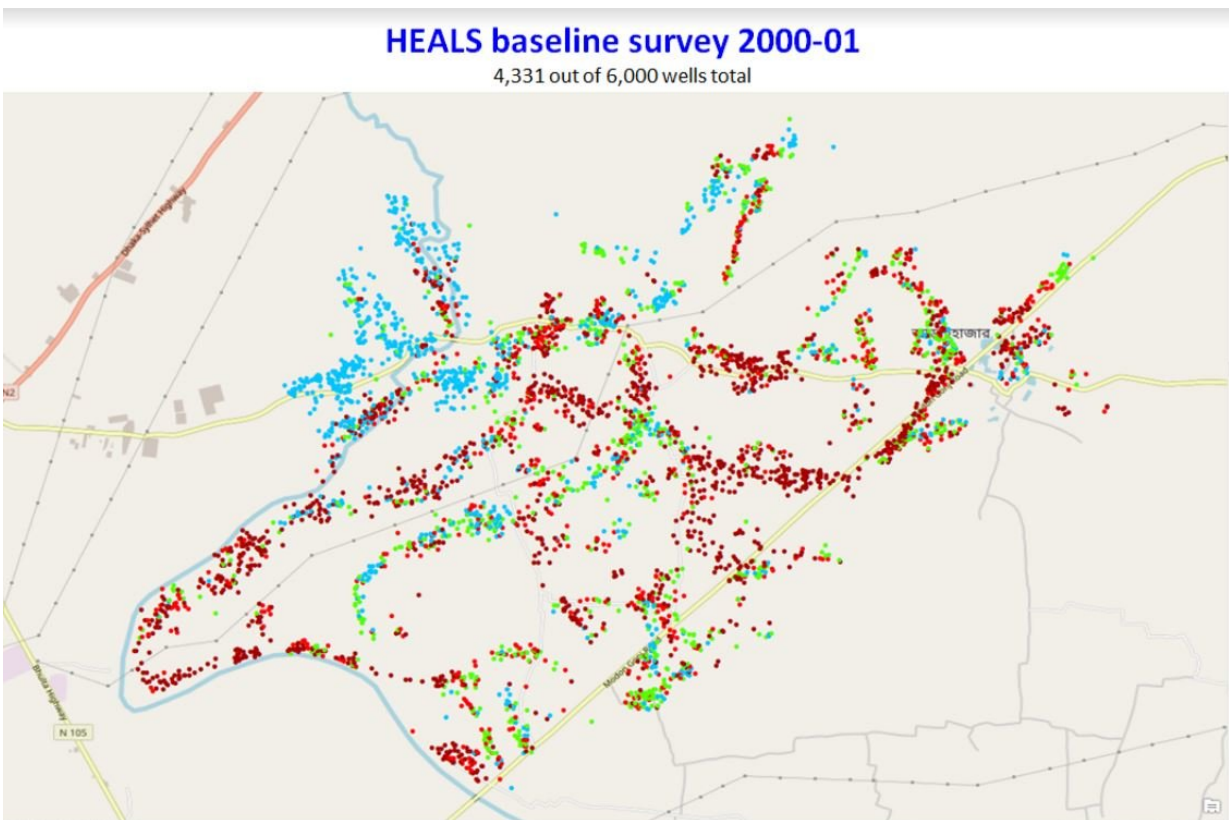


# Villagers follow the geology to safer water in Bangladesh

November 5 2018



Changes in wells over time. Credit: Alexander van Geen and the NSF.

Water researchers have found a way to fight the "king of poisons" that accounts for one of every 20 deaths in Bangladesh.

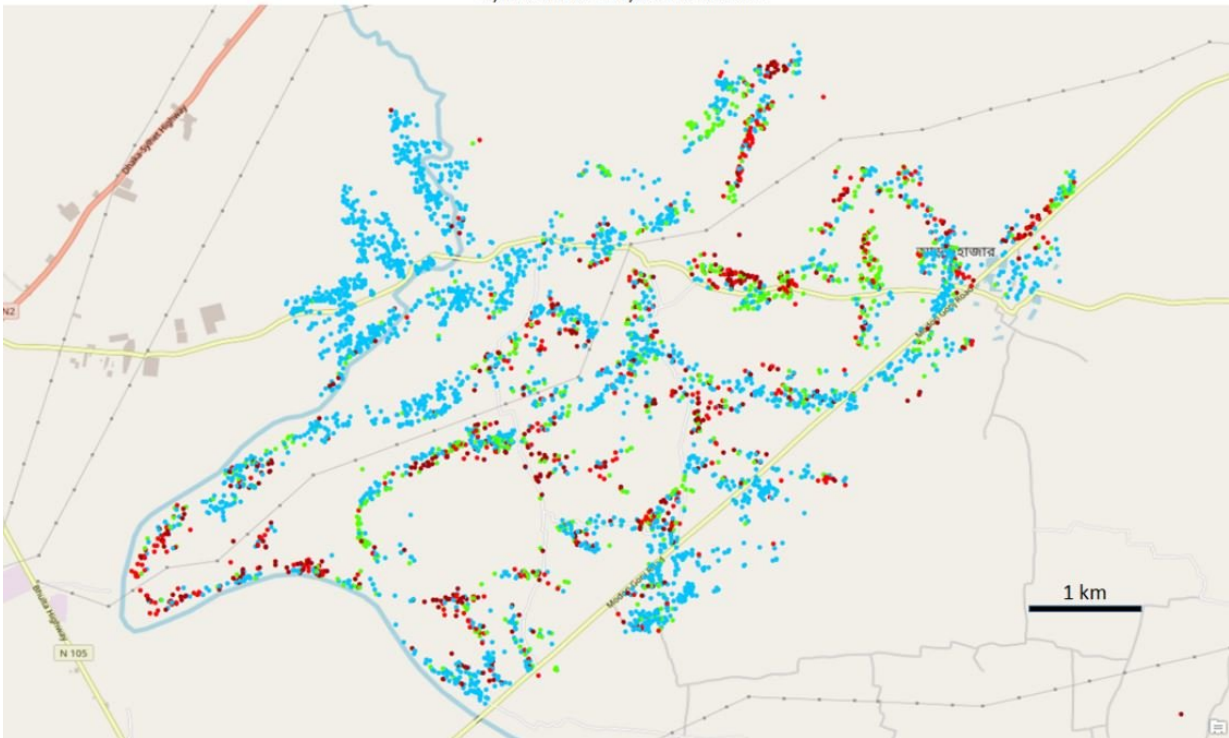
Arsenic has a long, sordid history as a poison once used in very high doses to assassinate aristocrats, but it is also a common natural element found in well [water](#) around the world. In groundwater, too much arsenic is still a killer, but nowhere more than in Bangladesh. The south Asia country is home to more than 10 million shallow, hand-pumped [wells](#) that yield water that often exceeds the World Health Organization (WHO) arsenic guidelines of 10 micrograms per liter.

"Groundwater is popular because it is generally free of bacterial pathogens, unlike surface water," explained Alexander van Geen of Columbia University, Lamont-Doherty Earth Observatory. Groundwater must travel through rocks and sediments, which filters out most harmful bacteria. The same process adds minerals to groundwater—including a lot of arsenic in some shallow wells of Bangladesh.

In 2000, van Geen and his team surveyed 6,000 wells, and then recruited a health study cohort of 12,000 people. Then in 2013, they conducted larger survey of 50,000 wells serving 350,000 people. They found that government wells that were more than 150 meters deep were typically low in arsenic. However, they also found that the more than 900 deep were distributed in a way that suggested they had been taken by elite and politically connected households, and were not accessible to the public. This interpretation has since been confirmed by development economist Mushfiq Mobarak at Yale University, van Geen explained.

## HEALS 6<sup>th</sup> follow-up 2017-18

4,390 out of >11,000 total wells



Changes in wells over time. Credit: Alexander van Geen and the NSF.

"Millions of people rely on water supplies that are contaminated with naturally occurring arsenic," says Sarah Ruth, a director of the National Science Foundation's Dynamics of Coupled Natural and Human Systems Program, which funded the research. "Consumption of arsenic-contaminated water, or the rice crops irrigated with it, can have severe health effects, including a variety of cancers and increased child mortality."

The hijacking of the deeper government wells by some households has meant that other villages can't get good water, however. People in the study area now generally understand that deeper is better, van Geen said.

As a result, they have been taking it on themselves to drill deeper wells, often encountering low arsenic water well before 150 meter depth. A new survey of the water in the study area recently documented a jump in the proportion of villagers drinking from wells meeting the WHO guideline. Only 25 percent of wells were safe in 2000, compared to 70 percent in 2018.

"This is good news," said van Geen of this year's survey of water. "This is for a population of 12,000 living within a 25 square kilometer area that we've been tracking since 2000. Urine arsenic data confirm that villagers aren't just telling us what they know what we'd like to hear." Most of the decline is attributable to households reinstalling wells to a greater depth at their own cost.

"Some villages have figured this out; others have not," said van Geen. His team is trying to convey this information to the villages through water tests, so people can see the difference for themselves. "Geology and geochemistry causes the problem, but it's also the solution. The [arsenic](#) is avoidable without having to resort to water treatment."

Van Geen will be presenting his latest water survey results at the meeting of The Geological Society of America in Indianapolis, Indiana, on Tuesday, 6 Nov.

**More information:** How Earth Processes Can Poison Millions but also Provide A Solution: The Case of Well-Water Arsenic In South Asia, Presentation time: 10:50 a.m. [gsa.confex.com/gsa/2018AM/webp ... ram/Paper319704.html](http://gsa.confex.com/gsa/2018AM/webp...ram/Paper319704.html)

Provided by Geological Society of America

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