INVESTIGATION OF THE EFFECTIVENESS OF UPPARU SALT BARRAGE IN JAFFNA PENINSULA (3rd Stage)

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Introduction

The Jaffna Peninsula is located in the northern Sri Lanka. The total area of the Jaffna Peninsula is 1036 km^2 and demarcated three internal lagoons such as Thondamanaru, Upparu and Valukiaru. The first two lagoons comprise of an area of 77.6 km^2 and 25.9 km^2. They are connected to the sea and drain an area of 518 km^2. Majority of the local community of the area is depending on agriculture and fishing.

Groundwater is the main source for people in Jaffna Peninsula for domestic and agricultural activities. According to the field observations even people having their own wells, majority of them are affected by salt water intrusions. Therefore, they depend on the common water supply given by the government for drinking purposes, whereas some people still depend on groundwater sources. Recently, barrage was constructed as a salt water exclusion bund to convert the salt water in lagoon Upparu to fresh water lake. This is expected to improve available water resources of the peninsula, both in recharging the underground storage (Sukanya, 2012). This research is focus of the area from the fringe of the lagoon into the land extending around 2 km. Major aim of the research is to evaluate the effectiveness of the barrage by delineating the salt water intrusion pattern especially in the west and northwest areas of the lagoon.

Methodology

Existing aquifer types, geology and topography were studied with the help of available resources and monitoring was done in the area. Wells were selected in a circle to the fringe of Upparu lagoon. The areas coming under study are parts of Nallur, Kopay and Chavakachcheri divisional secretariat divisions. Electrical conductivity (EC) of the groundwater was measured during wet and dry seasons. The wells in which EC show a sudden change was selected for further chemical analysis (sodium and chloride). In addition, both wet and dry season sixty eight (68) shallow well samples were selected for sampling. Water samples were collected in PETF bottles, acidified and capped tightly. Water samples were analyzed for Na using Varian Atomic Absorption Spectrometer (AAS 240 series) facility available at the Uva Wellassa University. Chloride was measured with argentometric method. Spatial distribution of the chemical & physical parameters in the groundwater was interpolated using Inverse Distance Weighted method available in Arc GIS 9.3 software.

Results and Discussion

Results of this study show that EC values for groundwater in the study areas varies between 574 µS/cm and 23,470 µS/cm in wet seasons and between 544 µS/cm and 22,810 µS/cm in dry seasons. Element chloride values range between 449.8mg/L and 7,197.7 mg/L in wet seasons and between 949.7 mg/L and 4,098.7 mg/L in dry seasons. Sodium values vary in between 38.3 mg/L and 802.9 mg/L in wet seasons and between 26.7 mg/L and 648.4mg/L in dry seasons.

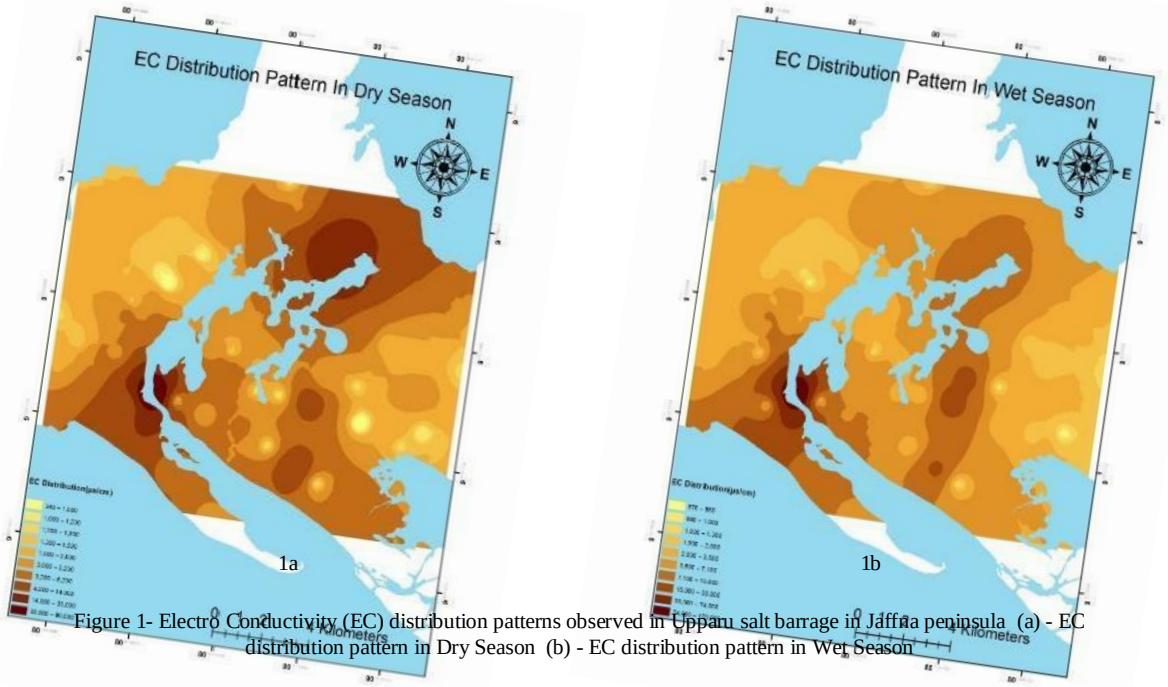

Figure 1- Electro Conductivity (EC) distribution patterns observed in Upparu salt barrage in Jaffna peninsula (a) - EC distribution pattern in Dry Season (b) - EC distribution pattern in Wet Season

In general, salinity of water depends on the chloride and sodium concentrations in the water. They are the factors controlling the salinity and thickness of fresh water lenses available in the area before and after the inter-monsoon and north-east monsoon rains. Further, due to rapid extraction of groundwater leading to mixing of the saline water with freshwater through the fresh water and saline water interface can be recognized from present study. In addition, changing low and high tides of the lagoons, wrong practice of fertilizer on cultivated lands, geological and structural conditions of the basement and already deposited salt may be the other controlling factors of the salinity of groundwater in the area.

Conclusions

Results obtain from present study indicate that the salinity of groundwater is not only depends on the seawater intrusions. However, if the barrage is working properly groundwater in the fringe of the lagoon can be expected to change in to fresh water. Which can be used to cultivate 11,000 acres of agriculture land effectively.

References

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