Prediction of chloride content using electrical conductivity of groundwater for selected water supply wells in Jaffa Peninsula

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Abstract

Groundwater of Jaffna peninsula is polluted with chloride severely of a number of places identified as saline areas with poor quality water. A water supply system with good quality water had been established to rectify this problem. Hence, the Present status of the quality of water of these water supply systems was studied. Samples of water from water supply wells of Watharawatta, Kayts, Karaveddy, Velanai, Chunnakam, Vaddukoddai and Araly South were drawn at three different levels. The electrical conductivity was measured by portable conductivity meter and choloride concentration was estimated by Mohr's titration method for the period of September 1997 to July 1999 at monthly intervals.

Out of seven supply wells, the wells at Velanai and Chunnakam were not suitable to fit a chloride to electrical conductivity model with high correlation value since the chloride concentrations were very low and also less than WHO recommended level of 250 ppm. The fitted models for chloride to electrical conductivity were $Y = 0.2707\ X - 48.314$ ($R^2 = 0.9212$) for Vaddukoddai; $Y = 0.2851\ X - 82.341$ ($R^2 = 0.9349$) for Araly South; $Y = 0.3264\ X - 72.443$ ($R^2 = 0.8897$) for Watharawatta; $Y = 0.317\ X - 82.71$ ($R^2 = 0.8806$) for Karaveddy; $Y = 0.3106\ X - 78.4$ ($R^2 = 0.9324$) for Kayts; in which Y denotes chloride in ppm and X denotes electrical conductivity in mmhos cm^{-1}

The relationship between the electrical conductivity and the chloride concentration of water could be easily utilized to predict the unknown chloride concentration for unknown electrical conductivity of a water sample. As the measurement of electrical conductivity of water could be made easily, at the site of the well and at low cost with the help of portable instruments which minimizes the cost of chemicals, the degree of salt water intrusion could be predicted since the chloride content is synonymous with salinity in Jaffna peninsula.

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