydrochemical results showed that, the Lagoons as well as the feeder streams are influenced by anthropogenic activity.

A Groundwater Inventory and Hydrogeological Assessment Project of the Ankobra Basin was carried out by CSIR Water Research Institute between November 20065 and December 2007. This project formed part of the Service Agreement signed between WRI-GWD and the Water Resources Commission under the second phase of the Danida-supported Water and Sanitation Sector Program Support (WSSPS II). Maps have been prepared from this assessment project showing borehole locations superimposed on existing geological and district maps; and also providing information on socio-economic activity of various communities within the Ankobra Basin.

Three types of data used under this project consisted of available hydrogeological data, borehole GPS coordinates and socio-economic activity data. Available hydrogeological data for 263 boreholes covering five districts were collected from the Hydrogeological Database of the Groundwater Division of the CSIR Water Research Institute and used for hydrogeological assessment of the Ankobra Basin. Results from the data analysis have been interpreted using a two-way approach, namely, the district-based approach and the geology-based approach.