

Study of Soil Moisture Movement and Recharge to Groundwater due to Monsoon Rains and Irrigation using Tritium Tagging Technique in Hardwar District

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ABSTRACT

District Hardwar falls under the vast alluvial tract of Quaternary deposits of Indo Gangetic plains in Uttaranchal. It is bordered by river Ganga in the east, foot-hills of Himalayas in the north and districts Saharanpur and Bijnor in the west and south respectively. The area is well drained by a number of rivers and nallahs like Ratmau Rao, Solani, Ason and Song rivers and Sitla Nallah etc. The Solani river is the main source of natural drainage in the area. The upper Ganga canal flows across the study area and is the main source of recharge to shallow aquifers in the adjoining areas. Total geographical area of the district is 201466 feet. It comprises of 120898 hect cultivated, 37519 hect forested, 31132 hect built-up, 2115 hect barren land and 9802 hect uncultivated land. The yearly rainfall in normal year is 1077 mm while the normal monsoon rainfall is 892 mm. Sugarcane, wheat and rice are the main crops grown in the area. The soil in district Hardwar varies from sandy to silty loam.

The geo-hydrological data indicate three aquifers system in this region, e.g. shallow with in 60 feet depth below ground level (b.g.l), intermediate within 70-150 feet b.g.l. and deeper aquifer with in 300-500 feet depth b.g.l. The groundwater table varies place to place in the study area from 1.75 m to 30.27 m in pre-monsoon season while from 0.82 m to 29.39 m in post-monsoon season.

The present study aims to estimate the recharge to groundwater due to monsoon rain through the unsaturated porous media in case of cultivated and uncultivated fields. Artificial radioisotope was injected at two uncultivated and six cultivated sites before the onset of monsoon and soil samples were collected from the injection points after the rainy season. The results of recharge to groundwater in uncultivated land vary from 3% to 5% while 8% to 17% in cultivated land. The values of recharge to groundwater seem justified keeping in

view the type of soil and other geo-hydrological conditions prevailing in the study area. Further studies using Neutron Moisture Probe and environmental isotope will throw more light on the interconnections of different aquifer systems, locations of recharge zones to deeper aquifers and major recharge sources.