

Hydrogeological investigation of groundwater resources in the district of South 24 Parganas, India

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Abstract The South 24 Parganas district in India, consists of alluvial and marine sediment of Quaternary age. In this region, groundwater from a confined aquifer is the major source of drinking water. The aquifer is located at a depth of between 160 m and 335 m. This paper reports the results of integrated geological and geochemical investigations to assess the subsurface lithology, hydrological characteristics, groundwater chemistry, depth to the freshwater and seawater intrusion in this critical aquifer. Vertical electric soundings (VES) were conducted to determine facies change in the subsurface lithology and the existence of a saline water zone overlying the aquifer. The VES curves are interpreted by the 1-D inversion technique and the results show the presence of five to six prominent layers consisting of alluvial top soil, saline water, brackish water, an impermeable clay layer, freshwater and the bottom clay with silt and sand lenses, under the prevailing hydrodynamic conditions. The average depth of the confined aquifer is 180 m and the average resistivity of the freshwater zone is about 62 Ohm-m. Lithological characteristics of the area constructed from VES analyses are used to identify potential zones in the aquifer for abstracting drinking water. Geochemical investigations demonstrate that the TDS of the aquifer ranges from 590 to 965 mg/L and is a suitable source for drinking water supply.

Key words VES studies; brackish water; confined aquifer; TDS; Sodium Adsorption Ratio