World Academy of Science, Engineering and Technology
International Journal of Environmental and Ecological Engineering
Vol:17, No:06, 2023

# Spatial Mapping of Variations in Groundwater of Taluka Islamkot Thar Using GIS and Field Data

**Authors :** Imran Aziz Tunio

**Abstract :** Islamkot is an underdeveloped sub-district (Taluka) in the Tharparkar district Sindh province of Pakistan located between latitude 24°25'19.79"N to 24°47'59.92"N and longitude 70° 1'13.95"E to 70°32'15.11"E. The Islamkot has an arid desert climate and the region is generally devoid of perennial rivers, canals, and streams. It is highly dependent on rainfall which is not considered a reliable surface water source and groundwater is the only key source of water for many centuries. To assess groundwater's potential, an electrical resistivity survey (ERS) was conducted in Islamkot Taluka. Groundwater investigations for 128 Vertical Electrical Sounding (VES) were collected to determine the groundwater potential and obtain qualitatively and quantitatively layered resistivity parameters. The PASI Model 16 GL-N Resistivity Meter was used by employing a Schlumberger electrode configuration, with half current electrode spacing (AB/2) ranging from 1.5 to 100 m and the potential electrode spacing (MN/2) from 0.5 to 10 m. The data was acquired with a maximum current electrode spacing of 200 m. The data processing for the delineation of dune sand aquifers involved the technique of data inversion, and the interpretation of the inversion results was aided by the use of forward modeling. The measured geo-electrical parameters were examined by Interpex IX1D software, and apparent resistivity curves and synthetic model layered parameters were mapped in the ArcGIS environment using the inverse Distance Weighting (IDW) interpolation technique. Qualitative interpretation of vertical electrical sounding (VES) data shows the number of geo-electrical layers in the area varies from three to four with different resistivity values detected. Out of 128 VES model curves, 42 nos. are 3 layered, and 86 nos. are 4 layered. The resistivity of the first subsurface layers (Loose surface sand) varied from 16.13 Ωm to 3353.3 Ωm and thickness varied from 0.046 m to 17.52m. The resistivity of the second subsurface layer (Semi-consolidated sand) varied from 1.10 Ωm to 7442.8 Ωm and thickness varied from 0.30 m to 56.27 m. The resistivity of the third subsurface layer (Consolidated sand) varied from 0.00001 Ωm to 3190.8 Ωm and thickness varied from 3.26 m to 86.66 m. The resistivity of the fourth subsurface layer (Silt and Clay) varied from 0.0013 Ωm to 16264 Ωm and thickness varied from 13.50 m to 87.68 m. The Dar Zarrouk parameters, i.e. longitudinal unit conductance S is from 0.00024 to 19.91 mho; transverse unit resistance T from 7.34 to 40080.63 Ωm2; longitudinal resistance RS is from 1.22 to 3137.10 Ωm and transverse resistivity RT from 5.84 to 3138.54 Ωm. ERS data and Dar Zarrouk parameters were mapped which revealed that the study area has groundwater potential in the subsurface.

**Keywords :** electrical resistivity survey, GIS & RS, groundwater potential, environmental assessment, VES
**Conference Title :** ICGIGISGT 2023 : International Conference on Groundwater Investigations, Groundwater Information Systems and Geophysical Techniques
**Conference Location :** Montreal, Canada
**Conference Dates :** June 15-16, 2023