

# **The Application of Geoelectrical Vertical Soundings in Delineating the Hydrostratigraphy of the Southern Red Sea Coastal Area, Saudi Arabia**

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## **ABSTRACT**

Because of the presence of detectable and significant contrasts in the physical properties of the subsurface lithological units in the southern Red Sea coastal areas (Wadi Damad and Wadi Sabya), an integrated application could be made of the results of electrical resistivity method and the data gathered from lithological well descriptions and the geophysical well logs to delineate the hydrostratigraphy and assess the salinity of groundwater with respect to the distance from the southern Red Sea coast.

The survey comprised 25 vertical electrical soundings (VES) distributed along two profiles. The Schlumberger configuration was used with a maximum half current- electrode spacing of 500 m and the density of data 7 measurements per decade.

The electric resistivity survey showed that it is possible to detect freshwater zones of medium resistivity (20 to 70 Ohm-m) beneath strata with very low resistivity ( $< 7$  Ohm-m) at depths of greater than 60 m. The highest groundwater potential is found mainly in the upstream of Wadi Damad where the weathered bedrock is clearly identified and is overlain by Wadi alluvium which contains a lower clay content than found farther downstream.

The conclusions reached from this study indicate that the cause of lower electric resistivities in the coastal area is probably due to seawater-saturated sediments, whereas farther inland the cause may be related to clay layers saturated with more saline irrigation water.