Assessment of groundwater suitability using integrated techniques in part Niger Delta Region, Nigeria

Ekpa, Moses M. M.[1], and Ibuot, Johnson C.[2]

[1] Federal College of Education (Technical), Omoku, Rivers State, Nigeria
(ekpamoses@yahoo.com)
[2] University of Nigeria, Nsukka, Enugu State, Nigeria
(johnson.ibuot@unn.edu.ng)

Abstract

Integrated technique was employed to investigate the suitability of groundwater repositories in parts of Niger delta region, Nigeria. The geophysical data were acquired by Vertical electrical sounding technique employing Schlumberger electrode configuration. From the resistivity and thickness values, the Dar-Zarrouk parameters were determined. The longitudinal conductance estimated revealed low protective capacity in most part of the study area, this suggests high permeability of the overlying geoelectric layers, hence, the possibility of ingress of contaminants into the subsurface hydrogeo-resource. The contour maps show the spatial variation of the geoelectric parameters across the study area. The water samples were subjected to various physicochemical analyses and the result compared with the WHO permissible standard values for drinking water. The results show the ranges of concentrations of the physicochemical parameters. Na^{+}, Mg^{2+}, Ca^{+}, SO^{2-}, Fe^{2+} Mn^{2+}, Cu^{2+} and Cl^{-} have concentrations below the WHO standards, while K^{+} and F^{-} have their respective concentrations above the WHO standards in some boreholes. The Sodium adsorption ratio (SAR), Magnesium adsorption ratio (MAR) and the Kellys ratio (KR) were also calculated in order to determine the suitability of the groundwater for agricultural purposes (irrigation). The realization of the possibility of ingress of contaminants into the subsurface hydrogeo-resource shows the goodness of fit and the effectiveness of integrating the indirect geophysical method (electrical resistivity) and the direct physicochemical method.

Keywords: Groundwater, physicochemical, longitudinal conductance, SAR, MAR, KR