

## **Geochemical Controls on Arsenic Release into Groundwater from Sediment: In Relation to Existence of a Natural Reactive Barrier**

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The presence of elevated levels of arsenic (As) levels in groundwaters of SE Bangladesh poses serious health threats. Arsenic is frequently sorbed onto the Fe- minerals in sediments and is subsequently released when microbally induced reduction processes dominate. The objective of this study is to characterize the hydro-geochemical interactions between the Meghna River and groundwater aquifers along the river boundary aquifer known as the hyporic zone (HZ). The goal is to define the role of tidal and seasonal water level fluctuations on sequestering As within or by Fe-bearing minerals across the transiently oxidized HZ. Hyporheic zone exchange significantly promotes release of As under alternating reducing and oxidizing conditions, thereby acting as a Natural Reactive Barrier (NRB). Groundwater samples from a range of depths were collected from two different transects running up to 1 km east and west of the Meghna. Groundwater samples were tested in the field for geochemical parameters including DO, pH, conductivity, and dissolved As and Fe. Laboratory analyses of cations, anions, speciation, and  $\delta^{18}\text{O}$ ,  $\delta^2\text{H}$  are being conducted. Fifteen 1.5m deep sediment cores were obtained 10m away from the rivers' edge on both riverbanks, spanning 3 km from north to south of the study area. Sediment cores were analyzed at 60cm intervals, using hand held XRF for relative elemental abundance, and X-Ray Diffraction for mineralogical composition changes along a depth profile. Preliminary geochemical results show that >65% of GW samples contain As over the WHO MCL (0.01mg/L). Although the transect distance is probably beyond the HZ during the dry season, frequent flooding during the wet season can render sufficiently the upper portion of these aquifers to be impacted by fresh DO and DOC at times that can help in mobilizing the As from sorbed minerals.