

## **Testing for the Presence of Bacteriophages in Surface and Ground Water in Bara Haldia, Bangladesh**

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More than one billion people worldwide are denied access to clean and safe drinking water. Contaminated drinking water contributes to the spreading of many water-borne diseases, such as diarrheal diseases. In rural Bangladesh, a switch to shallow groundwater wells (<20 m), intended to avoid arsenic-polluted deep groundwater wells, (>20m) sadly increased exposure to microbial contamination. This study aimed to further characterize such contamination by testing water samples for bacteriophages, or bacteria-infecting viruses. These viruses were predicted to be found in some groundwater following filtration, as well as in all surface water samples. In this experiment, water samples were collected from 11 ponds, 2 sewage canals and 49 shallow groundwater wells (<20 meters) in Bara Haldia, Bangladesh. A 10 ml sample and, for groundwater, a filtered sample, were tested for bacteriophages using the Easyphage plating protocol. This protocol entails combining a water sample, Easyphage medium, log-phase *E. Coli* and bacterial stain together and consequently plating. If bacteriophages are present in the water sample, small blue plaques will appear on the red bacterial lawn, representing where the virus ate away at surrounding bacteria. Bacteriophages were found to be present in 46.9% of unfiltered well-water, 69.4% of filtered well-water and 100% of surface water. Viral pollution was most concentrated in the Northern Bara Haldia region and was least concentrated in Southern Bara Haldia. The results of this experiment show that there is both surface and subsurface viral pollution of the water. Furthermore, the plating method used proved to be a straightforward and feasible means of testing for bacteriophages. This research demonstrates that groundwater management in Bangladesh requires drastic improvements and corroborates the case that private tube-wells, which are low in microbial contamination and arsenic, should be installed.