Saltwater Intrusion into Freshwater Lagoons in Jaffna Peninsula

A. Gajenthiran, D.T. Udagedara and N.T.S.G. Gamachchige

Department of Science and Technology, Uva Wellassa University, Badulla, Sri Lanka

Surface water and groundwater are scares and hence highly demanded resources in the Jaffna peninsula causing the communal water supply is an extreme challenge. In order to ease the burden, barrages were constructed closing fresh water lagoon envisaging the accumulation of rainwater during the monsoon periods. Though the initial expectation was the lagoons to act as freshwater ponds, due to malfunctioning of barrages the anticipation wilted. The barrages were reconstructed expecting the same purpose early this decade. However, the salinity has been unexpectedly high even since then irrespective to the climatic patters viz dry and wet seasons in the peninsula. This research focuses on understanding the behaviour of salinity variation in the Upparu lagoon and in the Thondamanaru lagoon which is under the spot light nowadays. Several investigations of the salinity variations across the Upparu barrage showed that there are subsurface linkages with high saline water from the Jaffna lagoon. In addition to that, the evaporation during dry season increases the salinity away from the barrage toward the mainland. The electrical conductivity (EC), salinity, sodium and chloride concentrations were measured in 58 groundwater wells around the lagoon as the lagoon water recharge the nearby groundwater table. The EC varies between 954 µS cm^{-1} to 13450 µS cm^{-1} in the wet season and it is between 673 µS cm^{-1} to 18570 µS cm^{-1} during the dry season. The salinity varies from 0.63 to 10.32 in the wet season, where as it is 0.92 to 12.3 in the Dry season. Chloride concentrations vary between 49.70 mg L^{-1} and 3012 mg L^{-1} in wet season and between 33.5 mg L^{-1} and 5538 mg L^{-1} in dry season. Sodium concentrations vary between 43.1 mg L^{-1} and 5324.3 mg L^{-1} in wet season and between 17 mg L^{-1} and 4124 mg L^{-1} in dry season. The groundwater quality far from the barrage is comparatively good to the areas closer to the barrage. This observation has been appearing with promising prospectus over last six years. Yet, it is not convinced whether this is due to the less effectiveness of the barrage or subsurface movement of brackish water from the Jaffna lagoon to the south Kopai area. Additionally, the dry period of this year was longer than usual. Thus, it is recommended to continue the research focusing more on south Kopai area.

Keywords: Freshwater pond, Upparu lagoon, Saltwater barrage, Salinity, Seawater intrusion