

“WATER FOR DEATH”

## ARSENIC IN DRINKING WATER

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When one learns that anything living on this ‘Blue Planet’ with 70 percent of its surface covered by water cannot survive without water and that human beings can go without fresh water three days at the most, it becomes evident how precious the resource is and how serious people should be to protect it.

To focus on the importance of safe water for all, “World Water Day” is being observed every year on March 22 since 1993. The General Assembly of the United Nations declared 2005-2015 as the decade for implementing the “Water for Life” programme. In November, 2002, the International Covenant on Economic, Social and Cultural Rights recognized the right to water as a fundamental human right. The General Comment observed: “the human right to water entitles everyone to sufficient, affordable, physically accessible, safe and acceptable water for personal and domestic uses”. The General Comment ratified by 145 countries India included provides, inter alia, a tool to the civil society to keep governments alert on this vital issue specially among the poor and the vulnerable section of the society.

In the developing countries water used by the general mass of people is invariably contaminated with bacteria that causes diarrhoea, cholera, typhoid, and other life-threatening diseases. In many parts of the world the small streams often directly contaminated by sewage, are the only source of water.

In 2006, about 1.1 billion people lacked proper drinking water. Water borne diseases claim around 1.8 million lives each year. It goes without saying that people in the developing world are in a dire need of good quality water in sufficient quantity.

To reduce the risk from microbial contamination of drinking water, thousands of tube wells were dug in Bangladesh under the supervision of the British Geological Survey. Risk from microbial contamination of drinking water came down substantially though, the water was inadvertently contaminated by heavy doses of a still riskier agent—*Arsenic*. The organization responsible to set up tube wells had paid little attention towards testing the quality of water coming out of the drilled tube wells. During the 80’s and 90’s, the organization even conducted no tests for *arsenic*. It was not done during the 1992 survey either. Ironically, the same organization tested for arsenic in a London aquifer in 1989. It is a clear pointer of double standard.

Prolonged use of drinking water with high concentrations of arsenic caused long-term chronic health effects, such as skin disease, skin cancer, and tumours in lungs, bladder, kidneys and liver among a large section of Bangladesh people.

If during irrigation, water used contains arsenic, crops get a share of it and is transmitted to human bodies consuming them.

The menace of arsenic poisoning or *arsenicosis* afflicted a large part of West Bengal too, which the ruling power tried, ab initio, to conceal with disastrous consequences.

Prof Manindra Narayan Majumdar has done a great job by bringing the silent killer to the fore in all its facets through his book written in lucid Bengali.

It is the second edition of his earlier book published in 2006 with the same title. In this edition Prof Majumdar divides the book in two distinct sections. In the first part, the author claims to have presented the subject in a simplistic approach, without using much of complicated science which has been accommodated in the second part meant for readers with a somewhat advanced science background. Should omission of the second part pose no serious hurdle to an uninitiated reader in making out even to a significant extent the gravity of the problem, the idea would be really a commendable one.

Arsenic as a free element is rarely available on earth's surface. In common parlance, "Arsenic" includes all its chemical compounds. In both parts of Bengal, underground water contains arsenic mainly in the form of "arsenate" or "arsenite". Arsenites in drinking water have a higher toxicity than arsenates .

In the first few chapters of the book under review, Prof Majumdar makes a round of the crucial health hazards that affected a huge population of both parts of Bengal. The source remained undetected for quite some time. Later it was established that consumption of not-too-deep under-ground water containing high concentration of arsenic in it, was the cause. Surface water and water of wells and draw wells were, by and large, free from the contamination. People living in 9 out of 19 districts of West Bengal and 50 out of 64 districts of Bangladesh are now victims of arsenic contamination.

Ash coming out of thermal power stations after burning of coal, contains a considerable amount of arsenic. Fly ash that spreads over a long distance, adds to the arsenic contamination level over a wide area. All this and transfer of arsenic to humans through cereals, vegetables and domestic animals have been well explained in the book. It however, passes comprehension why hydel power stations have been included in Table 6.2 which depicts emission of arsenic and mercury from the thermal power stations of West Bengal.

The author has elaborated the physiological and socio-economic effects of arsenic poisoning.

This, along with the photographs of arsenicosis victims is, sure to touch the sensibility of all serious readers. Source of excessive arsenic in the underground water of the Ganga delta belt and methods to reduce it have been discussed in two separate chapters.

Beyond the Ganges delta belt, countries facing the threat of arsenicosis are Thailand, Taiwan, Mainland China, many locations of the United States, Argentina, Chile and Mexico. There are many others with a relatively low arsenic concentration in ground water.

Arsenic as a poison is in use from time immemorial. That in small doses it works as a medicine is also well known. The author describes, taking from the pages of history, a few incidents of assassination using arsenic.

Over a hundred years back, the Maximum Contaminant Level (MCL) of arsenic in safe drinking water was fixed at 150 parts per billion (ppb) by a Commission headed by the famous scientist Kelvin. It was subsequently lowered down to 50. In the United States, MCL of arsenic being followed since 2006 is 10 ppb as recommended by the Environmental Protection Agency. The World Health Organization also recommends a limit of 10 ppb of arsenic in drinking water. More recent findings show that consumption of water with levels as low as 0.17 ppb over long periods of time may cause arsenicosis. Tropical country people consuming larger quantity of water, need to have a lower MCL of arsenic in it. But both in India and in Bangladesh, the national level still remains at 50 ppb. Monitoring and control system here is also awfully poor.

Effect of arsenic over the entire global system has been described in the second part where has also been incorporated various testing and mitigation methods – Neutron Activation Analysis, Atomic Absorption Spectrometry, reverse osmosis, filtration using alumina and iron etc. From all this, inquisitive readers may feel inspired for newer innovations.

In an age when the world is getting more and more conscious about safe drinking water, indifference to it, despite incidence of dreadful arsenicosis cases in a large scale, is a criminal offence. The urban elites too did not pay much heed to it, perhaps because they remained mostly outside the ambit of affliction. In this backdrop, Prof Majumdar's is really a worthy endeavour.

In his introductory comments Majumdar recounts the painstaking exercise he had to go through, for marketing the first edition of the present book. This time, one can hope, not against hope people specially his target group—"mothers and sisters of Bengal" would be wise enough to learn all about the insidious disaster. □□□