

Advancing Water Security through Isotope Hydrology

Water, as a precious and finite resource, demands efficient management and conservation. India's diverse climatic and hydrological ecosystems present unique challenges in achieving sustainable water resource management, particularly in realizing SDG-6's goal of universal access to clean water and sanitation by 2030.

The Bhabha Atomic Research Centre (BARC), Department of Atomic Energy, has been championing isotope technology's benefits among rural and urban communities while fostering public participation in water resource management.

The Radiochemistry & Isotope Group (RC&IG) at BARC has developed expertise in isotope hydrology, driving directed research in nuclear and radiochemistry to address critical water challenges. Over the past decade, extensive hydrological studies/investigations have been conducted utilizing isotope techniques to *trace groundwater recharge sources and flow dynamics, identify contamination pathways and plan effective remediation approaches*, across various regions of India, yielding substantial societal benefits.

This BARC Newsletter issue focused on "Application of Isotope Techniques in Hydrology" represents a timely publication aligned with DAE's vision for water security. It covers pertinent topics, including isotope hydrology, water resources, contamination mitigation, climate change impacts and community-based water resources management.

By addressing frontline challenges and proposing science-backed solutions, it is expected that this publication will serve as a vital resource for engineers, researchers, policymakers and practitioners. It underscores the importance of isotope hydrological techniques in bridging the gap between scientific innovation and groundwater management, ensuring water security for current and future generations.

I commend the contributing authors, associate editor, and SIRD editorial team for their exceptional efforts and camaraderie in creating this thematic issue in a time-bound manner.

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