

A comparison of As biogeochemistry in Southeast Asian aquifers

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In the lower Bengal delta plain, Murshidabad in India, and Matlab in Bangladesh, are two sites currently being studied both demonstrating alarming quantities of groundwater As. The present study aims to discuss the spatial and depth distribution of groundwater As and the role of dissolved organic carbon (DOC) in groundwaters at shallower to deeper depths corresponding to dissolved As. In Matlab 19 groundwater (depth range 14-240m) and 9 surface water samples from 4 different piezometer nests in North and South Matlab were collected (As varying from 75-407 µg/L at shallow depths). The fluorescence studies indicate that the DOM in Matlab contain predominantly UVA humic-like components likely derived from sediment sources. The C¹⁴ and Sr^{87/86} measurements in the waters indicate that only 15% of it is modern carbon at shallower depths which may indicate less available young carbon to accelerate mobilization and the water is infiltrating through mostly terrestrially derived weathered sediments into the shallower zones. The results from Matlab may point to more humic DOC in shallower groundwaters which may be involved in complexation or other biogeochemical reactions that can mobilise As in aquifer. MPN based colilert tests suggest the the E.coli concentrations ranged from 2.6-17.6 from shallow to deep wells. In Murshidabad, a total of 35 samples (30 handpumped shallow wells, 5 surface waters) were collected from six sites (As varying from 3-609 µg/L at shallow depths). Fluorescence results in Murshidabad investigate the possible sources of DOM to be of microbial origin and whether the reducing groundwaters contain older, more decomposed DOM. Using MicroSnap based field microbiological analyses, Murshidabad waters showed the presence of enterobacteraceae in two high and one low As sites (within a depth of 18m), while fecal coliform is only present in one of the low As areas at about ~43m.