

Assessment of Effects of Arsenic Pollution on Health in Rural Bengal and Development and Implementation of Sustainable Technology Solution.

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PI: Prof. Kalyan Kumar Bhar
Department of Civil Engineering, IEST, Shibpur

Co-PI: Prof. Chanchal Majumder
Department of Civil Engineering, IEST, Shibpur

Collaborative Institute(s) (if any): Prof. Bhaskar Sengupta
School of Planning, Architecture and Civil Engineering, Queen's University, Belfast, UK

Brief Description of the Project

Arsenic contamination in groundwater in nine districts of West Bengal is rapidly taking the shape of a health disaster. Millions of rural people living in these areas are drinking ground water with arsenic concentrations far above acceptable levels. Many people have already been diagnosed with poisoning symptoms; however, much of the at-risk population has not yet been assessed for arsenic-related health problems. There is no other treatment of arsenic poisoning (i.e., arsenicosis) than to consume arsenic-safe drinking water. However, a number of issues are related to the mitigation of this arsenic poisoning: i) presence of arsenic is not physically traceable, ii) external manifestation of arsenicosis is often misleading with other common skin diseases and hence clinical examination is needed for detection, iii) lack of awareness about arsenic contamination in poor and less literate rural people, iv) availability of appropriate and sustainable technology solution, v) participation of the community people in implementing the solution and vi) assessment of the improvement in health condition after providing the solution.

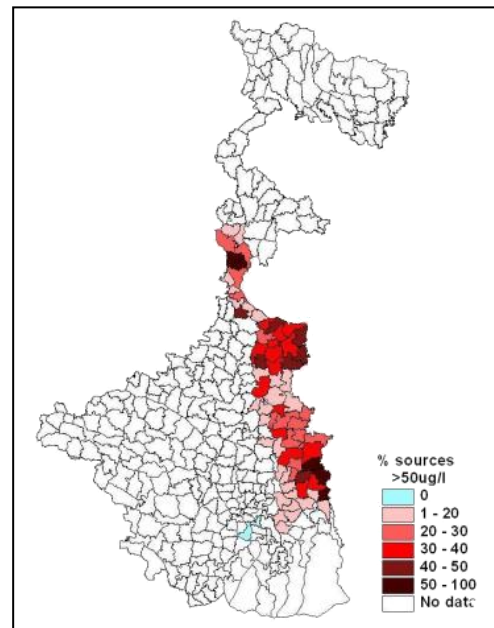


Fig. 1 Arsenic Contamination in West Bengal

With this scenario in the background, the objective of this project was to design, develop and implement a methodology that would address all the issues mentioned above, and provide relief to a large community affected by arsenic poisoning. An appropriate community filter was designed developed and installed in a village in Ranaghat Block – II, Nadia, West Bengal, which is providing arsenic-safe water to 120 hundred families since June 2013, thus saving the lives of more than a thousand people from arsenic poisoning. The unit is successfully being run and maintained by a water committee comprising a small group of active members of the community.

Keywords: Groundwater Pollution, Arsenic Contamination, West Bengal, Sustainable Solution, Community Participation

Methodologies/Approaches Adopted

Experiences gained from more than two decades of extensive research and implementation of the technology solutions at large number of locations in West Bengal and in other states has helped the faculty members of IEST, Shibpur to identify the major activities necessary towards successful implementation of an arsenic remediation programme. These are: i) Clinical Examination, ii) Testing of water samples, iii) Awareness Generation, iv) Development of Technology Solution, v) Implementation of the Solution, vi) Participation of the People, vii) Assessment of Health Impact and viii) Operation and Maintenance of the system installed. Accordingly, this project proposed and adopted the following integrated approach that involved all of these activities in a manner appropriate for the particular arsenic affected area under consideration.

- i) Assessment of degree of arsenic poisoning in groundwater through sample collection and laboratory testing;
- ii) Organizing health camps for identification of level of arsenic effects on health of the people through clinical examination;
- iii) Generating awareness among the community people about arsenic contamination of water they are consuming, its health hazards, remedial measures and their responsibilities, through a series of meetings discussions, and workshop with audio-visual media;
- iv) Designing, developing and installing appropriate technology solution to provide arsenic-safe water and involving community people to operate, maintain and protect the system installed, and
- v) Assessing the improvement in the health condition after consuming arsenic-safe water, through clinical tests in medical camp.

Assessment of Extent of Arsenic Contamination

PI and Co-PI visited six villages in Ranaghat Block-II of Nadia District, West Bengal, which are badly affected by arsenic contamination in groundwater. They met the local people as well as the local authorities, and discussed about the sources of water, number of people using community tube wells as well as private tube wells, inquired about their awareness regarding arsenic contamination, checked for any visible symptoms of arsenicosis.

The project team collected water samples from a number of tube wells to assess the extent of arsenic contamination. These samples were then tested at BESU and it was found that in most of the cases arsenic contamination was much higher than the permissible limit. Tube well at Surerkhal Primary School was having the highest concentration of arsenic in the drinking water which was more than 10 times the permissible limit. This tube well, which is used by a large number of families, is selected to be provided with remedial measures.

Awareness Programs

The community people of the study area are mostly poor farmers and workers. To make them aware about the alarming situation of arsenic contamination in the area, two awareness programs were organized. With audio-visual media, the project team discussed about the health hazards of arsenic contamination, possible technology solutions, and if implemented, involvement of the community in



Fig. 2 Arsenic Contaminated Tube Well at Surerkhal Primary School

maintenance and operation. These programs helped the project team to gain confidence and support of the community people.



Fig. 3 Awareness Program

Health Camp

Effect of arsenic on health is the main theme of this project and it was decided to check the health conditions of the community people before and after the installation of the unit. Accordingly a health camp is organized and a large number of community people were clinically tested for any symptoms of arsenicosis by Dr. Kunal Kanti Mazumdar of KPCMS Medical College.



Fig. 4 Health Camp: Checking for symptoms of arsenicosis

Development and Installation of the Community Filter

The developed community filter was installed at Mollaberia Primary School on 22nd June 2013. It was inaugurated by Prof. Ajoy Kumar Ray, Director, IEST, Shibpur. The programme was attended by a large number of community members and they were informed about the functioning and proper usage of the system just installed.

Water Committee

After installation of the filter unit, the “Water Committee” was formed from the community people who will look after the unit and also the overall management of the water supply system. Subsequently, they were trained about the regular operation and maintenance of the installed unit.

The committee started collecting monthly subscriptions from the families using the filter. They opened a bank account to deposit the collected funds and are maintaining a register of accounts. Daily operation and maintenance of the installed system is done by the member of the Committee.



Fig. 5 Inauguration of the Installed Arsenic Removal Unit at Surekhal Primary School



Fig. 6 Use of the Unit by the Community

Project Highlights

This project addressed a very serious problem of health hazard: arsenic contamination in drinking water, that is very rapidly taking the shape of a disaster, affecting the lives of millions of people in India and also in other countries. This project also provided a successful and sustainable solution that is providing arsenic safe water to more than 700 people in an arsenic affected village, thus saving their lives. This solution is already installed in a number of villages in West Bengal and other states. The institute feels proud in developing such an effective solution for the direct benefit of the society.

Awards, Appreciations, News Reporting, if any

UKIERI is a prestigious project – usually awarded to only a few innovative, highly relevant, beneficial technology research projects. In 2014, this project is very much appreciated and highlighted in the annual report of UKIERI. Earlier this year, as per the UKIERI Impact Study survey conducted by Deloitte, this project has been selected by UKIERI as one of the most successful UKIERI partnership project, and also selected for documentation by UKIERI.

Plan of Future Project Proposal based on the Current Project

A project proposal was sent to Global Innovation & Technology Alliance (GITA) in India; and Innovate UK, in United Kingdom for possible funding for industrial-scale implementation of the technology developed in this project. The proposal is already selected by GITA from a large number of proposal submitted. Once implemented, the system will benefit thousands of arsenic affected people.

