

# **THE APPLICATION OF GEOELECTRICAL SURVEYS IN DELINEATING GROUNDWATER IN SEMIARID TERRAIN - CASE HISTORY FROM CENTRAL ARABIAN SHIELD**

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## **ABSTRACT**

A resistivity survey was conducted in Shaib Al Ziba, central Arabian Shield as part of groundwater exploration program in Ranyah area. The survey consisted of 30 vertical electrical soundings (VES) and 15 horizontal electrical profiling (HEP) using Schlumberger and Wenner arrangements, respectively.

Two aquifer systems were delineated in the study area. The shallow aquifer system comprises the coarse alluvial deposits overlying fractured bedrock. The second aquifer system is that associated with fractures in the underlying diorite and granodiorite. The water in these deep fractures is recharged through the Wadi alluvium.

The analysis of VES curves and HEP contour map in conjunction with the results of groundwater parameters indicates that the SW section (VES 1-16) contains groundwater in clay-rich formation that yields poor water discharge opportunities. The middle part (VES 16-24 ) acquires relatively better groundwater potentiality, since the water-bearing layers have less clay content. The groundwater potentiality in the NE section (VES 24-30) is almost negligible since the basement depth is very shallow. The thin alluvium cover in this section does not contain significant groundwater for practical uses.

The results obtained from this study suggest that the groundwater potentiality occurs mainly at the intersection of Shaib Al Ziba and Wadi Ranyah. The most promising sites for borehole drilling which demonstrate relatively better groundwater potential are VES 22, 21, 19, and 18 respectively. Further geophysical investigations are strongly recommended in the downstream of Wadi Ranyah because of its higher sedimentary thicknesses, less clay content, more fractured basement rocks and less saline water quality.