PREVENTION OF UPSTREAM SALINITY INTRUSION AND GROUNDWATER CONTAMINATION BY KADUPITIYA OYA REGULATORY ANICUT ON KARAMBALAN OYA

A dissertation submitted to the

Faculty of Animal Science and Export Agriculture

Uva Wellassa University

in partial fulfillment of the requirement of

the degree of

Bachelor of Science in Aquatic Resources Technology

by

HATHTHOTUWA GAMAGE RASANGIKA DILAKSHI

Department of Animal Science

Faculty of Animal Science and Export Agriculture

Uva Wellassa University

2016

ABSTRACT

A regulatory anicut was constructed in 1904 at 6.5 km upstream to divert the flow in Kadupitiya Oya, a tributary of Karambalan Oya into Tinipitiwewa. Stream water at 1.5 km upstream of the weir is being abstracted at present by National water Supply and Drainage Board as source water for drinking after conventional treatment. The area of the Kadupitiya Oya sub-watershed has been subjected to large-scale silica sand mining. The quality of stream water and groundwater was examined under the dry and wet weather during September and November with a view to determining the effectiveness of the anicut in preventing upstream salt water intrusion and possible groundwater contamination. Electrical conductivity of water samples collected from the Kadupitiya Oya from downstream of the regulator to about several kilometers upstream and five shallow dug wells of the located in the landward area of the right bank were determined under dry weather conditions. In addition, Electrical Conductivity, Total Dissolved Solids, pH, Turbidity, Colour, Sulphate ion, Total Hardness, Total Alkalinity, Chloride ion was determined with the onset of inter monsoonal rains.

Shallow dug well water has extremely low Electrical Conductivity under the dry weather (178 ± 106 μS) and wet weather (120 ±71 μS), which were not different from that of deep groundwater. The electrical conductivity of shallow dug wells located downstream of the regulatory anicut was little higher than that of the shallow ground water upstream of the weir. The mean water level of shallow groundwater levels has increased by about 0.6 m with the onset of second inter-monsoon rainfall in November. The brownish murky colour of the water was apparent in certain shallow dug wells during sampling, which is common over several decades according to the villagers. The depletion of groundwater level occurred in this area can be attributed to both massive silica sand mining and extremely dry weather conditions. The brownish colour water at certain locations is resulting from organic matter deposition during the mid-Holocene sea level rises. The lowest electrical conductivity, which is unique to the area relates to the geology of the overburden, which is mainly composed of silica sand. Regulatory weir is an excellent prevent of upstream movement of tidal flow.