KALYANI INSTITUTE FOR STUDY, PLANNING & ACTION FOR RURAL CHANGE (KINSPARC)

East Zone Partner of

INDIA WATER PARTNERSHIP (IWP)

Report on IWP- sponsored Project:

"Water, Sanitation and Health in Selected Villages of West Bengal, 2010"

Conducted by KINSPARC

A non-governmental organization for Training, Research and Development, registered under West Bengal Societies Registration Act

● **B-10/114, Kalyani West Bengal – 741235** ● **Phone: 0 9339127701, 0 9831227404**

ACKNOWLEDGEMENT

Water scarcity and its contamination are on the high rise in West Bengal. If these critical issues are not addressed in time, it may lead to severe shortage of water for drinking both for mankind and livestock and serious health hazard.

As Eastern Zonal Partner of India Water Partnership (IWP), Kalyani Institute for Study, Planning & Action for Rural Change (KINSPARC) proposed to take up a field study of these problems in the region in order to design and implement technologies for dealing with the problem. The present report is the outcome of this proposal.

The Global Water Partnership (GWP) based in Sweden and the India Water Partnership (IWP) in New Delhi sponsored the project and provided financial support for conducting it. We are grateful to these distinguished institutions. We are particularly thankful to Professor S.R.Hashim, President, IWP, and Dr. Veena Khanduri, Executive Secretary, IWP, for their valuable comments and suggestions. The Director, Joint Director and scientists in the State Institute of Panchayat and Rural Development of the Government of West Bengal provided valuable infrastructural and library assistance for the project. We are grateful to them. A team of visiting scientists led by Professor Maiko Sakamoto from Nagasaki University, Japan, provided technical support for testing arsenic level in the tube wells in Chandamari village in West Bengal. We benefited immensely from their technical expertise and advanced technology. We express our gratitude to scholars and experts from various Universities, institutes, and Government Departments in the eastern region for their interest and suggestions.

At the village level, we express our thanks to leaders, officials and members of Panchayat at villages Iswaripur and Chandamari for their help and interest in the study. Their involvement is essential for dealing with the critical problems of Water, Sanitation, Health and Livelihood for sustainable rural development.

Water, Sanitation and Health in Selected Villages of West Bengal

I. Executive Summary

The Gangetic river basin in Eastern India receives heavy monsoon rainfall, much higher than the rest of India. Nonetheless, the region suffers from both the problem of year round water availability and quality of drinking water. Due to excessive exploitation, the aquifer level of *Ground water* in the region has been *depleting* alarmingly, Surface water, a minor source of safe drinking water, is highly limited and poorly maintained. Recharge of ground water is not commensurate with withdrawal, and *water quality* has been deteriorating rapidly. *Arsenic contamination* has been detected in large parts of the region. Fluoride contamination is also found in some areas, salinity and prevalence of iron in drinking water is also common. Appropriate technologies must be designed and ways must be found for their sustainable implementation to deal with this problem..

Although water is the most vital need that sustains life on earth, experts argue that the "propensity to give priority to water supply over sanitation, and sanitation over hygiene is one of the key weaknesses behind our failure to improve the level of community health and prevent infectious diseases in the country. Indeed it is improved hygiene, keeping the faecal matters away from hands, food and from water itself which determines health. Neglect of hygiene goes a long way towards explaining why water and sanitation programmes have not often brought the expected benefits. Water alone can go only part of the way in achieving the basic objective of improving health status of the community. Policies for ensuring adequate quantity and safe quality water within easy reach of a household must be an integrated one. Improved sanitation, drainage and hygiene practices at home need to be facilitated through awareness building, attitude changes and better health education.

A major problem of effective management of water and health security is that large proportions of rural people are still *ignorant*, *indifferent* and even *ambivalent* to the dangers of scarcity and pollution of water. Imminent policy and action are needed where stake holders including scientists, policy makers and, above all, society as a whole are involved. *The present IWP-KINSPARC Project, through village experiments, suggests that recognition of a problem must precede search for solutions. A*wareness and attitudinal changes have to be generated among people so that they are induced to identify and adopt technologies and lifestyles that enable them to deal with the problem of an impending disaster.

II. Problems and Objectives

Despite its location in the Gangetic river basin and being recipient of heavy monsoon rainfall, problem of water insecurity is emerging rapidly in eastern Indian states, including in the state of West Bengal. Due to excessive exploitation, the aquifer level of *Ground water* in many areas has been *depleting* alarmingly, Surface water, a minor source of safe drinking water, is highly limited and poorly maintained. Recharge of ground water is not commensurate with withdrawal, and *water quality* has been deteriorating rapidly. *Arsenic contamination* has been detected in large parts of the region. Fluoride contamination is also found in some areas, salinity and prevalence of iron in drinking water is also common.

About the distribution of households by source of drinking water facility, rural West Bengal households depend overwhelmingly on ground water and during the decade 1991 to 2001, dependence on hand pump, tube well and dug well increased from 89 percent to more than 91 percent. Only a negligible population of rural West Bengal use surface (e.g. rivers, canals etc.) water for drinking purposes Added to extraction of ground water for irrigation this situation indicates the potential danger of sinking of ground water table further leading to loss of soil moisture and increase in drought, crop failures and environmental degradation.

Water, of course, is the most vital need that sustains life on earth. However, in the words of an expert, propensity to give priority to water supply over sanitation, and sanitation over hygiene is one of the key factors behind our failure to improve the level of community health and prevent infectious diseases in the country. It is improved hygiene-keeping the faecal matters away from hands and food and from water itself when it is stored in the home, which transforms health. And the neglect of hygiene goes a long way towards explaining why water and sanitation programmes have not often brought the expect benefits. *It is argued that water alone can go only part of the way in achieving the basic objective of improving the health status of the community. Policies for ensuring adequate quantity and safe quality water within easy reach of a household must be an integrated one. Improved sanitation, drainage and hygiene practices at home need to be facilitated through awareness building, attitude changes and better health education. "… Promotion of hygiene behaviour in the domestic setting is possibly the most cost-effective among all preventive public health measures in a developing country".*

A serious aspect of the problems is that large proportions of rural people are still largely *ignorant*, *indifferent* and even *ambivalent* to the dangers of scarcity and pollution of water. Imminent policy and action are needed where stake holders including scientists, policy makers and, above all, society as a whole are involved. Policies for ensuring adequate quantity and safe quality of water within easy reach of a household must be integrated. Improved sanitation, drainage, and hygiene practices at home need to be facilitated through ***awareness building*, *attitude changes* and *better education and training for health development***.

III. Methodology and Outcomes

Awareness Generation through Village Level Meetings and Interactions

Through various studies we have realized that despite being used to living in hard conditions of rural life, characterized by scarcity and poor quality drinking water, as well as poor sanitation, health and livelihood, large numbers of rural people are often resistant to change for different, but improved lifestyles involving technological and attitudinal transformations. For such people, awareness and capacity building is essential for successfully implementing sustainable water resource development in villages. Villagers can then be enabled to make choices and decisions regarding how to solve the problems they encounter in their every day life in the village.

For this purpose two Gram Panchayats of Nadia District in West Bengal were selected and conducted a series of meetings and interactions with villagers there. After comprehensive base-line surveys of a cluster of villages we have identified two villages for in-depth study. These are **"'*Iswaripur*' in 'Sarati" Gram Panchayat,** and "***Chandamari*" in "Kanchrapara" Gram Panchayat.** In both locations, a series of interaction meetings were conducted on problems commonly faced by villagers, namely: Drinking Water, Sanitation, Health, and Livelihood facilities.

Preliminary meetings in the villages were followed by discussions and interactions with ***Village Panchayat*** *officials and functionaries.* Participatory village development models and methodologies were discussed in details and hands on trainings are to be provided so that villagers can work out with the models and solve their basic problems in facilitating improved livelihood. Panchayat members and officials participated in the discussions and gave their opinions and suggestions regarding their most critical needs in the village life. Gradually through these meetings and discussions new realistic village-specific ideas came up. Implementation of these ideas of appropriate intermediate and inclusive technologies could help villagers in meeting the needs for village development In most cases. Panchayat members came forward with ideas and active support in implementing the projects. Apart from dialogues and interactions at the village level, we also held meetings and discussions at higher official levels, with the District Commissioner, concerned Municipal officials and Engineers, and others concerned.

In focused meetings and interactions with the Panchayat Pradhan the project was thoroughly discussed and Panchayat Pradhan's suggestions were examined and incorporated in the project. Main points of discussion were: (a) seeking help to develop basic infrastructure for conducting the programme on continuing basis; (b) seeking participation, involvement and support from village leaders as well as motivating them in organising awareness generation meetings, vocational training programmes for capacity building and entrepreneurship development of villagers; and (c) organising self-help-groups to promote micro finance and micro enterprises for sustainable village development.

Once the foundation of villagers' awareness, information, motivation, and capacity building for sustainable village development can be ensured, regular programmes of village development including problems of water, sanitation, health and livelihood would be conducted for the benefit of people in the neighbourhood. Gradually the ideas would be diffused to wider areas for sustainable rural progress.

Survey of Iswaripur shows that religion-wise, about 78 per cent of population in the village Iswaripur is Hindu and the remaining 22 per cent are Muslim. About 97 per cent of the Hindus belong to SC. 56 per cent of households in the village are landless. Total area cultivated in the village is about 257acre. Rice is the major crop grown and most of land cultivated is under double cropping.

According to the survey, over the past two decades, some villages in the locality have changed in some basic aspects. For instance, literacy rate in Iswaripur has increased to 86 per cent for boys and 100 per cent for girls aged 5 to 14. However, most others are lagging behind, and economic condition of most of these villagers is still poor. About half of the income of village households is earned as hired labour, mostly agricultural labour who work on other land owners' farms. Remaining half comes from self employment, e.g. small traders, rickshaw pullers, vendors, artisans etc. Unemployment rate is high among the young and level of poverty is also high.

III.(a) Village Iswaripur : Base-line survey

Information obtained from the survey in 'Sarati' Gram Panchayat under which the village 'Iswaripur' is located 'are :

Number of Villages in the Panchyat * :	10 (**One of these villages is 'Iswaripur'*)	
Total Area of the Panchyat	:	1500 ha.
Total Population (in Panchayat including Iswaripur)	:	10 thousand
Number of Primary schools (in Panchayat)	:	12
Number of Secondary schools	:	02
Post Office	:	02
Primary Health Centres	:	02
SSK s	:	02
ICDS Centres	:	11
Deep tube well	:	4

Base-line surveys are only preliminary indicators for planning of sustainable rural development programmes. In the next phase of the programme we propose to develop this programme further and construct comprehensive structures for integrated village development. The programme will focus on training and capacity development for critical water-related problems including h*arvesting and conservation of safe pollution- free drinking water, improvement of sanitation and hygiene, development of health and livelihood*

III.(b) Village Chandamari

As part of our programme, we also selected another village, **Chandamari** (Majherpart area), where the only source of drinking water is tube well. However, **ground water in this locality is highly contaminated with arsenic, and people are exposed to the danger of arsenic poisoning.** In order to determine the extent of this problem and to make people aware of the need to avoid using this water we held a series of detailed discussions, interactions, and awareness meetings with villagers and Panchayat leaders. We conducted household surveys and collected micro data on water, sanitation, health, as well as social, economic, and environmental scenario of Chandamari.

As part of the study, with technical support from visiting experts, we also carried out arsenic contamination tests in tube well water in the village.

Chandamari Village Survey: Socio-Economic Characteristics and Water Scenario :

- Chandamari-majherpar has a total **population of about 700 with 136 households.**
- The village has **104 household-owned (medium deep or shallow) Tube wells, and seven public (deep) Tube wells**.
- **Only about 20 per cent of labour force in the village have regular employment earning about the state minimum wage of Rs.100 per day. Rest of the working population is engaged in informal sector (both farm and non-farm) as self-employed, part-time, casual, and contractual labour (e.g., small traders, vendors, rickshaw-drivers, etc.). Their earnings are often less than at the minimum wage rate.**

Water, Sanitation & Health Scenario at Chandamari

***(a)* Ground Water : *Tube wells*::**Most of the households in Chandamari have a Tube well with a total of 104 Tube wells owned by households. Except a few medium deep and only seven deep tube wells in the village, most of the remaining tube wells are shallow. Tests have shown that all *shallow tube wells are Arsenic contaminated* to varying degrees. As advised by the village leaders, for drinking purposes, villagers generally use water from the deep tube wells. Shallow and medium deep tube well water is used for non-drinking purposes, e.g., washing, cleaning, bathing, etc Major problems relating to tube-well water in Chandamari shows that:

(i)There is *too much pressure* of users on the deep tube wells (an average of about hundred persons per tube well (ii) Deep Tube wells being located far from many family homes, fetching drinking water is *strenuous for women who mostly bear the burden; (iii) Due to scarcity of enough water, family members sometimes* take recourse to *using the easily available shallow tube well water, although it is arsenic contaminated.* The main reason for this is lack of awareness regarding the serious consequences of arsenic poisoning.

In Chandamari -Majherpar area under our study, there is a total of 111 tube wells, 104 of which are shallow/ medium deep owned by households plus remaining seven public/ Panchayat-built deep tube wells.

We carried out a programme of testing the water of all these tube wells for Arsenic contamination. Results show that the seven public deep tube wells are arsenic free and the level of arsenic contamination in the remaining 104 private tube wells ranges from less than ten microgram/ liter through 100 micrograms per liter. According to Government of India specification, valid for Eastern India (including our study area: Chandamari-Majherpar) arsenic contamination in water up to 50 micrograms/ liter may be considered safe. Contamination above 50 micrograms/ liter is unsafe.

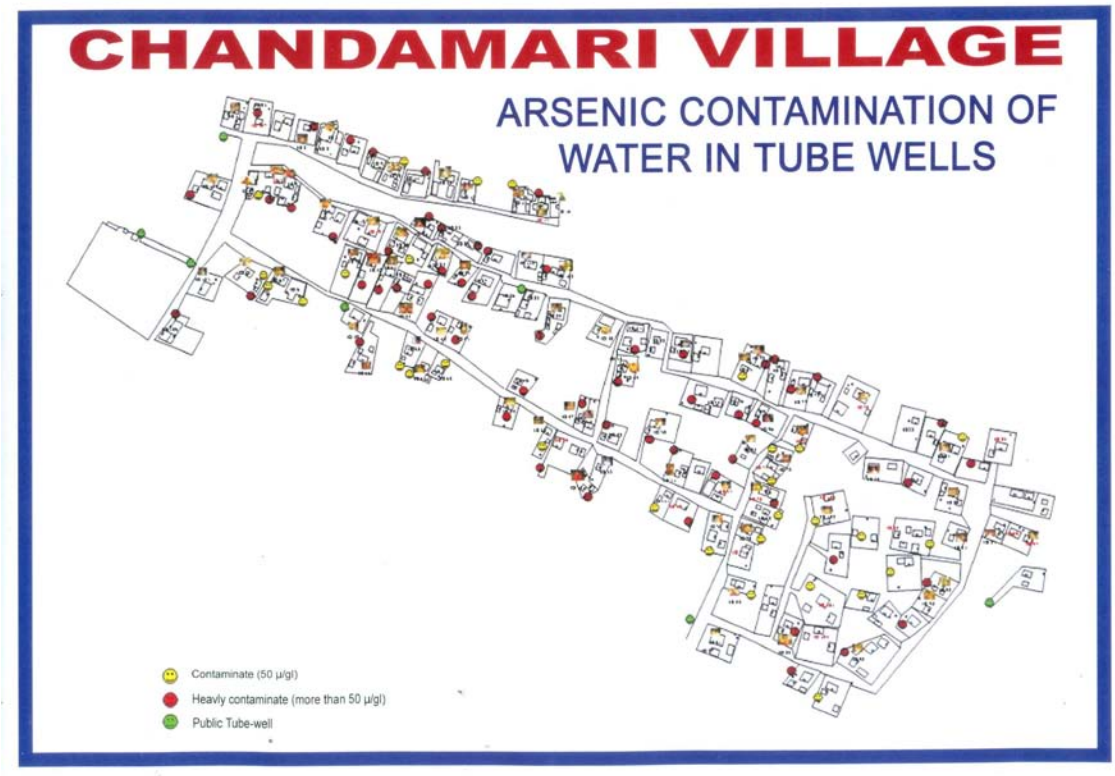
Arsenic level in water is not constant. It varies with level of ground water depending on seasons and climate. In view of such variability, especially in our study area, we have classified the range of arsenic levels in our sample of 104 tube wells into three groups :

(i) "Safe" : Below 50 mili gm/ liter (mmgpl), denoted by yellow colour: 28 tube wells;

(ii) "Moderately Safe/ Unsafe" : around 50 microgram/ liter: also denoted by yellow colour : 52 tube wells.

(iii) "Highly unsafe" : Above 50 mg./ liter, denoted by red colour: 24 tube wells;

In addition, the seven deep public tube wells, denoted by green colour are free from Arsenic. See map below.



As arsenic level in water varies from time to time, for safety we have encouraged the villagers to use only the arsenic free water from the deep tube wells marked green, for drinking purpose.

(b)Surface Water: Ponds Chandamari village is a relatively recent settlement of people consisting mostly of immigrants from Bangladesh. The village in located on highly flood prone and low land area near river Ganges. Small houses are built on somewhat elevated land with the help of soil dug out from within the premises. This leaves small pond-like excavations near each house and thus the entire village is dotted with small ponds, most of which contain small quantity of water used by the household for washing and cleaning purposes.

There are almost 100 such small ponds in Chandamari-Majherpar. Following are the characteristics of the ponds:

Surface Area:
Small (>0.05 acre) :56% :
Medium (<0.05 acre-- >0.08acre): 37%:
Large (<0.08) : 6%
Depth
Shallow (Depth >5ft.): 12%
Medium Depth : (Depth<5ft.>10 ft.): 80%
Deep**:** (Depth: <10): 8%

- As the survey data show, most of the ponds are small and shallow.
- Except the relatively large ones all the ponds go dry for about 3—4 month in the year.
- Most of the ponds are virtually of little use for household purposes. Few of the medium and large ones which can retain water for about 9 months in a year are used for washing clothes, bathing cattle, and even sometime for their own bath.
- Many serve as terminals for drains and remain as pools of dirty water breeding mosquitoes, emitting odour and polluting air. This is a major health hazard for the villagers.

- There is no large water Tanks/Ponds with round-the –year water that can be used for safe household purposes.

(c) Sanitation

Though majority of households in the village have toilets and open defecation is not common, sanitation situation in the village suffers from several weaknesses. First, many of the latrines are simple pit latrines, not the more scientific water sealed latrines. Another problem is that very few of the latrines are regularly cleaned causing accumulation and spill over of polluting excreta and spreading diseases. There is scope for more vigorous awareness generation and motivation for better hygiene and cleaner environment.

(d) Health

The survey, as well as discussions with villagers, suggest that almost a third of the population in the village suffer from some illness, most of these caused by

the warm humid atmosphere aggravated by the little damp ponds with pools of waste water from neighbourhood drains. Most common illnesses in the village are gastro-intestinal (stomach) and respiratory tract diseases like cough, cold, fever, etc.

Focus on Water at Village Chandamari

KINSPARC faculty and staff members have been involved in continuous programmes of meetings, workshops, interactions and surveys in the *village Chandamari.* Objectives of the program are to create awareness and motivation among villagers about the need for harvesting and conservation of clean and safe water, ensuring sanitation and pollution-free neighbourhood, providing guidelines for following basic principles and practices of health and hygiene, etc.

We organised a number of meetings and interactions with villagers and presented to them results of the Arsenic tests and informed them about the prevalence of widespread arsenic contamination in their household tube wells. After we passed on to the villagers this critical information, we explored the reaction of villagers to determine how they would propose to have the problem dealt with.

For this purpose we conducted another ***Rapid Rural Survey*** of households in Chandamari for collection and analysis of data and information from villagers in the light of the fact that they now have the knowledge of Arsenic pollution in their tube well water. Through the survey we sought to identify what problems regarding water the villagers perceived as most critical in their everyday life in the village. We also explored how much importance they would attach to the problems faced and what their perception was about possible solutions.

IV. Experiments, Conclusions and Impacts:

Testing of Tube well water in Chandamari & Discussion of Test Results

In KINSPARC's continuing programme relating to improved *Water, Sanitation, Health and Livelihood* facilities in Chandamari particular mention may be made of the following activities carried out.

A *village-wise workshop-cum-interaction* meeting was organized at Chandamari for awareness generation and behavioural change relating to problems of water, sanitation, health and livelihood. More than one hundred members of the village community including village panchayat members and community leaders attended the July meeting and participated in it with keen interest. It was particularly important to note that most of the participants (more than eighty per cent) were women. The perceptive questions asked and the keen interest shown by the villagers about the problem of arsenic contamination in drinking water showed their anxiety to learn more and to find solutions to the problem. (***Please see attached List of Participants, their names, addresses and contact numbers wherever available. Please also see the map of village Chandamari with locations of each house earmarked with unique ID numbers and also the photographs of individual women representatives of the families residing in those houses.)***

At this meeting, for the first time KINSPARC members disclosed to the leaders and members of the village community about the levels of Arsenic present in most of the household tube wells in Chandamari, by showing the results of tests which KINSPARC had conducted earlier. *A map was presented (copy enclosed) to the villagers displaying arsenic level in each tube well in the village. It enabled everyone to identify the level of Arsenic present and to ascertain the danger in using this water from the tube wells.*

Panchayat leaders took keen interest in offering their help, participating in the projects and mobilising people in implementing the programmes. With our suggestions they have established contacts with government authorities and technologists for the programme. Panchayat and local government authorities have already taken steps to ensure supply of filtered river water to the village through government run 'Water Project'. Panchayat leaders are eager to ensure our suggestions, participation, and technological advice for the programme. We have among our advisors eminent technologists and water experts who can provide guidance. Given resources we can help the programme with needed technological interventions.

Villagers scrutinized the map with great interest and anxiety prompting them to ask many questions. Their responses showed that, up until now, despite some general awareness about the dangers of Arsenic, village people have not been taking the problem very seriously. They often tend to believe that perhaps they could remove Arsenic by boiling water and using it for cooking. They said that when thirsty, and when the Arsenic free deep tube well is far from home, they even drink the contaminated water. *After the presentation of the test results and discussion of its implications with the villagers, many participants became anxious and were eager to know how they could find possible solutions.*

The KINSPARC-Chandamari workshop-cum-interaction meeting, especially with the participation of women who bear the burden of the problem of water for the household, served an important purpose in generating awareness among the otherwise ambivalent villagers many of whom live a dangerous life in regard to the most vital need for safe drinking water.

This awareness is essential for initiating action for sustainable water security, and the IWP-KINSPARC programme achieved this important objective.

(ii) Another significant activity of KINSPARC in village Chandamari was a comprehensive *social survey* of households conducted in respect of their present awareness level and changes in attitude and behaviour patterns regarding Arsenic contamination of drinking water. The survey questionnaire probed villagers' response in the light of their knowledge of the existence of serious arsenic pollution in their tube wells.

To asses the anxiety level of the beneficiaries about Arsenic Pollution in water in Chandamari, the same set of population was interrogated before and after the intervention. The table below shows the result.

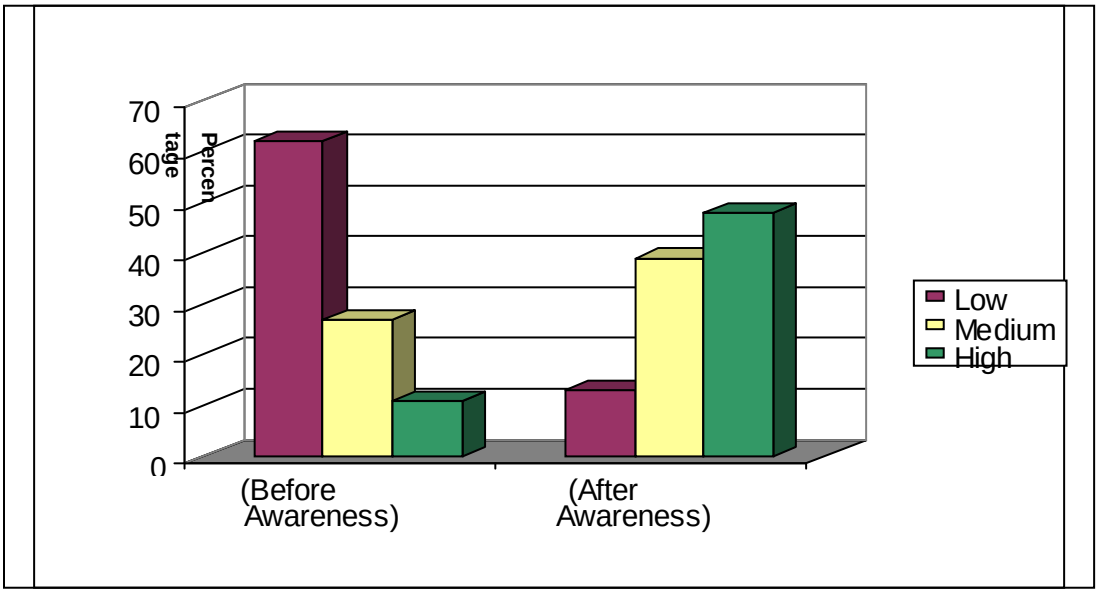
Table :Level of Anxiety of Villagers About Arsenic Pollution in Water in Chandamari

(Per cent of Population in Chandamari)

Year of study	Level of Anxiety about Arsenic Pollution in Water (*Percent of Population in Chandamari*)		
	Low (I don't worry)	*Medium (I worry but not too much)*	High *(I am very much worried)*
(*Before awareness*)	62	27	11
(*After awareness*)	13	39	48

CHART; Anxiety Level of Villagers About Arsenic Pollution in Water in Chandamari

((Per cent of population)



The change in awareness and anxiety of Chandamri villagers before and after acquiring the knowledge of existing arsenic pollution in the tube well water in the village shows that as result of the awareness of villagers, there has been almost a virtual reversal in the villagers' response and reaction. Earlier, majority of the people in the village were either largely ignorant or indifferent to the problem of existence and dangers of Arsenic pollution. In contrast, at present most of them are highly conscious about the problem, and many of them are anxious about finding solutions to it.

It may be inferred from the study that recognition of a problem must precede search for solutions. When concerned people are uninformed and ignorant about potential dangers of a situation they may not be as anxious about the consequent problems, as when they are aware of the problem. Now that they have realised the problem they are actively looking for solutions to the problem.

So awareness and attitudinal changes among people generated by IWP-KINSPARC Programme may be interpreted as a progress towards mitigating the threat of an impending disaster.

V. Future Programmes

Impacts of the programmes and activities for building awareness and capacity for saving, harvesting and cleaning of water resources, improving sanitation, health and livelihood facilities by KINSPARC as partner of IWP suggests that future projects for water security should be designed so as to provide prescriptions for improving village water environment using eco-friendly technologies.

Future programmes should highlight the issues of planning, designing and implementing such projects in participatory and sustainable ways. It would also involve programmes of training about what technologies should be appropriate for adoption, what kind of combination of water options should be installed, and how best can the village human and natural resources be augmented and utilized.

Activities proposed for the next phase of the programme will be worked out through collaborative interactions among IWP, KINSPARC technologists, policy administrators and village leaders.

Kalyani and selected villages in the neighbourhood in West Bengal may be identified as an appropriate forum for this action programme. The ongoing KINSPARC-IWP activities have already laid.

Chandamari Household Survey by KINSPARC Staff

Chandamari Village Pond choked with water Hyacinth & Garbage

Villagers using Pond choked with waste water

KINSPARC Meeting with village leaders : Chandamari

(Lady in the back is Panchayat Chair)

KINSPARC Meeting with village leaders : Chandamari

KINSPARC-Chandamari Workshop-Interaction Meeting

Village Women Listening with Keen interest

Villagers Participating in Discussion