

## Investigation of the Effectiveness of Salt Barrage in Jaffna Peninsula (5<sup>th</sup> Phase)

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To improve the quality and quantity of water resources in Jaffna peninsula, a barrage has been constructed converting the Upparu lagoon into a fresh water lake. Upparu lagoon with its increased fresh water volume is expected to recharge the underground storage and act as an additional surface storage desalinating the lands fringing the lagoon making them suitable for cultivation. Several previous studies have investigated the effectiveness of the barrage focusing on the water quality of different parts of the land bordering the lagoon. This research focuses on the area from the fringe of the lagoon into the land extending for 2 km perpendicular including Nallur, Kopay and Chavakachcheri D.S Divisions to evaluate the effectiveness of the barrage by delineating salt water intrusion patterns. Sixty-one wells were selected in a profile perpendicular to the fringe of the Upparu and Jaffna lagoons to measure in situ electrical conductivity (EC) and salinity in both wet and dry seasons. Out of 61 wells, thirty groundwater samples were selected for analysis of sodium and chloride. The EC of groundwater varies between 571  $\mu\text{S cm}^{-1}$  and 20,370  $\mu\text{S cm}^{-1}$  in wet season and between 991  $\mu\text{S cm}^{-1}$  and 20,620  $\mu\text{S cm}^{-1}$  in dry season. Salinity varies between 0.2% and 12.15% in wet season and between 0.45% and 11.3% in dry season. Chloride concentrations vary between 46.15  $\text{mg L}^{-1}$  and 5,183  $\text{mg L}^{-1}$  in wet season and between 170.4  $\text{mg L}^{-1}$  and 5,467  $\text{mg L}^{-1}$  in dry season. Sodium concentrations vary between 22.8  $\text{mg L}^{-1}$  and 6,259.4  $\text{mg L}^{-1}$  in wet season and between 8.7  $\text{mg L}^{-1}$  and 4,470  $\text{mg L}^{-1}$  in dry season. Groundwater quality along the fringe of the Upparu lagoon far from the barrage is of good quality compared to the groundwater close to the barrage in both seasons. Even though the effectiveness of the barrage is less during both seasons due to insufficient run-off and seepage, analysis of past five year continuous data set reveals that the salinity of the groundwater in the fringe of the lagoon has reduced to moderate levels. If the barrage works properly as at the initial stages of its construction, the groundwater in the fringe of the lagoon will become fresh water in near future. However, further continuation of this research would deliver a much better result.

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