



## ARSENIC – A SLOW POISON, SWALLOWING RURAL LIVES IN BERHAMPORE BLOCK (W.B.).

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### ABSTRACT

Berhampore block is one among the five blocks of sub-divisional town, Berhampore, of Murshidabad district in the state of West Bengal. Contamination of underground water with soluble, inorganic arsenic is one of the rigorous problems now-a day in this area. This problem is leading mainly the lives of rural and outskirts areas at high risks, as they are primarily dependent on underground water exposed to arsenic contaminated tracts. Here, thousands of rural people are suffering from the problem of arsenic induced health diseases. This problem needs wider attention and awareness among rural and outskirts population around urban areas, as they are exposed to this problem worse. This paper reveals that a major part of this block is exposed to arsenic. Also, this suggests further projects, experimentations and researches to innovate some concrete alternative for taking suitable planning strategy to reduce the human vulnerability from the aforesaid underground water contamination.

**Keywords:** Contamination, innovation, alternative.

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### INTRODUCTION

Water is quiet significant, pure and beautiful gift of God, in which life has originated. But it's the fact that misuses of any resource ask compensation in many forms. Our water resources, which are contaminated by us in various ways, are in turn taking revenge by creating several problems for ourselves.

Government of India has spotted 8 districts including 79 developmental blocks in West Bengal as areas having arsenic concentration greater than the delimited value of the WHO (Das *et.al.*, 2009). Though the problem is not very old but its effects are quiet intensive in this part of the India. In the developing areas like Berhampore block, where rural populations forms a major part of the total population, are mainly dependent on the underground water which is easily available to them in the form of either hand tube-wells or wells.

Quiet unfortunately, this contamination is leading numerous health hazards and ill impacts on them (Fig. a.-f).

This paper highlights that a major part of this block is exposed to arsenic. Thousands of rural people are suffering from arsenic induced health diseases, which needs wider attention and awareness among common mass. It will also attract the scientists, researchers etc. for further projects, researches and experimentations to innovate alternatives for either the utilization of the underground water or to make it entirely free from this slow poison and also its cure.

### MATERIALS AND METHODS

The present study has been worked out based on different secondary data sources, in this block of Murshidabad district (Named after the Nawab,

Murshid Quli Khan). Populations for the various areas have been acquired from Census of India (2001). Also, the field visits have been done intensively to observe the severity of the arsenic induced health diseases in the affected areas. The study area lies between the 23° 55' 44" N to 24° 10' 52" N latitudes and 88° 08' 38" E to 88° 28' 59" E longitudes covering a total geographical area of 314.19 sq. km. Berhampore is one among the five blocks of subdivisional town, Berhampore of Murshidabad districts in the state of West Bengal.

Rural area under Berhampore block consists of 17 Gram panchayats, viz. Bhakuri-I, Haridasmati, Niyallispara Goaljan, Rangamati Chandpara, Bhakuri-II, Hatinagar, Radharghat-II, Chhaighari, Madanpur, Radharghat-I, Satui Chaurigachha, Daulatabad, Manindranagar, Rajdharpara, Gurudaspur, Naodapanur and Sahajadpur. Urban area under this block consists of three census towns: , Goaljan and Gora Bazar. According to the census 2001, the block has a total population of 3, 78,884. Here, a major part of the total population lives in rural areas while only 6% people reside in main sadar town.

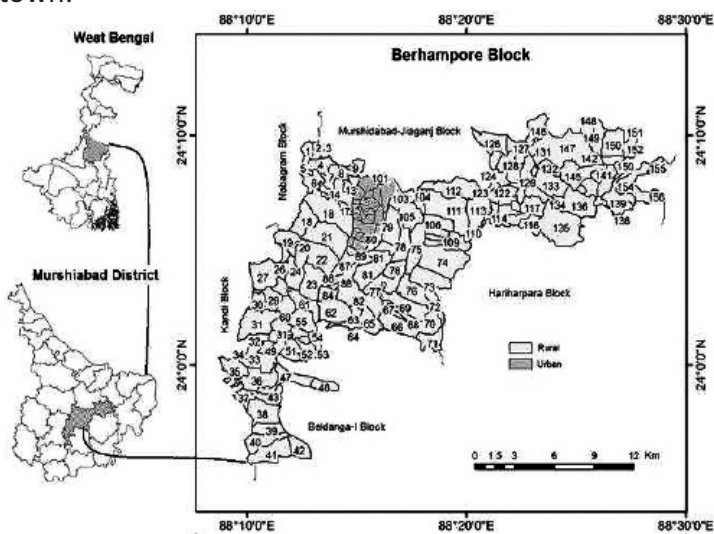
depth of 20–100 mbgl, is mainly made of sediment deposited by meandering streams (Mehta *et al.*, 2009) (Central Ground water Board's Annual report, 2009, 2010).

## RESULTS AND DISCUSSIONS

Arsenic is a naturally occurring metalloid (metal-like) element, naturally it is usually found in combination with other elements. They have no smell and most have no special taste. Thus, its presence cannot be identified easily. It may stay in soil and sediments for very long periods of time and only some plants can absorb it (Elangon and Chalakh, 2006). Primary stage of arsenic accumulation can cause a pattern of skin changes that involve a characteristic darkening of the skin and the appearance of small wart-like outbreaks on the palm, soles, and torso (Keratosi & Hyperkeratosis), while high levels of arsenic can result cancer and even death.

The World Health Organization (WHO) has recommended a limit of 0.01 mg/L (10 parts per billion) of arsenic to be the safe value in drinking water (National Secondary Drinking Water Regulations, 2012). This recommendation was established based on the limit of detection for most laboratories' testing equipment at the time of publication of the WHO water quality guidelines. More recent findings have shown that consumption of water with levels as low as 0.00017 mg/L (0.17 parts per billion) over long periods of time can lead to diseases caused due to excessive arsenic accumulation (WHO, 1993).

The study reveals that a major part of the block has the underground water contaminated with arsenic. Among the 79 developmental blocks of the 8 marked districts, Berhampore is one, where *ca.* 1.5- 2.5 lakhs rural and outskirts population is recognized as Risk Population by the PHED (Berhampore, W. B.). Of the 17 Gram panchayats, more than 8 including Manindranagar, Bhakuri I, Bhakuri II, Radharghat-I, Rajdharpara are worse arsenic affected areas of Berhampore block (Chakraborti *et al.*, 2005). The other three are Radharghat-II, Daulatabad and Sahajadpur



**Fig. 1. Map depicting the Location of Berhampore Block along with its Mouza divisions.**

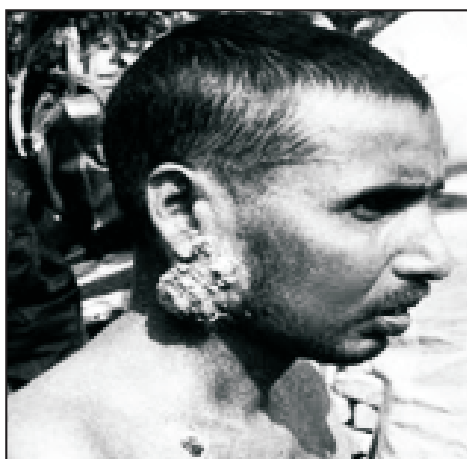
The river Bhagirathi drains across north to south over the block. The arsenic polluted area in the district includes succession of upper Holocene Quaternary sediments where arseniferous tract lies mainly within shallow

**Table 1. Groundwater arsenic situation and sufferings of people in Murshidabad district, Reported work done by SOES.**

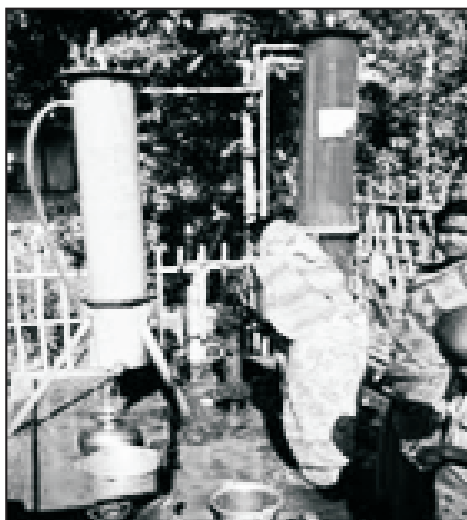
Block	Total samples analysed	Distribution of total samples in different arsenic concentration (mg/L) ranges							% of Samples with As > 10mg/L	% of Samples with As > 50mg/L	Max. conc. mg/L (samples with As > 1000mg/L)	
		≤ 3	4-10	11-50	51-100	101-200	201-300	300-500				501-1000
		Beharampur	1821	797	180	560	180	79				15
Beldanga I	1396	459	86	368	194	126	52	64	45	61.1	34.7	1700 (2)
Beldanga II	1037	529	130	248	78	39	12	1		36.5	12.5	345
Bhagowangola I	1775	592	96	544	170	256	72	33	10	61.2	30.6	1285 (2)
Bhagowangola II	819	137	96	234	134	83	51	57	23	71.6	43.0	1852 (4)
Bharatpur I	616	533	47	34	2	-	-	-	-	5.8	0.3	82
Bharatpur II	625	625	-	-	-	-	-	-	-	-	0	<3
Burwan	702	684	10	6	2	-	-	-	-	1.1	0.3	64
Domkal	3371	729	295	1166	429	392	161	139	58	69.6	35.0	1300 (2)
Farrakka	489	84	33	285	81	6	-	-	-	76.1	17.8	150
Hariharpara	1520	436	123	453	182	117	88	93	27	63.2	33.4	1160 (1)
Jalangi	1917	317	109	516	288	233	129	178	109	77.8	50.9	2040 (38)
Jiaganj	1235	492	205	360	123	49	6	-	-	43.6	14.4	286
Kandi	932	832	64	28	7	1	-	-	-	3.9	0.9	140
Khargram	715	670	22	20	3	-	-	-	-	3.2	0.4	75
Lalgola	1030	180	98	397	174	138	16	14	12	73.0	34.5	1028 (1)
Nabagram	705	656	41	8	-	-	-	-	-	1.1	0	40
Nawda	1208	420	17	516	141	63	18	20	12	63.8	21.1	3003 (1)
Raghunathganj I	515	394	21	34	36	9	9	6	1	19.4	12.8	3003 (5)
Raghunathganj II	1233	266	40	371	355	146	26	23	6	75.2	45.1	875
Raninagar I	778	132	116	253	122	123	24	6	1	68.1	35.6	1018 (1)
Raninagar II	2219	489	261	610	189	253	165	191	54	66.2	38.7	1652 (7)
Sagardighi	707	637	28	25	15	1	-	-	1	5.9	2.4	560
Samsheganj	878	120	69	480	111	77	21	-	-	78.5	23.8	287
Suti I	443	130	9	85	104	67	30	17	1	68.6	49.4	700
Suti II	982	131	48	441	147	108	46	35	19	81.8	36.9	1852 (7)
<b>Total</b>	<b>29668</b>	<b>11471</b>	<b>2244</b>	<b>8042</b>	<b>3267</b>	<b>2366</b>	<b>941</b>	<b>884</b>	<b>382</b>	<b>53.8</b>	<b>26.7</b>	<b>3003 (71)</b>



Fig. a. Black spots on the palm. (Fig. b.- c. ) Symptoms on the feet.



(Fig. d.- f.) Different effects of the Arsenicosis.



(Fig. g.- i.) Different types of filter plants in public and private places used to remove Arsenic from underground water.

where the condition is deteriorating with time.

In the study area, arsenic is the threatening toxicological element found in the hand tube well water. The problem of arsenic is now more serious in the areas of high population density than uninhabited area. It shows that the population pressure to the hand tube wells have led the massive withdrawal of groundwater. Thus, the diurnal fluctuation of water table has a direct influence in the leaching of arsenic to water (Mondal, 2012).

As per a report of SOES, out of total 1821 hand tube-wells analysed in the block, about 46.3% of the hand tube wells have experienced arsenic concentration beyond the WHO drinking water guidelines of about  $> 10\mu\text{g}/\text{L}$  while 15.6% have exceeded the BSI guidelines of about  $>50\mu\text{g}/\text{L}$ . About 635 samples have experienced the arsenic concentration of  $> 1000 \mu\text{g}/\text{L}$  (Max. concentration). It is also found that the arsenic concentration is not uniformly distributed over the study area; only the central part is highly arsenic prone (SOES, 2011) [Table. 1].

Another fact is that this area has been used for Boro paddy cultivation that requires huge ground water for irrigational purposes. It was scientifically proved that trace elements of arsenic could reach human body through food chain. Therefore, elevated arsenic in area of agricultural landscape may also pose threat to the human being (Mehta and Srivastava, 2009).

## CONCLUSION

If greater amounts of arsenic are absorbed, mainly, by drinking groundwater derived from natural deposits contaminated with arsenic, than the body can detoxify and eliminate, the body can develop ill effects of increasing burden of arsenic (Arsenic Health Info, 2007). The severity of the exposure of this hazardous substance depends on the route of the exposure (skin, inhalation and ingestion), how long the exposure lasts, and how high the exposure is?

The major portion of the rural population of the study area is facing the arsenic induced health hazards.

They need to make aware of the causes and preventing measures for this problem. Testing domestic well and hand tube wells for arsenic in the laboratories of the PHED may reduce the risk, by avoid using it. Though not sufficient as per the requirement, but PHED (Berhampore, W. B.) has planted a number of filters (Fig. g- h) on the road sides and also in private places (Fig. i) for providing arsenic free water.

Besides PHED (W.B.), many other organizations, universities and institutions like Directorate of Health Services (W.B.), All India Institute of Hygiene and Public Health (AIHH & PH), School of Environmental studies (SOES), Jadavpur Universities, Institute of Post Graduate Medical Education and Research (IPGMER), different NGOs, State level Arsenic Task Forces, UNICEF etc. are actively participating in the awareness programs and innovating new techniques either modern or conventional to barricade this problem.

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