

Geoelectrical Resistivity Method in Aquifer Characterization at Opic Estate, Isheri-Osun River Basin, South Western Nigeria

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Abstract : Investigation was carried out at Opic Estate in Isheri-Osun River Basin environment using Electrical Resistivity method to study saltwater intrusion into a fresh water aquifer system from the proximal estuarine water body. The investigation is aimed at aquifer characterisation using electrical resistivity method in order to provide the depth to which fresh water fit for both domestic and industrial consumption. The 2D Electrical Resistivity and Vertical Electrical Resistivity techniques alongside Laboratory analysis of water samples obtained from the boreholes were adopted. Three traverses were investigated using Wenner and Pole-Dipole array with multi-electrode system consisting of 84 electrodes and a spread of 581 m, 664 m and 830 m were attained on the traverses. The main lithologies represented in the study area are Sand, Clay and Clayey Sand of which Sand constitutes the aquifer in the study area. Vertical Electrical Sounding data obtained at different lateral distance on the traverses have indicated that the water in the aquifer in the subsurface is brackish. Brackish water is represented by lowelectrical resistivity value signature while fresh water is characterized by relatively high electrical resistivity and in some regionfresh water is existent at depth greater than 200 m. Results of laboratory analysis of samples showed that the pH, Salinity, Total Dissolved Solid and Conductivity indicated existence of water with poor quality, indicating that salinity, TDS and Conductivity is higher in the Northern part of the study area. The 2D electrical resistivity and Vertical Electrical Sounding methods indicate that fresh water region is at ≥ 200 m depth. Aquifers not fit for domestic use in the study area occur downwards to about 200 m in depth. In conclusion, it is recommended that wells should be sunkbeyond 220 m for the possible procurement of portable fresh water.

Keywords : 2D electrical resistivity, aquifer, brackish water, lithologies

Conference Title : ICGGEE 2018 : International Conference on Geosciences, Geophysics and Environmental Engineering

Conference Location : Miami, United States

Conference Dates : March 12-13, 2018