INFLUENCE OF SEASONAL SEA LEVEL VARIABILITY ON SALT-WATER INTRUSION IN KELANI RIVER BASIN

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ABSTRACT

Kelani River is the third largest river in Sri Lanka and is extensively utilized for many purposes such as agricultural practices, industrial activities and domestic uses. The main supply of Colombo the capital of Sri Lanka, Colombo depends mainly on the river Kaleni because the water-pumping station for the city is located at Ambatale about 15 km from the river mouth. Saltwater intrusion causes a severe problem for the water supply, particularly during the dry season. The nature of saltwater intrusion to the lower area of the Kelani river is studied by analyzing data of the river discharge, electrical conductivity of river water, sea level fluctuation and salinity variation in the river. Computer aided three-dimensional hydrodynamic model called Estuary Lake Computer Model (ELCOM) was applied to interpret the behavior of salt wedge under the natural conditions in the Kelani estuary.

The similar pattern of vertical salinity distribution was shown from the results obtained both by the computer model and by the measured data in the field. It suggests that the applied model is well fitted to the natural conditions of the Kaleni estuary, and it can be used to predict the chemical and physical changes that will be taking place in the estuary in the future. In addition, the model illustrates the simulation of the distance of salt-water intrusion observed in Kelani river estuary.

Length of salt water intrusion depends on different oceanic conditions (mainly tidal influence) and also on river discharges. In general, low discharge appears during the months of December to March, and lowest discharge rate appears in January.

Water level fluctuation in the river depends mainly on the river discharge and high water level was recorded during high flows. On the other hand, salinity of the river water increases with decreasing river discharge rate. Model results show that the variations of the salt wedge strongly vary with the river discharge, and surface salinity varies with tidal cycles.