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Delineating Saline Water Zones in an Inland Brine Area using Electrical Resistivity Sounding

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This paper presents results of saline groundwater zone delineation using electrical resistivity sounding. The study area, Awe town is a semi urban area that has been known to be plagued with saline groundwater resulting from brines associated with Awe Formation. As a result of this challenge, water supply scheme for the area was situated about 8km away from the main settlement. This made access to water difficult as the area is a semi – urban area. Electrical resistivity method has been applied extensively in delineation of saline groundwater zones. Geological mapping coupled with electrical resistivity surveys were done around the town with the sole aim of delineating the saline groundwater and fresh groundwater regions around the settlement. A total of 20 vertical electrical soundings were carried out in a grid using the Schlumberger configuration. Contour maps of longitudinal conductance and transverse resistance(S and T respectively) as well as transverse resistivity (t) and longitudinal resistivity (l) were used to assess saline water distribution in the aquifers of the study area. The contour maps and pseudosections aided in the identification of fresh groundwater, 1.2km from the main town. Geological mapping and analysis of borehole logs in the saline and fresh groundwater regions revealed fresh groundwater aquifers within Younger rocks i.e. Ezeaku and Keana Formations, which overlie the Awe Formation. The aquifers have resistivities in the range of 150 to 300Ωm, with thicknesses ranging between 20m and 35m; these zones were interpreted to have high yield potential as such zones were the best part for choosing drilling sit. The results of the present study informed the decision by the Nasarawa State Government (where the study area is located) to drill four 150m deep borehole in the non saline region to supply water to the community.