

Arsenic Contamination and Community Participation Programme

The problem

In Bangladesh, with extremely limited alternative options, thousands of rural poor are currently drinking water that is contaminated with high levels of arsenic. While the problem is generally referred to as one of the biggest environmental and health calamities of the last decades, little has been achieved to manage the issue. Most initiatives today are researching the geological, chemical, health and technical details.

What should be done?

While these activities are obviously very important to clarify the many uncertainties that emerge from this issue, Bangladesh has been a 'playing field' for research for a long time. Nowadays, the urgent character of the arsenic issue requires a more pragmatic approach linking practical research to local knowledge and local priorities.

The lack of such initiatives is mainly a result of the weak institutional and financial capacity of the Bangladeshi government. In this light it seems more realistic to focus on developing solutions at the village level. At that level one has to counter a huge lack of awareness as one of the main obstacles. Such a problematic situation asks for a learning-by-doing strategy.

Who are we?

Over the last 10 years an education programme between the Technical University Delft and local NGOs in rural Bangladesh has led to a partner-ship where students and researchers have been involved in projects at the village level. Nowadays the collaboration is focussing on the arsenic issue. Initial work strongly suggests that where the highly centralised Bangladeshi administration fails, local NGOs should play a crucial role in the implementation of solutions. It is believed that a joint effort between local organisations to translate the mitigation agenda into grassroots activities, and the experience of research organisations on a scientific and technical level will be successful.



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Introduction

For the people of Bangladesh, mostly in rural areas, a new disaster has emerged. More than one-third of the shallow tube wells installed over the last three decades – roughly ten million in total – turn out to deliver arsenic concentrations above the permissible level set by the Government of Bangladesh. If the World Health Organisation (WHO) provisional level is considered roughly two-third of the wells exceed the limit. These wells were installed in a large shift from surface water to ground water as the primary source for drinking water in the firm conviction that they would contribute to a secure and reliable drinking water supply, and would get rid of epidemic diseases caused by the use of pathogenic surface water. In itself that goal has been reached but it is a bitter observation that this very approach has led to widespread arsenic poisoning of drinking water.



Arsenic is chronically toxic after prolonged low level exposure and can lead to skin lesions, bronchitis, diabetes and eventually tumours and cancers.

Estimations tell that roughly 42 million people (more than 30% of the population) have been exposed to an arsenic concentration above the WHO standard for many years.



Arsenicosis symptoms

Various problems arise in pursuing feasible solutions. Main technical problems for designing feasible solutions are the uncertainties about the scientific aspects of the contamination itself as well as the cost and complexity of available remedial technologies (mainly various types of filters of surface or groundwater and the more expensive deeper wells).



Some of the main social hindrances are: the lack of adequate local awareness about arsenic and the lack of well-functioning institutional arrangements for drinking water provision, inadequate involvement of local communities in managing the problem and the insufficient consideration of the gender-based roles and responsibilities in water management in general and their potentials with regard to mitigate the effects of arsenic in particular.

As scientific, geological, chemical and medical uncertainties remain, and technologies all have disadvantages and as such are not ready to use and must be further developed, and also the implementation of these solutions will be severely hampered by the lack of good and efficient institutional support, sustainable solutions will take a considerable time to be developed and implemented.

Access to safe drinking water may be regarded as a basic human right and it is common to expect that the central government should hold this responsibility. However, for the Bangladeshi government, it is increasingly difficult to play a leading role in delivering this service. The public administration is still highly centralised with a hierarchical substructure and the administrative efficiency is questionable.

This is particularly the case with the arsenic problem where the water crisis is mainly a crisis of governance and institutional capacity. It therefore becomes a logical step to concentrate on a decentralised approach with a focus at the village level with an essential role for local non-governmental organisations (NGOs).

This more direct link to local communities will allow a better understanding of the causes of the problem. It will also enhance the chances to come up with appropriate community-based approaches to mitigation. In such a local approach the position of women and children as the most vulnerable groups of the local poor can much better be taken into account than in large-scale central operations. Besides, it is also expected that adequate involvement of users of water technology will enhance acceptability and impart sustainability to the efforts.



Today, one of the main dilemmas of the situation is what strategy should have the priority. Must the emphasis be laid upon the scientific understanding of the geochemical mechanism of the arsenic contamination, so that it might be easier to come up with the best solution possible? Or should priority be given to the short-term mitigation of the arsenic problem in order to save lives as much as possible?



Guiding principles and general goals

This ambiguous situation leads to the necessity of clear priorities in the design of strategies to address the problem. The Arsenic Mitigation and Research Foundation (AMRF), a partnership between Dutch and Bengali scientists and NGOs, has taken the initiative to set up a pilot programme based on the following guiding principles:

- For the realisation of sustainable long-term solutions the gender-based participation of the local community is felt to be essential.



- The short-term emphasis should be on the mitigation of the arsenic problem thereby facilitating the role of women as domestic water managers.



- The long-term solution should be based on the understanding of the causes of the contamination and its transportation mechanism.

- The long-term development goals of a people-oriented approach and the short-term orientation inherent in the mitigation problem ask for special attention to the dialogue between the different stakeholders.

- Due to the inherent complexity of the problem it becomes necessary to look into the risks associated with the introduction of a new drinking water technology.

The overall objective of the program is to create, by technical and social actions, the necessary conditions for the successful implementation of sustainable water supplies in the rural areas of Bangladesh.

Specific objectives

The following developmental, institutional as well as scientific and technical elements are the main objectives of a comprehensive programme:

1. *To set up a social mobilisation programme in three different working areas:* A participatory process will be launched to sort out possible technical and socially acceptable solutions that will lessen the burden of the arsenic contamination and secure people from further health hazards. This process will be based on reliable technical and social data. For the implementation, operation and maintenance of the selected technology an adequate local institutional framework will be developed.

2. *To optimise or develop a field level mitigation technology and to set up a local accessible data-gathering procedure to monitor the quality of the drinking water from the tube-wells:*

A careful check-up of the existing tube-wells will be done in 5 selected villages in each area. The measuring procedures, especially for the arsenic content of the drinking water should be manageable by the local community without loss of reliability. The design of any mitigation technology based on using tube-well water must include a solution for the removal of the arsenic sludge because that will be an inescapable by-product of the filtering process.



3. *To investigate under what conditions participation of the local community can be elicited in managing problems of water quality degradation such as contamination:* The knowledge about the impact of community participation during a process of technological changes or innovations is rather limited. Useful guidelines are almost solely restricted to operation and maintenance. A lot has to be learned about the effects of non-technical conditions during all stages of that process of introduction of a new technology. Provisions will be made to stimulate the process at all institutional levels.

4. *To set up a communication structure to share experiences and information:*

Workshops will be held to facilitate this communication structure. The primary goal of these workshops will be to share experiences. At the local level the emphasis will be on the participatory process itself, while at the other levels the conditions to facilitate this process will have primary attention. The necessary institutional and technical support will be a main issue at all levels.



The objectives 1 to 4 can be dealt with autonomously at the local NGO level. This proposal will therefore cover only these objectives, which are directly linked to the provision of clean drinking water. Beyond the scope of this proposal some more long-term objectives can be specified:

5. *To investigate under what conditions arsenic will migrate to tube-wells:* Conceptual and numerical modelling techniques will be used to analyse the behaviour of groundwater.

6. *A risk assessment programme will set up:* This study will not be limited to only technical issues but also involve the consequences of organisational and institutional constructions.

For these objectives local NGO's can play an important facilitating role. Proposals for these more scientific and technical issues will be prepared for EU funding (INCO-DEV 2005 and Asia Pro ECO 2005). These research proposals will only be effective if they can be linked to the practical activities at NGO level. Moreover, long-lasting international contacts have been developed in Bangladesh, the Netherlands, Australia, and Sweden with research institutes addressing these issues.

Considerations for the action plan

Most of the NGO-sector has been opposing the government top/down-approach because of its expected negative impact for the poor people. But for the arsenic issue it is not enough that the NGO-sector confines itself to critical analyses only and they should come up with alternative strategies and proposals. Recently a number of NGO's have come forward with some initiatives but these are still very limited compared to the magnitude of the problem.



In governmental bodies a shift to a more integrated approach can be observed. The recognition that the standard technical approach has a number of disadvantages, especially the inability to cope with social and cultural phenomena, is fuelling a change in a multidisciplinary direction.



This shift in attitude by both the non-governmental and governmental sectors might activate a better co-operative climate, especially at the local level.

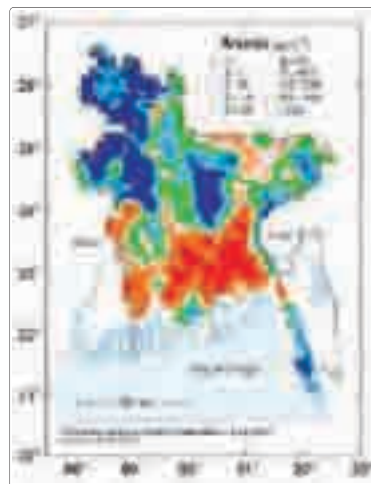
On this local level, the emerging crisis warrants critical attention with regard to the participation of the people in the process of management, mitigation and analysis of the problem. Within the framework of a sustainable development strategy the question about the relevance of the potentials of people's participation and of local knowledge about water management systems becomes a very important one.

An assessment of the middle and long-term possibilities of technologies, based on local knowledge and know-how are of great importance for the water resource sector. Of equal significance are the participatory monitoring and evaluation of technologies and their organisational implementation.

For this reason, the basic method and starting point of the AMRF programme might be best described as participatory action that fits into a "learning by doing"-strategy at the grass roots level. At that level data about the arsenic contamination of the wells, about the health risks as well as about possible short-term solutions will be used to trigger the participation of the local community.

It is with these considerations in mind that the problems related to the arsenic contamination of more than half of the wells in Bangladesh will be tackled. Considering the limited successes until now (despite the large sums of money made available by UNICEF and others to the Bangladeshi government

for the arsenic issue), the AMRF programme aims at smaller local-level projects in order to find innovative methods that are replicable and capable of producing multiplier effects in the country. The experiences from this pilot programme might prove to be relevant in other countries facing similar problems.



Initial work on the arsenic issue has provided valuable insights and also led to the formulation of this proposal. Within a long-lasting collaboration between staff of Delft University of Technology in the Netherlands and various local NGO's, a large number of students have visited projects in the rural areas of Bangladesh on broad water management topics.

Over the last couple of years, with the emergence of the arsenic issue students and researchers have worked together with a number of NGO's on this particular problem. The complexity and urgency of the situation demands a more elaborate commitment going further than simply a student programme. Several other activities have to be initiated.



Student programme

Action plan

This strategy becomes relevant in light of the range of the contamination and gravity of the health risks. Therefore we focus on the organisation of pilot projects where the information gathered from the activities and experiences are disseminated in different ways to the local and national bodies. This is an essential part of the action plan. Although the issue has sparked off serious social and scientific inquiries, most of the NGO community, especially at the local level, is obviously not that much aware of the consequences of the problem. These local NGO's have neither the technical and scientific facilities, nor the useful linkages to the efforts being undertaken by the government at the national level. Therefore it is a joint task for local NGO's and research organisations in a (inter-) national network to array all possible means to uncover the hidden and explicit threats the arsenic problem is engendering.

In order to mobilise people at all levels of the society, it is important that the perceptions and interests of the various parties involved are taken fully into account. The sharing of costs and benefits connected with various ways of the usage of water, the participation of societal entities involved in this process

and the conservation of future water resources are some of the significant issues.

From the specific objectives, two goals can be distinguished: (1) implementation (including local implementation and central coordination), and (2) research (the latter is beyond the scope of this programme).

(1) IMPLEMENTATION GOAL

To increase the value of the programme experiences, three local implementation areas with five villages will be selected. These pilot areas will be chosen in different highly contaminated districts with different demographic and physical characteristics. The central coordination body will harmonise and integrate the activities in these different areas. Depending on the funding possibilities, we can choose to start at the same time in three areas or in one at a time. In that case the central coordination body will gradually increase as more areas are added.



The following activities in each of the three local implementation areas can be summarised:

- Raising awareness among the community people
- Organising social mobilisation
- Development of field level mitigation technologies
- Set-up of community-based water supply facilities, including the local institutional arrangements
- Organising information handling and communication

These activities will spark off concrete discussions and actions in the villages. For example a water-testing programme in a village can be used to get the attention for the arsenic issues. In the same way an innovation, the construction of a social map, or other research input can be used as triggers.



ordinating activities of this part of the organisation are therefore of equal importance.

The following activities for the central coordination can be summarised:

- Coordination, management and administration
- Building a communication structure
- National networking and contacts



Tubewell installation

To bring about the involvement of the community will require more than just an awareness programme; it is necessary to give them a perspective on a short-term solution for their immediate problem (no survey without service). For example the installation of safe water options (such as pond sand filters, deep tube wells or rainwater harvesting systems) in the target villages might serve this purpose. This will create room for further investigations for long-term solutions and the knowledge and information from the local people is an essential 'trigger' for this.

To effectively learn from these activities there is an important task in documenting, monitoring and communicating the information about the different developmental processes from different interrelated and complementary orientations: the institutional development process, the participatory process, and the implementation process.

In this, and for success of the total programme, performance at the local level must be considered as one of the important keys. This success cannot be achieved by the individual local organisations only, but will depend on the performance of the central management as well. The facilitating and co-



Dhaka the crowded capital of Bangladesh



Because both the local implementation and central coordination are strongly inter-related, it is quite obvious that the operational success of the programme will depend on how these functions are reflected in the programme organisation itself. Therefore AMRF

is organised as a network structure and based on the idea of a shared and balanced responsibility.

The work can start in one area independently as soon as funds are available. The relevant contacts in Bangladesh have already been built up over the past 10 years in the context of the student programme.

(2) RESEARCH GOAL

Finally, for the sake of clarity, the more research-oriented goal with a more general significance is presented in this proposal as well. For research, partnerships and funding are sought on an international level.

The long-term strategy for the AMRF collaboration is directed at minimising the risks of existing and future remedies, while incorporating essential institutional requirements for implementation of remedial technologies. To create a broader understanding, this strategy requires research for a better understanding of the hydro-geological situation as well as the institutional possibilities and restrictions.



A multidisciplinary set-up has therefore been developed which relates three more or less disciplinary research orientations on technological issues, geology, institutions, and implementation. The first direction is set towards a more scientific understanding of the behaviour of arsenic in groundwater. The second looks into the preconditions for building local institutional capacity. It investigates formal and informal institutions and networks at community level. The third explores possible frameworks for implementation of sustainable drinking water (sub-) systems, facilitating a basic development strategy for people's participation. The overall aim will be to



translate social and institutional findings into a basic framework for technological choices and provide usable technical recommendations for implementation of the solutions.

An approach focussing on mere research activities might not be in line with the immediate problems in Bangladesh. Furthermore, there is a huge lack of hands-on experience, which pushed AMRF to prescribe the short-term strategy by activities directed to a quick reduction of arsenic concentrations to an acceptable level, in a number of pilot projects in the mentioned local implementation areas.

It is believed that a synergy between efforts of local NGO's to translate the mitigation agenda into grassroots activities, and the experience of research organisations on a scientific and technical level will be successful. Because of its practice-oriented and integrated methodology, this program might prove to be a demonstrator project for preventing or at least resolving similar problems in the future.

Monitoring and evaluation of the activities

Development in this programme is seen as a lengthy process that has to come from within. Otherwise it will hinder disadvantaged communities in their autonomy to choose their own development path. The dynamics are strongly determined by specific local cultural, historical and social factors. At the same time important influences will come from outside involvement of various international stakeholders. The ensuing risk of this should be recognised and is portrayed in the following metaphor by Nikos Kazantzakis in Zorba the Creek.



Ceremony for a successful installation of a tubewell

“I remembered one morning when I discovered a cocoon in the bark of a tree, just as the butterfly was making a hole in its case and preparing to come out. I waited a while, but it was too long appearing and I was impatient. I bent over it and breathed on it to warm it. I warmed it as quickly as I could and the miracle began to happen before my eyes, faster than life. The case opened, the butterfly started slowly crawling out and I shall never forget my horror when I saw how its wings were folded back and crumpled; the wretched butterfly tried with its whole trembling body to unfold them. Bending over it, I tried to help it with my breath. In vain. It needed to be hatched out patiently and the unfolding of the wings should be a gradual process in the sun. Now it was too late. My breath had forced the butterfly to appear all crumpled, before its time. It struggled desperately and, a few seconds later, died in the palm of my hand.”

This simple story tells in a nutshell why it is important that a monitoring and evaluation system should be a product of a learning process off the organisation itself. Only in that way it can become a professional tool for the organisation. Based on own priorities measurable criteria can be chosen and activities be monitored and evaluated. Learning about the development process and its objectives will lead to a dynamic set of criteria that ideally supports a development process that is well understood by its participants, because it reflects primarily their own rationality.



Field worker painting a contaminated well



A more classical way of accounting will be executed by collecting the material figures, such as the number of checked tube-wells in village, the status of the “red/green” (contaminated/safe) codification of the tube-wells, the extent of the arsenic poisoning, number of health courses given, number of arsenicosis patients, number of people with access to the supplies, etc.