



Wednesday Talk Series

Date: Wednesday, November 19, 2025

Time: 04:00 PM-5:00 PM

Venue: Mithal Hall, Department of Earth Sciences, IIT Roorkee



Title of the presentation

Groundwater pollution source identification and apportionment using receptor models in the arid region of NW India

Speaker: Darshan Malviya



Abstract: The hydrology of arid regions is differently governed as water availability, geology, and climatic conditions are different. The inhabitants in such regions adjust to limited water resources and compromise on their economic growth. Many times, it creates socio-hydrological, human migration, and groundwater quality issues. In this study, we have assessed 428 groundwater samples from the 15 arid districts of NW India. Nearly 82% of the samples were classified into brackish water, and a median nitrate concentration is 40 mg/L and high fluoride concentration is omnipresent. The concentration of these elements was higher in shallow aquifers, owing to surficial activities as compared to deeper confined aquifers. A combination of geogenic and anthropogenic sources contribute to groundwater contamination. However, their simultaneous interaction makes it difficult to distinguish the relative impact of these processes. Underscoring the need to identify the potential sources and quantify their relative contributions to groundwater contamination. The Positive Matrix Factorization (PMF) was used for contaminant source analysis, combined with Health Risk Evaluation Model (HREM) to quantify the health risks. The findings provide evidence-based source apportionment that can directly inform groundwater protection, policy planning, and sustainable water management in arid environments.

Brief introduction: Mr. Darshan Malviya is a full time Ph.D. scholar (MHRD) in the Department of Earth Sciences, IIT Roorkee, working under the supervision of Prof. Govind Joseph Chakrapani. His doctoral research focuses on the groundwater dynamics in the arid region of Northwestern India, with an emphasis on understanding how hydrochemical processes, climatic stress, and anthropogenic pressures shape both the quantity and quality of groundwater.