

**IDENTIFICATION OF AREAS WITH POTABLE GROUNDWATER RESOURCES  
IN AN ENDANGERED COASTAL AQUIFER AT KALPITIYA, NORTH WEST  
SRI LANKA: A GEOCHEMICAL AND GEOPHYSICAL APPROACH**

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Kalpitiya peninsula of the Puttalam District in the western coastal belt of Sri Lanka is being intensively cultivated and these cultivations almost entirely depend on groundwater based irrigation. Shallow groundwater is extensively exploited from highly productive unconfined coastal sand aquifers. Extraction of groundwater and heavy usage of agrochemicals in the peninsula have lead to environmental problems.

The present field study included of Hydrochemical and Geophysical observations aimed at the demarcation of safe areas within the peninsula, for adequate supply of potable quality ground water, to cater to the communities in the areas concerned.

Observations were made at the agricultural and domestic dug wells in the area in order to make an assessment on the depth to ground water table and shallow subsurface geological formations. On-site water quality measurements were taken using electronic chemical loggers for determination of Electrical Conductivity (EC), Ammonia, Nitrate and Chloride of the water. These parameters were used to prepare water quality maps of the area depicting safe and vulnerable areas.

Continuous Vertical Electrical Sounding (CVES) profiles (each with 400 m long) were carried out at nine representative locations to demarcate (a) the saline water freshwater interface, (b) lateral and vertical extent of the fresh water lenses. Measured data of the profiles were processed into two dimensional resistivity images depicting the subsurface resistivity distribution of the formations resulting from the variations of the salinity of groundwater.

The findings of the study revealed that fresh groundwater occurs as a shallow lens/layer floating on an underlying brackish/saline water body which extends beyond the studied depth (approximately 50 m). Thickness of the shallow fresh water layer varies from place to place from less than one meter to more than 12 m under favorable conditions. Up-coning of saline water due to excessive pumping of groundwater is also evident at some locations. This problem however, appears to be confined to locations and is not an area-wise problem. Shallow groundwater has low to moderate salinity in most parts of the area. Pollution of groundwater due to agricultural activities and improper waste disposal practices is evident from high Nitrate and Ammonia in groundwater in a very large part of the area.

Based on the present study, it was possible to identify and demarcate three potential areas with adequate quantity and good quality groundwater to cater to the proposed new settlements. One of these three areas is more desirable when technical, social and logistic aspects involved in community water supply programmes are considered.