Abstract

The objective of the present study was to assess the impact of the Tsunami that occurred on 26 December 2004 on coastal groundwater salinity in Matara district and to identify its recovery patterns. Three hundred and forty-four dug wells were selected for the study and the salinity situation monitored for 33 consecutive months from June, 2005 to February, 2008. The study area is an extremely flat coastal plain; the elevation is of about 1 to 10m above mean sea level with some elevated locations reaching a maximum of 15 m above mean sea level. Main river basins of the area are Nilwala and Polwattumodara river basins. The Goviyapana river situated in the western boundary of Matara district carries has a relatively small catchment. An emphasis was also made to relate groundwater salinity to the surface and subsurface soil properties. Average saturation permeability coefficient of soils were estimated as 2.573 x 10^{-3} cm/sec. The porosity had an average of 55% in the entire soil profile. The geological conditions of the area were very favorable for Tsunami water intrusion. The soils of the area are categorized under non-saline class, with the electrical conductivity below 4000µs/cm as at July, 2007 and pH of soils ranged between 6.1- 8.4. Soils belong to two soil pH classes, mildly alkaline and moderately alkaline soils. It was found that the elevated electrical conductivity of groundwater due to the Tsunami, had recovered by October 2007. Since then, seasonal fluctuation of salinity was observed with rainfall fluctuations. Average EC value of well water after October 2007 were stabilized within 800 to 1000µs/cm level, except in some localities where EC values were higher than the average value. The study revealed that, this high salinity patches associate with low groundwater level, closeness to river mouth and proximity to sea. When the groundwater pH is considered, the entire area had almost neutral (7.0) to mildly alkaline (7.8) water , which is typical for coastal sandy aquifers. Majority of well waters in the affected area had "Sulphate, Chloride, Sodium water" with primary salinity. However, the well water in the non-affected area was "Calcium Magnesium bicarbonate water" with secondary alkalinity. Quality of the well waters were within the WHO recommended range with respect to electrical conductivity (EC), total dissolved solids (TDS), pH, Ca^{+2}, Mg^{+2}, K^{+1}, Na^{+1} Cu^{+2}, Cd^{+2}, Zn^{+2} ,Mn^{+2} and Pb^{+2} ions by October 2007, except for a few wells which had high Ca^{+2}, Mg^{+2} and Cd^{+2} concentrations.