

Testing the Accelerated Erosion Model for Arsenic Contamination of Groundwater in Kathmandu Valley, Nepal Himalaya

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Abstract. According to the accelerated erosion model, elevated groundwater As in the tectonic valleys of Nepal Himalaya results from losing streams with elevated As, which is a consequence of rapid erosion caused by monsoon climate and tectonic uplift. The important policy question is whether deforestation and overgrazing are also significant factors, especially in contamination of the deep confined aquifer of Kathmandu Valley. One study has used Cl-36 and an assumed pathway for groundwater recharge to argue that the confined groundwater is 200,000 - 400,000 years old. However, another study has documented changes in As from deep wells over seasonal time scales. The objective of this study is to test the accelerated erosion model in Kathmandu Valley by (1) comparing surface water, deep groundwater and bedrock chemistry (2) comparing stable isotopes of surface water and deep groundwater. Water samples were collected from 19 deep (> 200 m) wells and from 19 surface water sites upstream from anthropogenic pollution. Rock samples were collected from 44 sites, representing the eight mapped bedrock units of Kathmandu Valley. Stable isotopes of hydrogen and oxygen were measured using the Picarro Cavity Ringdown Spectrometer. Aqueous concentrations of nitrate, phosphate and sulfate were measured using the Hach DR-2700 Spectrophotometer. The PerkinElmer Optima 8000 ICP-OES is being used to measure aqueous concentrations of As and 11 heavy metals (Ag, Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, Ti and Zn), while rock samples are being analyzed for the same elements using X-Ray Fluorescence. Results will be reported at the meeting.