USE OF GROUNDWATER FOR COASTAL WATER SUPPLY SCHEMES, MINIMIZING THE SALINITY PROBLEM: A CASE STUDY AT KATTANKUDY IN BATTICALOA DISTRICT, SRI LANKA.

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Abstract.

The present study was conducted in Kattankudy, Batticaloa on a coastal unconfined aquifer for evaluating its hydrogeological environment. Based on the demography and infrastructure, the study area can be divided into three zones as a). Highly urbanized area, b). Semi urbanized area and c). Rural area. More than 550 open dug wells are present in the study area. However, some of the wells are abandoned or used only for washing purposes due to bad quality of water. When consider the annual rainfall and land use, the area receives about 8,156,500 m^3 of water annually from precipitation. The annual groundwater recharge is about 40% of the precipitation. The projected water demand (year 2018) is about 9173 m^3 per day. This amounts to 41% of the above mentioned annual groundwater recharge.

The whole study area acts as a coastal sand aquifer; the major aquifer unit is white coarse sand, which is situated between 2 and 9m depth. 90% of the area is underlain by this unconfined aquifer. The upper part of the aquifer is made up of recent coastal sand. It has a high porosity and

high permeability and therefore the infiltration is also high. The aquifer is connected in the East and West to the sea and the lagoon respectively. The fresh water in the aquifer could occur in the mode of fresh water lense separated by saline- fresh water interface.

When selecting of rates for pumping tests, especial attention was paid not to intrude saline fresh water interface. The hydraulic properties of the aquifer, were calculated using the steady state unconfined aquifer discharge drawdown test and also with the aid of computer simulation. Safe yields (pumping rates), duration of pumping, pump installation depths and pumping water levels were calculated based on the results of steady state, discharge drawdown test.

The total quantity of 2800 m^3/day can be obtained from existing well as minimum safe yield. In the meantime construction of another three wells would be necessary to cater the present required demand. Pumping rate should be restricted to an average of 25 m^3 per hour for each well. Twenty of test tube wells will be necessary to cater the projected demand of 2018. The groundwater in the study area can be used by controlled pumping; maintaining a low drawdown and with a large radius of influence. Therefore, construction of large diameter dug wells would give better results as a source of water for the water supply scheme. It was observed that Electrical Conductivity of water has gradually decreased during pumping. As a result, resistivity values of the formation could increase. This could be due to fresh groundwater flowing to the well and to the vicinity after pumping of stagnant water of the test tube well. No saline water intrusions were noted during pumping tests, even at the high rates of pumping (700 l per minute). For the purpose of economical abstraction and effective management of groundwater system, it is important to understand the hydrogeological model of the area.

When consider the magnitude of the total demand, there is a possibility of catering to the total demand from shallow groundwater. However, pollution and contamination of groundwater could be a serious problem with increasing population. Therefore, a strict buffer zone is necessary around all intake wells.

Development of catchment areas around productive tube wells will further enhance the performances of the productive wells. An awareness program has to be conducted on groundwater contamination in view of community to avoided manmade pollutions.