

HYDROGEOCHEMICAL AND PRINCIPAL COMPONENT ANALYSES WITH REFERENCE TO NITRATE CONTAMINATION IN THE GANGETIC ALLUVIAL PLAINS OF BIHAR, INDIA

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Abstract

High nitrate load in groundwater from the Quaternary deposits of the Gangetic Plains has been reported from different places. The present study covers two separate areas of Middle Ganga Plain in Bihar covering 1570 and 680 km² in Younger and Older alluvial deposits respectively. Within the Older alluvial deposits, the low-potential Aquitard Zone occupying top 40-60 m of the succession, has considerable NO₃ load with a mean of 93.7 mg/l. Spatially, high-NO₃ samples are clustered in some patches, where the formations are predominantly of sandy litho-facies, with shallow water levels and higher dissolved solids. The underlying aquifer system however, exhibits low NO₃ concentration. Analysis of hydrochemical facies and principal component analyses of major chemical constituents reveal that return seepage of irrigation water charged with leachates of fertilizers is a major source of NO₃ in the Older Alluvium. Non-agricultural sources like leakage from the drains and sewage, landfills etc. in the semi-urban areas also contribute to NO₃ enrichment in groundwater. The groundwater from the Younger Alluvial aquifers is low in NO₃ load with a maximum concentration of 13.4 mg/L.

Keywords: Nitrate contamination, Gangetic Plains, Principal Component Analyses, Fertilizer, Older Alluvium, Younger Alluvium.