

Groundwater Age Determination– Insight Into Groundwater Recharge, Flow Systems and Contamination Studies

GOPAL KRISHAN

National Institute Of Hydrology, Roorkee- 247 667, Uttarakhand, India.



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Groundwater over exploitation and depletion in groundwater table in many parts of the World posing a serious problem and there is a pressing need to find out the responsible factors.¹⁻³ In addition to the fall in water table, quality of usable groundwater is also deteriorating due to the natural or anthropogenic contaminations.⁴⁻⁶ Some of the factors for depleting groundwater levels and groundwater quality degradation are ever increasing populations; industrial discharges; surface pavements, deforestation etc are affecting recharge zones and recharge sources of groundwater.⁷⁻⁸ Therefore, identifying, conservation and safeguarding of recharge sources and recharge zones is essential through appropriate measures.


Groundwater gets recharged through precipitation, surface water resources, and irrigation return flows. Recharge primarily depends upon its sources, soil characteristics, surface topography, aquifer depth etc.⁹ Deep aquifers are potential sources of groundwater as in most of the places shallow aquifers are either dried up or contaminated.¹⁰ Data limitations are there about recharge areas, flows and flow rates of groundwater in deeper aquifers. Groundwater age determination provides useful information to investigate flow and flow rates in deeper aquifers.

Groundwater age dating techniques¹¹⁻¹² provides residence time of groundwater from few years to few thousand of years and help in identifying recharge zones as the age of water in recharge zones will be near to the age of recharging water. Once the water is recharged, the values of the isotopes used for age determination will start decreasing according to the half life. Therefore, the age of the groundwater will increase with the downward movement of water from recharge zone to discharge zone.

CONTACT Gopal Krishan ✉ drgopal.krishan@gmail.com 📍 National Institute Of Hydrology, Roorkee- 247 667, Uttarakhand, India.



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Groundwater age has also been encouraged as measures of assessing groundwater quality, its sustainability, renewability, identifying flow systems and paleochannels.¹³ Therefore, age dating of groundwater is of immense help in planning of the water conservation and advocating management measures in problematic areas.

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