

ASSESSMENT OF GROUNDWATER QUALITY OF BATHINDA DISTRICT, PUNJAB WITH REFERENCE TO NITRATE CONTAMINATION

Diana Anoubam Sharma¹, Madhuri S. Rishi¹, Tirumalesh Keesari^{2*} and Uday Kumar Sinha²

¹*Department of Environment Studies, Panjab University, Chandigarh, India*

²*Isotope Hydrology Section, Isotope Production and Applications Division, Bhabha Atomic Research Centre, Mumbai, India*

**E-mail: tirumal@barc.gov.in*

Abstract

An assessment of nitrate concentration in groundwaters of Bathinda District of Punjab State was carried out. Results indicate that nitrate concentration in groundwater varied from 2.2 to 434 mg/l with high nitrate levels in shallow zones and low to moderate levels in deeper zones. About 55% samples show nitrate concentration above the desirable limit (45 mg/l) set by BIS, (2012). A wide variation in nitrate concentration in groundwater was observed in the study area. Northern and central regions showed low NO_3^- concentration while the south and south-western regions showed high NO_3^- levels. The conductivity of groundwater in this district ranged from 382 to 3750 $\mu\text{S}/\text{cm}$. About 40% of the samples have low conductivity ($\text{EC} < 1500 \mu\text{S}/\text{cm}$) while high conductivity ($\text{EC} > 3000 \mu\text{S}/\text{cm}$) was observed only in 5% of the samples and rest of the samples showed intermediate EC values. It was observed that contour diagrams of EC and NO_3^- show a similar spatial distribution. High salinity in the southern parts can be attributed to the presence of sodic and saline soils. Hydrogeology of this district infers low lateral hydraulic conductivity of the formation due to the presence of clay zones. This could lead to enhanced leaching of salts from the soils due to low flushing of groundwater resulting in both high salinity and NO_3^- concentration. Overall, NO_3^- concentration in groundwater is most significantly affected by groundwater dynamics followed by different land use pattern as well as non-point sources. A comparison of groundwater quality in relation to drinking water permissible limits showed that most of the water samples are not suitable for drinking purpose.

Keywords : Nitrate contamination, Groundwater Quality, Hydrochemistry, Salinity