An Adapted Water Treatment Option in Bangladesh: Solar Oxidation and Removal of Arsenic (SORAS)

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An estimated one-third of Bangladesh’s population of 130 million is exposed to arsenic from consumption of ground water with arsenic concentrations above the currently accepted limit of 50 ppb. Until all wells are tested and arsenic-free water is available, most people will continue to depend on water with unknown arsenic concentrations and are at high risk of chronic arsenic poisoning. Several adapted arsenic removal technologies are now available and are briefly reviewed. Typically, arsenic is oxidized and partly precipitated in a first unit, followed by adsorption in a second unit acting as a filter column. Many of these technologies are convenient and efficient and should be applied as quickly as possible. However, the construction and maintenance of removal units require technical skills, special materials and often chemicals. Clogging of the filters and growth of pathogens remain unresolved issues and partly delay the large-scale introduction of units using filter columns. Another option, Solar Oxidation and Removal of Arsenic (SORAS), is a very simple water treatment method that involves the addition of 4–8 drops of lemon juice per liter of water, followed by exposure to sunlight for several hours in UVA-transparent containers such as PET bottles. After sedimentation of the precipitates, the water is decanted and/or filtered. SORAS can be applied in waters in which clearly visible brown iron (hydr)oxide precipitates are formed, which is the case with iron concentrations above 8 mg/L. Under this condition, SORAS is able to remove 75–90% of the arsenic. Although SORAS might not be as convenient as filtering methods and does not always reach the limit of 50 ppb, it is applicable immediately at no cost and bacteriological risk. Waters with high iron content also have the highest probability of elevated arsenic concentrations, such that SORAS could immediately lead to a four-fold reduction of the arsenic intake in a large fraction of the population until better methods are available.