# Examination of Carbon Sources Stimulating Microbially Mediated Arsenic Release in Bangladesh Aquifers

WHALEY-MARTIN, K.J.*[1], MAILLOUX, B.[2], SILVERN, R.F.[2], KIM, C.[2], BOSTICK, B.C.[3], VAN GEEN, A.[3], AHMED, K. M.[4], CHOUDHURY, I.[4] AND SLATER, G.F.[1]

[1]School of Geography and Earth Sciences, McMaster University, ON, Canada (*correspondence: martikjw@mcmaster.ca, gslater@mcmaster.ca)

[2]Environmental Sciences Department, Barnard College, NY, NY 10027, (bmaillou@barnard.edu, rfs2129@barnard.edu, ck2491@barnard.edu)

[3]Lamont-Doherty Earth Observatory, Columbia University, Palisides, NY 10964 (bostick@ldeo.columbia.edu, avangeen@ldeo.columbia.edu)

[4]Department of Geology, University of Dhaka, Dhaka 1000, Bangladesh 10964 (kazimatin@yahoo.com, imtiaz_choudhury@yahoo.com)

In South and Southeast Asia, estimates of more than 100 million people are being chronically exposed to arsenic (As) through the regular consumption of contaminated groundwater [1]. The reduction of iron oxyhydroxides by microoorganims releases inorganic arsenic adsorbed onto the sediment into the groundwater, but many questions remain about which organisms and substrates are most important in affecting As concentrations. In particular, the origin of the organic carbon that is driving the dissimilatory reduction has only been directly determined at one site. This study aims to further elucidate the organic carbon sources that stimulate anaerobic bacterial communities.

We characterized the indigenous bacterial community via measuring phospholipid fatty acid (PLFA) abundances, distributions and carbon isotopic compositions ($\delta^{13}C$ and $\Delta^{14}C$) in the local groundwater collected from two villages in Bangladesh. These sites exhibit a range of groundwater arsenic concentrations relative to depth. Preliminary results of PLFA analysis of sediment core samples reveal cell density estimates ranging from $3.9 \times 10^6$ to $1.1 \times 10^7$ cells/gram of sediment, typical of aquifer environments. Initial data reveal a possible correlation between cell density estimates and arsenic concentration in the groundwater at one site. PLFA distributions are indicative of typical anaerobic microbial communities. Stable and radiocarbon isotopic compositions of these PLFAs, and comparison to isotopic compositions of potential carbon sources (DOC, TOC, DIC) is ongoing and will be used to identify the carbon substrates most important to these communities.