Assessment of Ground Water Salinity in Upparu Lagoon Area in Jaffna with Respect to Salt Water Intrusion

K. Thananjeyan[l], M.D.N.D. Perera[l], S. Wijethunga[1] and S. Saravanan[2]

[1]*Department of ilgrieultural Engineering, University of Ruhuna, Sri Lanka*
[2]*National Water Supply and Drainage Board, Jaffna, Sri Lanka*

Groundwater is the only source of fresh water that is directly consumed by most inhabitants in Jaffna. However, salinity in ground water has become a serious problem in Jaffna Peninsula and affected to deteriorate the water quality. Further it has been noted that lagoons may be directly responsible for the increased salinity of abandoned agricultural lands in the area. Therefore, this study assessed the extent of the saltwater intrusion in Upparu lagoon which is a major water resource in the Jaffna Peninsula and nearby areas. In this study, 196 sampling points (132 wells in the east bank and 64 wells in the west bank of the lagoon) were selected by using GIS grid net method. Samples were collected along the banks of the lagoon at 1 km intervals and at each selected point, 4 samples were taken; inside the lagoon, 100m, 200m and 500 m away from the lagoon during the time period from August to November 2016. Electrical Conductivity (EC) and pH were tested to find the salinity and alkalinity of water samples. Salinity and pH distribution maps were prepared according the drinking and irrigation water quality standards by using GIS Arc map software. The average EC values in September at the lagoon and at 100 m, 200 m, and 500 m away from the lagoon were 22.44 mS cm^{-1}, 8.47 mS cm^{-1} 5.32 mS cm^{-1}, 3.60 mS cm^{-1} while in November those were 24.60 mS cm^{-1}, 12.63 mS cm^{-1}, 7.45 mS en ` and 4.94 mS cin^{-1}, respectively. Salinity level of groundwater increased during the dry season due to low rainfall, high temperature with high wind speed and therefore, water in the lagoon may not be suitable for irrigation during dry season. The pH of water in both lagoon and the wells was considerably high. pH in well water, 500 m away from the lagoon, is within the recommended level for drinking. Based on the results, it can be concluded that water in lagoon is not suitable for drinking and irrigation. Saltwater intrusion was increased and groundwater is contaminated with saltwater in dry periods due to the lateral seepage of salt water in Upparu lagoon area. However, well water can be used for drinking and agricultural activities if the distance from the lagoon to wells is increased.

Keywords: Groundwater, Lateral seepage, Salinity intrusion, Upparu lagoon