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Study of Soil Moisture Movement and Recharge to Ground Water Due to Monsoon Rains and Irrigation Using Tritium Tagging Technique in Saharanpur District

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ABSTRACT

District Saharanpur falls under the vast alluvial tract of Quaternary deposits of Indo-Gangetic plains in western U.P. It is bordered by river Yamuna in the west, foot-hills of Himalayas in the north and district Hardwar in the east and district Muzaffarnagar in the south respectively. The area is well drained by a number of rivers and nallahs like Hindon, Kali, Maskara, Krishni and Budhi Yamuna rivers and Katha Nallah etc. The Hindon river is the main source of natural drainage in the area. The Eastern Yamuna canal and Deoband branch of Upper Ganga canal flow across the area which is the main source of recharge to shallow aquifers in the adjoining areas. Total geographical area of the district is 389041 hect. It comprises of 272360 hect. cultivated, 66878 hect. forested, 41314 hect. built-up, 1211 hect. barren land and 7278 hect. uncultivated land. The yearly rainfall in normal year is about 901 mm. Sugarcane, wheat and rice are the main crops grown in the area. The soil in district Saharanpur varies from sandy to silty loam.

The geohydrological data indicate three aquifers system in this region, e.g. shallow within 60 feet depth below ground level (b.g.1.), intermediate within 70-150 feet b.g.l. and deeper aquifer within 300-500 feet depth b.g.l. The average Premonsoon and postmonsoon groundwater table fluctuation is around 1.6 m in the study area.

The present study aims to estimate the recharge to groundwater due to monsoon rains through the unsaturated porous media in case of cultivated and uncultivated fields. Artificial radioisotope was injected at two uncultivated and five 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 vary from 10% to 15% in uncultivated land while 14% to 26% 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.