Methods will reverse arsenic danger in Bangladesh water supply

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Children in a Bangladesh village sample the safe drinking water from a tubewell installed by SASMIT. Credit: KTH Royal Institute of Technology

Arsenic poisoning is widespread in Bangladesh, where ground water is contaminated by runoff from the Himalayas. Now researchers have developed two simple and cheap methods that well drillers can use to tap arsenic-safe drinking water.

The secret to finding safe water lies in the colour of sediment obtained from well boring, says Prosun Bhattacharya, Professor of Groundwater Chemistry at Stockholm's KTH Royal Institute of Technology and coordinator of the KTH International Groundwater Arsenic Research Group.

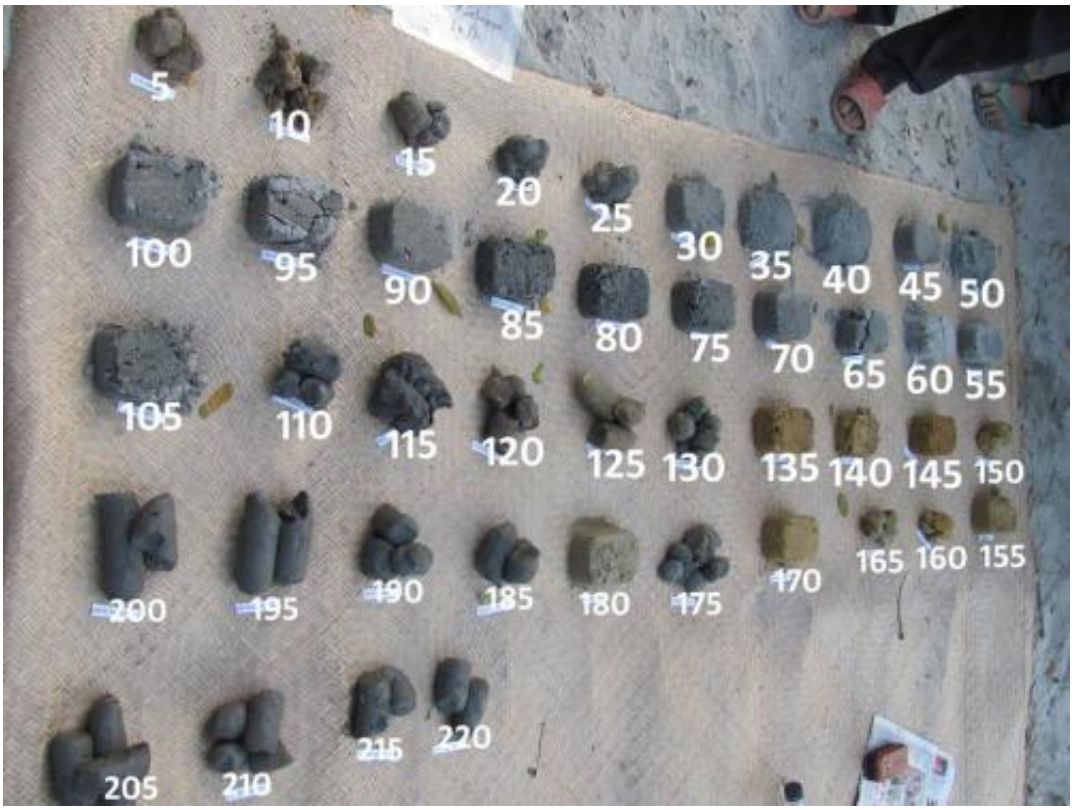
Led by Bhattacharya, an international arsenic mitigation research team found that the colour of sediment obtained through borings correlates to the concentration of the element in the well water.

They created a simple chart of four colours, based on the local well driller's sediment colour perception and Munsell colour system, which drillers can use to identify safe layers – and also avoid unsafe layers – when they install drinking water wells.

"When innovating this method, we took into account three important aspects – namely the local water driller's knowledge and role, the cost to drill for water and access to water with low amounts of arsenic," Bhattacharya says.

The findings of the study were published by the Sustainable Arsenic Mitigation (SASMIT) project, which is led by the KTH International Groundwater Arsenic Research Group.

The method could potentially protect millions of people now at risk of exposure to arsenic. With no colour or aroma, arsenic is difficult to detect before well installation. Arsenic contamination is widespread in South Asia, where arsenic-laden minerals are washed downstream from the Himalayas into the Ganges–Brahmaputra river basin, as well as the Mekong, Red and Irrawaddy river systems.



Sediment samples characterization for development of Sediment Color Tool and also targeting the sediments for installation of arsenic-safe tubewells. Credit: KTH Royal Institute of Technology

The scale of exposure to arsenic in Bangladesh has been referred to as the biggest mass poisoning in history. But the catastrophe is actually an unintended consequence of a successful drive to increase access to fresh drinking water. Millions of tubewells drilled during 1970s and 80s saved people from water-borne diseases contracted from drinking surface water. But by the 1990s, the water from many of these wells was found to contain unacceptable levels of arsenic.

As an alternative safe drinking water option, "deep tube wells" extending as deep as 250 metres serve many communities, but they are often cost-prohibitive. In the process of their work, the SASMIT researchers also

found safe drinking water at a depth of just 120 metres. This innovation makes it possible to install "Intermediate deep tube wells" to tap good drinking water with safe levels of arsenic and manganese as well. And these can be built at about half the cost of a conventional deep well.

Besides the research advances, the SASMIT project also installed 300 new wells which are currently supplying safe drinking water to more than 24,000 people.

Shallow boring for examining sediments and tubewell installation. Credit: KTH Royal Institute of Technology

More information: "Sediment color tool for targeting arsenic-safe

aquifers for the installation of shallow drinking water tubewells." Mohammed Hossaina, Prosun Bhattacharyaa, Shaun K. Frapec, Gunnar Jacksa, M. Mainul Islamb, M. Moklesur Rahmand, Mattias von Brömssena, e, M. Aziz Hasand, Kazi Matin Ahmedd, DOI: 10.1016/j.scitotenv.2014.05.064