

Spatial distribution of groundwater salinity in the Northern inland area of the Vadamradchi north lagoon

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Abstract

Excessive exploitation of groundwater in coastal agricultural lands is results in the drawdown of water table and subsequent contamination of the aquifers by seawater intrusion. Certain parts of Jaffna peninsula also experienced such catastrophe and the groundwater became saline due to the effect of seawater intrusion into the inland area of the lagoon. Groundwater of such areas affected the agricultural production. The salinity distribution pattern was studied for the groundwater of the Northern inland areas of Vadamradchi north lagoon by grouping the salinity classes of groundwater using the electrical conductivity values of the month of May 2001. The electrical conductivity value method is one of the most efficient geophysical tool used in detecting and delineating salinity.

Systematic sampling method was done using 2×2 square cm grid pattern from 1": $\frac{1}{2}$ mile topographical sheet. Groundwater sample was taken from the center point of the grid to group the salinity distribution pattern. The soil samples were also drawn from some selected places to correlate the electrical conductivity of soil saturation extracts and the groundwater.

Electrical conductivity values of groundwater were found to range from 950 to 19,990 μScm^{-1} . Of the 190 wells tested, 38.95% had medium salinity water (750 - 2250 μScm^{-1}), 36.84% had high salinity water (2250 – 5000 μScm^{-1}) and 24.21% had very high salinity ($> 5000 \mu\text{Scm}^{-1}$). Out of the 70.61 km^2 tested, 41.1 km^2 had good quality water to be used for domestic purpose. The electrical conductivity values of these wells were less than the recommended value of Sri Lankan Permissible limit of 3500 μScm^{-1} . This good quality water should be supplied to the remaining 29.5 km^2 , which has salty groundwater to satisfy the domestic requirement. There was no correlation between electrical conductivity values of soil saturation extract and groundwater in all tested areas. The distribution of salinity form the lagoon side to the inland area was higher than the distribution from the seawater side. Integrated costal zone management should be implemented to prevent the sea and lagoon water intrusion and to eliminate the salinity problem in the inland agriculture areas.

Key words:

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