

# Bangladesh's testing time with arsenic



*Villages across Bangladesh are affected by arsenic-contaminated supplies, with the results of one study indicating some 2.5 million wells are estimated to be contaminated.*

Over a decade ago, the world was shocked by the discovery in Bangladesh of arsenic in water wells across the densely populated delta. Already harassed by floods and typhoons, the poor Asian state seemed ill-fated indeed to face poisoning as well. Other horrors have diverted world attention from the strange and potentially deadly phenomenon, but internationally-funded work continues quietly seeking a solution.

'Once it was understood as a problem, everybody really tried to do their best. But it's taken a lot of coordination to do

● Arsenic contamination remains a serious health threat to millions of Bangladeshis. **PETER REINA** reports on efforts to deal with this natural blight.

some really good work to get the impact down to the communities,' says Alison Baker, a senior environmental manager with the Australian consultant GHD in Melbourne who is working on Bangladesh's problem. While similar groundwater contamination occurs in other countries, 'Bangladesh has been a focus because of the wide incidence of the problem,' she adds.

Although arsenic is popularly perceived as an instant killer favoured by crime novel writers, its real effects are more insidious. Across Bangladesh, countless villagers are afflicted by arsenicosis with keratosis, and other effects such as cancer are said to be spreading.

The cause of all this misery is naturally-occurring arsenic, thought to have been released thousands of years ago from sediments into the groundwater. Water from nearly half Bangladesh's shallow tube wells, those

under 150m deep, exceed World Health Organisation (WHO) arsenic guideline values, according to a national investigation by the British Geological Survey (BGS) in the late 1990s.

The WHO guideline value for arsenic in drinking water was lowered from 50µg/litre to 10µg/litre in 1993, with the same new level being adopted later by the US and the European Union. However countries with groundwater arsenic problems, including Bangladesh, retain the original higher values. This is partly because of technical difficulties in measuring lower concentrations, according to WHO.

Extrapolating for the UK-government financed survey by BGS, up to 2.5 million of Bangladesh's 10 million wells of the vulnerable type then in operation were estimated to be contaminated. Deeper wells, below the old sediment levels, pose much less of a risk. At the level of



International support has been helping address the arsenic problem in Bangladesh, where as many as 57 million people are thought to be exposed to levels above WHO recommendations.

contamination being experienced at the time of the survey, as many 57 million people were estimated as exposed to arsenic levels above WHO recommendations.

Finding alternative, safe water sources is an obvious, but not always available, option to using contaminated shallow dug wells. Where that this is not an option, various treatment technologies exist, according to WHO.

Among available treatment technologies, coagulation with filtration is the most common, including oxidation if arsenite is present, suggests WHO. Commercially produced synthetic resins and activated alumina granules can also remove arsenic through ion exchange. And membrane methods are also available, including reverse osmosis and nanofiltration.

But, as in Bangladesh, treatment can be viewed with official suspicion. One concern centres on having to deal with resulting creation of sludge which is rich in arsenic, explains GHD's Baker. And treatment technologies need looking after. 'There are a lot of O&M issues that are difficult to overcome,' she adds.

Baker is one of around ten expatriates in a multidisciplinary team funded by the Australian Agency for International Development, AusAID, to work on arsenic mitigation in Bangladesh. The team draws on expertise throughout Australia and Bangladesh, including Dhaka Community Hospital, the CRC for Waste Management and Pollution Control, the University of New South Wales and the University of South Australia. The project follows a number of others funded by aid agencies, with the biggest being the World Bank's through its Arsenic Mitigation - Water Supply Project.

Funding of over US\$40M, mainly

from the bank, was dedicated to work on arsenic mitigation in Bangladesh in the four years to 2003. Broadly, the work aimed at reducing rural and urban diseases by cutting lead consumption, while supporting the provision of clean water alternatives and boosting treatment of people suffering from arsenic-induced disease.

Apart from helping to boost local institutional and technical capacities, the World Bank funds have been channelled into providing technical support and helping to develop a community-based organisation able to quickly supply alternative infrastructure.

With about Aus\$2M (US\$1.5M) of funds, the Australian-backed team is extending that work. Started in mid-2001, the project is due to end this year. The effort is focused on five rural communities within two hours' drive of the Bangladeshi capital Dhaka, says Baker. But she believes the impact will be broader. 'The whole idea is to develop tools,' she says.

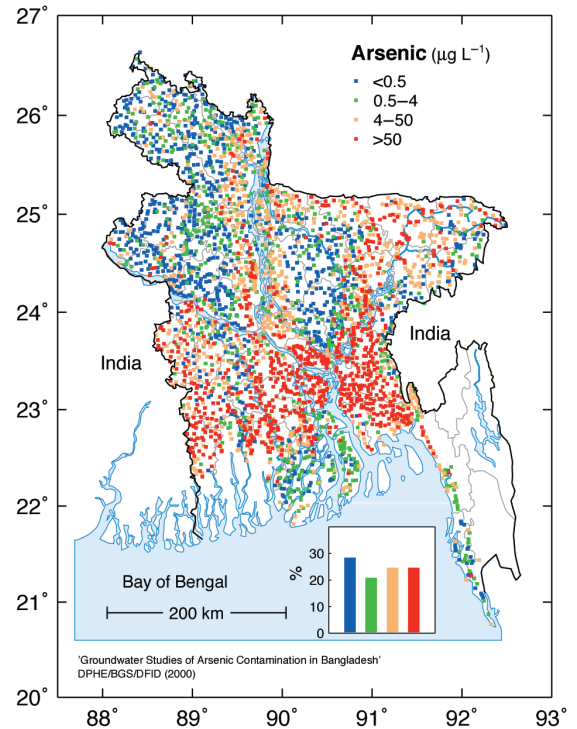
The safe water element of the project focuses on providing arsenic-free water and to determine the most appropriate alternative supplies or treatments. Rainwater tanks, shallow wells, pond and river water filters and deep wells are among the options, some needing to include treatment.

Additionally the project is preparing a water supply manual for villages. And it is introducing the principles of risk management and Hazard Analysis and Critical Control Point, of the sort used widely in food safety control, that are being developed in Australia and by WHO. 'The whole idea is to be proactive,' explains Baker.

Unusually, the project seeks not only to stem direct arsenic ingestion through drinking groundwater, but is also assembling information to help control exposure through food, soil and dust. It involves testing over 4000 samples of water, plant, food, soil and dust from 30 villages.

Village surveys are identifying uses of water and consumption of various plants and food. Satellite positioning is being used to map the villages and existing tubewells and locations of food and soil sampling.

A further key project element is the establishment of the new Bangladesh - Australian Centre for Arsenic Mitigation,



The extent of arsenic contamination in Bangladesh  
Credit: BGS AND DPHE, 2001. Arsenic contamination of groundwater in Bangladesh. Kinniburgy, DG and Smedley, PL (Editors), British Geological Survey Technical Report WC/00/19, British Geological Survey, Keyworth.

within Dhaka Community Hospital. It is equipped with laboratory facilities to support field programmes and analyses for arsenic of water, food and other samples.

But its wider-ranging remit is to advise arsenic-affected communities on safe water and food, as well as human health and wellbeing. It targets all levels, from villages to government agencies locally, and also in other affected countries, such as Vietnam, Nepal, India, Pakistan, Cambodia and China, including Taiwan.

Arsenic contamination is not just a problem for Bangladesh. The geological characteristics that helped to disperse poison into that country's water supplies exist more widely, notes the British Geological Survey, urging systematic testing where similar conditions are found. ●

Village surveys supported by AusAID are helping develop tools to manage the provision of water.

