Hypothesis of Cultivating Productive Water from Lagoons of Northern Sri Lanka

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Abstract - Jaffna is a peninsula which is 1000 km2 of land (out of which, Vadamarachchi Lagoon, Upparu Lagoon, Valukaiaru and Elephant pass Lagoon are covered with 75, 25, 15 and 100 km2 of surface area and 287, 212, 104 and 907 km2 of catchments area, respectively) covered by Indian Ocean by 160 km of coastline and no location is more than 10 km away from the coast. Hence it is very much susceptible to the salt water intrusion in to the land area. The water resource mainly the underground water in Jaffna Peninsula is totally polluted due to prolonged negligence and improper management of existing barrages at Thondamanaru, Ariyali and Ariyali and the salt water intrusion was taken place due to the none- maintenance of SWE bunds. In addition to these garbage and soakage pit pollution and increased usage of fertilizer chemicals also affected the ground water. As a result, people are facing problem in getting good quality water in their wells. Due to the salt water intrusion, hundreds of acres of lands, hundreds of wells are in abandon stage.A simplified reservoir simulation model was developed to study the water balance of the lagoon Downstream of the reservoirs of the four regulated river basins considered as local catchment to the Elephant Pass lagoon. Total inflow to the lake (lagoon) is the summation of monthly runoff yield from local catchment, direct rainfall on the lake and spill from upstream reservoirs. Outflow from the lake includes evaporation loss, percolation, demand and spillage. Evaporation loss from the lake was a function of water surface area and it was estimated from the monthly average Pan Evaporation values for the study area. Due to the absence of permeability measurements for the lagoon bed, monthly seepage loss was assumed as 2.0% (0.05% for irrigation reservoirs)[14] of the volume of water stored in the lake Monthly Rainfall data from the representative meteorological station and monthly spill volume from the upstream reservoirs were used as time series of input data. Low regulated water level (LRWL) was set at 0.3 m MSL with the proposed spill crest level of 1,2m MSL. Reservoir operation simulation was done with the constant release per month throughout the year. The results of the monthly simulation of lake showed that even after high evaporation loss, nearly 2MCM/month was available for release without upstream spill and 4MCM/month was available with upstream spill. Flushing out of lagoon bed in order to reduce the salinity can be carried out during the rainy season with excess water. It was found that nearly 70% of the total inflow evaporates directly from the lake and it is an unproductive loss. Reservoir optimization is required to increase the productivity. This study can be basis for future detail hydrological model study and planning of Elephant Pass Lake for best use of water with minimum negative environmental impact.