

## PORE RESISTIVITY VARIATION BY RESISTIVITY IMAGING TECHNIQUE IN LOWER GADILAM RIVER BASIN, CUDDALORE DISTRICT, TAMIL NADU, INDIA

R. Ravi<sup>1</sup>, S. Aravindan<sup>1</sup>, C. Ramachandran<sup>2</sup>, Sanjay Kumar Balabantaray<sup>1</sup>, B. Selvaraj<sup>1</sup> and K. Santhakumar<sup>1</sup>

<sup>1</sup> Department of Earth Sciences, Annamalai University, Annamalai Nagar, Tamil Nadu.

<sup>2</sup> Department of Geology, Periyar University, Salem, Tamil Nadu.

E-mail: rajuravi9725@gmail.com

### Abstract

Geophysical electrical resistivity survey was carried out to investigate the nature of the shallow subsurface formations along with geological contact in the main Gadilam River Basin. 27 vertical electrical soundings (VES) were conducted by Schlumberger configuration in the basin. Data was interpreted by curve matching techniques using IPI2WIN software and layer parameters like apparent resistivity ( $\rho_a$ ) and thickness (h) interpretation were exported to Geographic Information System (GIS). Interpretation distinguishes three major geoelectric layers like topsoil, sandy-clay layer and clayey-sand layer in the contact zone and in the basin. Interpreted VES sounding curves are of mostly four-layer cases and QH, H, HA and KH types. Investigation demarcates lithology of subsurface and hydrogeological setup by employing maximum possible electrode sounding to infer saline water and freshwater occurrence based on resistivity signals. The zone of groundwater potential map was prepared with a combination of resistivity ( $\rho = \rho_1 + \rho_2 + \rho_3 + \rho_4$ ) and corresponding thickness ( $T = T_1 + T_2 + T_3 + T_4$ ). The high resistivity value of  $>200 \Omega \text{ m}$  and low resistivity value of  $<10 \Omega \text{ m}$  indicates occurrence of laterite and saline water within the formation aquifers as a result of possible rock water interaction and saline water dissolution. Four-layer resistivity values from pseudo sections section (namely KH, AH, QA, and KA type) show resistivity distribution that separates the freshwater depth zones between 1 to  $140 \Omega \text{ m}$  from fluvial, flood basin, sandstone and clay layer with low resistivity value of  $3.16 - 7.5 \Omega \text{ m}$  that indicates contact with saline and freshwater aquifer. Iso-resistivity map delineates saline water and freshwater zones with the fourth layer case at the same locations indicating the irrational way of abstracting groundwater which has resulted in saltwater ingress.

*Keywords:* VES, Resistivity, Thickness, Lithology, Hydrogeology, Saline water and GIS.