

## **Towards a more effective operational response to the Arsenic problem**

According to the United Nation's World Health Organisation (WHO), the arsenic contamination of water wells in Bangladesh has caused the worst mass poisoning in history. After having studied the problem for almost a decade, the World Bank has published a remarkably candid report in April 2005. The title **Towards a more effective operational response to the Arsenic problem** indicates that what has been achieved this far in the international efforts to remediate the catastrophe has not been entirely successful.

The report may give a rise to a quarrel about the annual death rate from arsenic poisoning in Bangladesh. The World Bank report says 6 000 people. The Dhaka Community Hospital has earlier estimated over 100 000. But it should be immaterial whether it is arsenic poisoning that is put on the death certificate or any of the dozens of conditions, including various cancers that are caused by damage to the cardiovascular, pulmonary, immunological, neurological and endocrine systems by the metabolites of a long-term arsenic overload. No one is in disagreement with the fact that tens of millions of people in Bangladesh are drinking water with dangerously high arsenic content.

The lethal wells have been recommended, financed and often sunk by western organisations. Now the British Geological Society, the World Bank and Unicef are taken to court in Bangladeshi class actions and many other international organisations may follow. There is little chance for a guilty verdict but just the fact that the helpers are brought to court for their help is ominous.

In the larger context, Bangladesh is a very poor Muslim country and a strong breeding ground for Muslim extremism. Good water may not stop future suicide bombers, but it is part of a reconciliation package that may be a more effective response than the present war on terror. No doubt the World Bank will take this in consideration in its present deliberations and act forcefully.

Although the report concentrates on Bangladesh and South Asia, arsenic contamination of water is being discovered all over the world at an alarming rate. Arsenic-contaminated drinking water threatens millions of people in such diverse countries as Mexico, Argentina, Chile, Hungary, China, India, Cambodia, Vietnam, Thailand, Nepal and Ghana. Also more than 4,000 US water utilities serving 13 million people don't meet the US Environmental Protection Agency's (EPA) standards for arsenic. Add to this all private wells that are as yet unregulated as far as arsenic is concerned.

In many additional countries the problem may surface as increasing strain on water resources mandate the use of formerly untapped groundwater sources. Arsenic is, after all, a very common substance in the earth crust and it has also been, and is, used extensively in industrial undertakings.

The World Bank finds, like WHO and the EPA have found earlier, that there is no existing technology that is suitable for removing arsenic on a household or village level. The conclusion of the report is that the only viable solution would be the introduction of large scale municipal water plants.

However, in a hot climate, the balance between microbiological contaminants and disinfectants is impossible to maintain in even the most up to date treatment plant. This means that you either risk to get sick to your stomach or to become poisoned by disinfectants and disinfection by-products. Drinking water from a municipal water plant will therefore never be a first choice for the affluent.

The present trend in all hot climates, Italy, Spain, Southern and South-Western United States, Middle East, Malaysia, Indonesia is that the sales of bottled water and private water purification equipment skyrockets. Affluent city dweller would not use municipal water for drinking in Bangladesh either. So the huge investments needed for building and running modern water plants would in the long run be a non-solution to the arsenic problem.

In Bangladesh there is an added difficulty in that the surface water which is traditionally used for drinking is extremely difficult to purify because it is affected by recurrent flooding which blends latrine, agricultural chemicals and industrial waste into the feed water of any proposed water plants.

For small communities that cannot sustain large water plants, the situation is even more difficult. EPA has recently commissioned twelve demonstration plants for removing arsenic in small communities in the United States. All of the proposals seem expensive and not entirely reliable and none of them has solved the problematic disposal of arsenic residue. It does not seem to be an easy road to travel in the US and would certainly be even more difficult in Bangladesh.

In this perspective most of the ongoing research in Bangladesh and around the world on how to remove arsenic from water is pointless. Removing arsenic from the water with ion-exchange resins, absorbing or adsorbing substances such as iron or aluminium compounds. will produce dangerous arsenic residues. These methods will also leave most other risk contaminants in the water and have often been shown to increase the risk for bacterial recontamination of the water. Any intervention must be judged not only by how well it reduces arsenic but also against the criterion of minimizing risks of water-related infections.

One solution that has been proposed in the New York Times on July 30, 2005 is to close arsenic containing wells – a very large part of the 10 million wells – because “in many villages unsafe wells are near a safe well”. This would entail many extra miles of walking for the women in Bangladesh and the added strain on the remaining wells would probably hasten the release of arsenic also into these wells. Although there are presently strata in the ground that do not release arsenic, no doubt the ground contains arsenic all over the country and water has a way of moving around under ground and also a way of picking up and, at least partially, dissolving everything in its path.

Clearly, there is a need for rethinking. And it is not difficult to see how. Providing absolutely pure drinking water from the tap has been the ambition of international water professionals for more than a century. Time has proven that in most places, it does not work. Although water professionals are reluctant to give up their dreams and still keep arguing that water from the tap is the best solution, consumers are already choosing another path. They buy bottled water or they buy special purifiers for purifying tap water before drinking.

There is a leap frog to be done in Bangladesh. Instead of large water plants, the realistic and sustainable solution is bottled water and home water purifiers – according to consumer's choice.

This calls for community scale treatment methods for bottled water and household scale treatment methods for home water purification. These methods must remove arsenic and microbiological contamination as well as other pollutants from the water without adding new health hazards and without causing environmental contamination.

It goes without saying that to be accepted by the consumer, these methods must have low life cycle costs, be technically robust, reliable, easy to maintain, socially acceptable and affordable.

Such methods are not available off the shelf today as the World Bank report shows, but can be easily developed if there is a will to do so. Time to act with full force. Such action will have relevance also for other communities around the world that sooner or later come to grapple with this extremely difficult to remove substance, Arsenic.

Aapo Säask 2005-08-23

## **Biography of author**

Aapo Säask was born in 1943 in Estonia and has lived in Sweden since 1944. He is a graduate of Brown University, Providence, R.I., USA and also has studied at Rutgers University in the US and Stockholm and Linköping Universities in Sweden.

He has initiated, promoted and organized research and development projects with agencies such as World Bank/IFC, ITC/WTO, FAO, EC, EDF, ADB, the Swedish International Development Authority (Sida), the Swedish Fund for Industrial Co-operation (Swedfund), the Swedish Export Council, the Import Promotion Agency for Products from Developing Countries (IMPOD), the Swedish Board for Technical Development (NUTEK), the Swedish Council for Building Research (BFR), and the Industrial Fund of Sweden.

Based on Mr. Säask's recommendations and support, several agro-industrial projects have been established in Third World countries. Extended World Bank, ITC and FAO projects

in Tropical Crops have been initiated and Mr. Sääsk's views and advice solicited by international funding agencies and foreign Governments. Mr. Sääsk has also throughout his entire career, without charge, advised inventors and entrepreneurs, in Sweden and in Third World countries, in the areas of energy, food, water and business development. In later years, Mr. Sääsk has mainly worked with proprietary technology in water treatment and energy and has been engaged in mobilizing resources, co-coordinating development work and promoting technical research which resulted in formation of a number of companies in the area of sustainable development.

#### Education

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