

Fluoride contamination of groundwater and its hydrogeological evolution in Sonbhadra district (U.P.) India

H. K. P. HEMANT

hkp@mnnit.ac.in

Serious problems are faced in several parts of India due to the presence of high concentrations of fluoride in drinking water which causes dental and skeletal fluorosis to humans. The study area of higher fluoride concentration in Sonbhadra district, Uttar Pradesh, India is bounded between Latitude 24° 15' to 24° 30' N and Longitude 83° 15' to 83° 30'. Panda river flows through the area which is a tributary of Kanhar river. Sonbhadra district is quite challenging in view of its topographic features and habitats of poor and tribal people in affected villages. The present work is aimed to assess the hydrogeological characteristics playing a role in fluoride contamination of groundwater in Sonbhadra district (U.P.). This includes the assessment and monitoring of hydrogeological parameters like lithology, ground water level, and also to analyze the different chemical parameters & correlate the hydrogeological parameters with chemical parameters to understand their impact on fluoride contamination. Twenty two ground water samples and 12 rock samples were collected from the study area in Sonbhadra district. Chemical parameters like pH, F⁻, TDS, EC, hardness, alkalinity, chloride, phosphate, Ca, Mg, Na, K have been analyzed with standard analytical methods. Petrological study of rocks show that the rocks present in that area are mainly granite, granite gneiss and pegmatite. Alteration of fluoride bearing minerals through fractures present in the rock leads to leaching of fluoride in the groundwater. Generally, fluoride concentration is observed increasing in shallow water level due to erosion and the contact time with fluoride bearing minerals, but it is not always positively correlated with ground water level. Therefore, the role of weathering of different fluoride bearing minerals is more dominant reason for leaching of fluoride in groundwater. From the chemical analysis it has been observed that fluoride concentration in 8 villages exceeded the permissible limit (1.5ppm) out of 22 villages. The results of the present work prove useful in further detailed investigations on fluoride contamination based on hydrogeological evaluation.