

Groundwater resource evaluation in piedmont zone in Himalaya, India, using isotope and GIS techniques,

Muffit-al Haditi, M. Israil, D.C. Singhal, B. Kumar and M. S. Rao

ABSTRACT

Integrated geohydrological, isotopes and Geographical Information System (GIS) techniques have been used to delineate groundwater resources potential in the Piedmont zone of Himalayan foothill region, Uttaranchal, India. Thematic maps for hydrogeomorphology, slope, and drainage density have been prepared and integrated with the help of GIS by assigning the weights to various attributes controlling occurrence of groundwater to generate the groundwater potential map for the study area. The results indicates that the southern part of the study area has very good groundwater potential whereas the steeply sloping area in the northern part having high relief and high drainage density possesses poor groundwater potential. The groundwater potential zones are found in agreement with the available yield data of tubewell. Vertical component of recharge to groundwater due to precipitation varies from 3 to 13 %, which has been estimated using Tritium Tagging Technique. The estimated recharge to groundwater shows a linear relationship with environmental tritium contents in the water samples. This indicates that the precipitation is the major source of recharge in the study area. On the basis of environmental tritium contents, it has been found that recharge to groundwater is taking place at higher altitudes (300-400m, AMSL) in the Bhabhar region where the shallow and deeper aquifers have good interconnection. The estimated groundwater flow rate for the deeper aquifer is 1.2 m/d. The groundwater flow pattern estimated from isotope techniques has been validated from flow pattern determined by the depth of groundwater table.