

Geophysical and Laboratory Evaluation of Aquifer Position, Aquifer Protective Capacity and Groundwater Quality in Selected Dumpsites in Calabar Municipal Local Government Area, South Eastern Nigeria

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Abstract : The position of the aquifer, its protective capability, and the quality of the groundwater beneath the dumpsite were all investigated. The techniques employed were laboratory, tritium tagging, electrical resistivity tomography (ERT), and vertical electrical sounding (VES). With a maximum electrode spacing of 500 meters, fifteen VES stations were used, and IPI2win software was used to analyze the data collected. The resistivity map of the dumpsite was determined by deploying six ERT stations for the 2 D survey. To ascertain the degree of soil infiltration beneath the dumpsite, the tritium tagging method was used. Using a conventional laboratory procedure, groundwater samples were taken from neighboring boreholes and examined. The findings showed that there were three to five geoelectric layers, with the aquifer position being inferred to be between 24.2 and 75.1 meters deep in the third, fourth, and fifth levels. Siemens with values in the range of 0.0235 to 0.1908 for the load protection capacity were deemed to be, at most, weakly and badly protected. The obtained porosity values ranged from 44.45 to 89.75. Strong calculated values for transmissivity and porosity indicate a permeable aquifer system with considerable storativity. The area has an infiltration value between 8 and 22 percent, according to the results of the tritium tagging technique, which was used to evaluate the level of infiltration from the dumpsite. Groundwater samples that have been analyzed reveal levels of NO₂, DO, Pb²⁺, magnesium, and cadmium that are higher than what the NSDWQ has approved. Overall analysis of the results from the above-described methodologies shows that the study area's aquifer system is porous and that contaminants will circulate through it quickly if they are contaminated.

Keywords : aquifer, transmissivity, dumpsite, groundwater

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