GROUNDWATER QUALITY MONITORING, ASSESSMENT AND MODELING – A CASE STUDY

Y. R. Satyaji Rao

Deltaic Regional Centre,
National Institute of Hydrology, Kakinada, A. P., India
E-mail: yrsrao@gmail.com

Abstract

Due to non-availability of sewage disposal network in most of the cities in India, citizens are opting for septic tank-soak pit systems especially in coastal areas. As a result, the contamination of groundwater from leaky/faulty septic system as a non-point source of contamination is one of the most important environmental problems in India. RISK-N model separates the unsaturated soil into the upper zone, lower zone, drain field zone and the intermediate-vadose zone. Transport in each unsaturated soil zone is simulated on the premise of complete mixing of nitrogen concentration, which is achieved by spatially averaging the nitrogen convective-dispersive partial differential equations. In the saturated zone, this complete mixing assumption is not used. Instead, the two-dimensional convective-dispersive equation is solved analytically. The application of 1-D unsaturated zone and 2-D saturated zone modeling using RISK-N analytical model indicates that 70% of the present groundwater nitrate concentration is mainly from leaky/faulty septic systems and unsewered conditions within the KMC. Sensitivity analysis of RISK-N model parameters reveals that intermediate vadose zone thickness, seepage from leaky septic system, denitrification rate and the average house plot area are most sensitive parameters in converting nitrogen load into nitrate concentration in groundwater. Results reported in this paper would be useful in managing nitrate contamination due to faulty septic systems in the coastal aquifers.

Keywords: Groundwater, Septic Tanks, Nitrate, Salinity and Coastal Aquifers