

Impact and implications of arsenic in the human environment: A case study of the Bhagalpur floodplains, Bihar, India

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Arsenic as a toxin has severe long term health impacts. Geogenic arsenic found in the young alluvial river plains of south Asia is being regularly ingested through contaminated drinking water sources by a large number of rural population. Bhagalpur district of Bihar, that lies adjacent to the known arsenic contaminated areas in West Bengal, has a large number of arsenic contaminated hand pumps and bore wells that render community health vulnerable to arsenic poisoning. The purpose of this study was to determine the spatial extent of arsenic contaminated aquifers along the densely populated southern banks of river Ganga in Bhagalpur; to determine the route of arsenic from the tapped aquifers to the human body and environment; to assess the symptoms of arsenic poisoning in the study area; and to provide an approximation of the vulnerable rural population for sustained mitigation initiatives. The methodology included field sample collections of hand pump and irrigation bore well waters; irrigated edible plant samples; and biological samples of persons with visible symptoms of arsenicosis. Silver dioxido diethyl carbamate (SDDC) method was used to test the arsenic accumulations in the samples. Within a narrow belt of 5 kms. from Ganga river, over 28% of the 9000 hand pumps' water had high arsenic contamination, the highest recorded value was 608 $\mu\text{g/L}$ against the permissible limit of 10 $\mu\text{g/L}$ as per WHO guidelines. High arsenic content was recorded in crops irrigated with arsenic contaminated water. Skin and hair samples of persons with visible arsenicosis symptoms also recorded high arsenic content. An index for determining the vulnerable population was also derived and arsenic contaminated drinking water sources were mapped to help in formulating sustainable arsenic mitigation strategy.