

OCCURRENCE AND EXTENT OF ARSENIC, FLUORIDE AND IRON CONTAMINATION IN GROUNDWATER IN SELECTED DISTRICTS IN EASTERN GANGES BASIN – A REVIEW

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Abstract

Arsenic and fluoride contaminations are prominent issues worldwide. In this study, a detailed review was carried out to explore the occurrence of arsenic and fluoride in groundwater from selected districts in Bihar (Madhubani, Purnia), West Bengal (Cooch Behar, Malda), Bangladesh (Rajshahi, Rangpur) and Nepal Terai (Dhanusa, Saptari and Sunsari) in Eastern Ganges Basin. In addition to arsenic and fluoride, iron concentration in groundwater is also evaluated since iron and arsenic occurrences are interrelated. In India and Bangladesh, groundwater in the districts under study is found to contain high iron concentration, which exceeds the desirable ($Fe > 0.3$ mg/l) or permissible ($Fe > 1$ mg/l) limits of drinking water standards. In Nepal, data and literature are not available to discuss iron concentration in the groundwater of Dhanusa, Saptari and Sunsari districts. Existing studies reveal that groundwater arsenic contamination is encountered in the regions under study; however, severity is not the same in all the nine districts. Malda, Rajshahi and Rangpur are highly affected compared to the other districts. In Madhubani, Purnia and Cooch Bihar, the groundwater arsenic is not studied well. In Nepal Terai, most of the studies reported that 90% of the groundwater samples have $As < 10$ mg/l. Studies related to fluoride in groundwater are scarce. Fluoride concentration in the groundwater of Madhubani and Cooch Bihar districts is generally lower than the drinking water standards ($F < 1.5$ mg/l). In Purnia, high fluoride concentration is reported in literature. In Rajshahi and Rangpur districts, fluoride concentration is found to be lower than 1.5 mg/l and within the permissible limit of drinking water standards. In Nepal Terai, data are not available to discuss fluoride concentration in groundwater, while the existing studies concentrated mostly on major ions, nutrients and some biological parameters of groundwater. High iron content observed in the groundwater of all the districts suggests that aquifer is in an anaerobic condition, which favours reduction process and subsequently releases metals to the groundwater, especially arsenic if it is in the soil. Hence, detailed investigation is recommended before planning/initiating groundwater management activities in these districts.

Keywords: Arsenic, Iron, Fluoride, Groundwater, Review, Eastern Ganges Basin