Geophysical mapping of saltwater intrusion in the Kerpan coastal area, Kedah

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The salinity of the ground water in the coastal alluvial aquifer between Kerpan-Air Hitam and Sanglang area in Kedah was investigated using both vertical geoelectrical sounding (VES) and 2-D geoelectrical resistivity imaging techniques. The resistivity measurements were made using ABEM SAS 300C and SAS4000 terrameters. A total of 61 VES stations were established over an area of approximately 100 km^2 of Quaternary alluvium. The 2-D imaging was used to study the lateral and vertical changes in resistivity of the alluvial sediments. Salinity of the ground water was interpreted based on the apparent resistivity values. Ground water with resistivity values less than 5 ohm-m is considered as saline and those of greater than 100 ohm-m is fresh water. The resistivity values ranging from 5 to 100ohm-m is for brackish water. The VES and imaging results show that the ground water has resistivities ranging from 0.53 to 670.5 ohm-m. The results of spatial distributions of apparent resistivity indicate that the ground water is mainly brackish with the salt-water affected aquifer confined to the coastal part of the study area. Vertical variations of the resistivity values plotted along profiles perpendicular to the coastal line, indicate that the saltwater has significantly affected the ground water at depth and far away from the coastal area.