Groundwater arsenic contamination – a multi-directional emerging threat to water scarce areas of Pakistan

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Abstract Arsenic contamination of groundwater has exponentially endangered human life and complicated efforts for obtaining and maintaining drinking water quality standards in Pakistan, particularly in the central and southern parts of the country. In the province of Sindh, groundwater arsenic concentration has reached up to 1100 µg/L compared with WHO limits of 10 µg/L. In the province of Punjab, over 20% and in the province of Sindh, around 36% of the population is exposed to arsenic contamination above WHO limits. Therefore, keeping in view the catastrophic situation, a study on arsenic prevalence in the small village of Bhutewan (which fulfills all the prerequisites for arsenic prevalence) in the district of Rahim Yar Khan, Pakistan, was carried out. During 2004, 13 water sources were tested, having depths of 14–50 m, and significant arsenic concentrations were found in all the 13 water samples, with minimum concentration of 50 µg/L at 45 m depth and maximum arsenic concentration of 400 µg/L at 3 m. A positive correlation between Fe concentration and arsenic concentration in samples indicated the reductive dissolution of arsenic-bearing iron (hydro)oxides. In 2005, with the collaboration of UNICEF, 19 307 water sources were tested in Rahim Yar Khan district and it was observed that of these samples, 9644 samples were within the safer limits <10 µg/L (49.95%) and the remaining 9663 samples (50.05%) were found to have arsenic concentrations ranging from 20 µg/L to 500 µg/L. This paper is a part of the effort to evolve and develop a community-based, sustainable arsenic mitigation system by establishing spatial and temporal prevalence of arsenic in the study area.