A Note on Arsenic mitigation & technology dissemination in Assam

Arsenic in ground water is becoming an emerging issue in the water supply and health sectors of our Country. Rural areas in East and North Eastern States are dependent on ground water for drinking water consumption. The ground water from handpumps, shallow tube wells and ring wells contain arsenic at concentrations higher than the safe limit set for drinking purpose by WHO 1993. Arsenic contamination in the ground and surface water occurs in West Bengal and in the North Eastern states of Assam, Tripura, Nagaland, Manipur, and Arunachal Pradesh. In India after West Bengal and the bordering districts of Bangladesh, arsenic in groundwater was detected in part of Assam, Arunachal Pradesh, Manipur, Nagaland and Tripura. *(Arsenic Contamination in Groundwater of North Eastern India by A.K. Singh, Associate Professor and Adviser (Soil & Water Testing Lab & Microbiology Lab) North Eastern Regional Institute of Water and Land Management)*

It may be noted that concentration of arsenic in groundwater exceeds the permissible level (50 mg/l based on water consumption of 2 litre per day, WHO) in parts of Assam (20 districts out of 24 districts tested) Tripura (3 districts out of 4 districts), Arunachal Pradesh (6 districts out of 13 districts), Nagaland (2 districts out of 8 districts) and Manipur (1 district out of 9 districts). The IGSSS is already doing a project in Assam (North Lakhimpur) to reduce the arsenic content and to monitor the potable quality of water.

IGSSS initiative in Mitigation of arsenic and other contaminants:

To address the arsenic and iron contamination IGSSS has taken initiatives such as advocating and provision of technical support of low cost affordable household level arsenic filter "Kanchan^{TM} Arsenic Filter (KAF)" and community capacity building on Water Quality Monitoring and Management through a field unit at Lakhimpur, Assam. IGSSS's DRR team is trained and certified by Environment and Public Health organization (ENPHO) Nepal on promotion and construction of KAF. The technology used by IGSSS is developed by researchers at Massachusetts Institute of Technology (MIT), Environment and Public Health Organization (ENPHO) of Nepal, and Rural Water Supply and Sanitation Support Programme (RWSSSP) of Nepal, based on slow sand filtration and iron hydroxide adsorption principles.

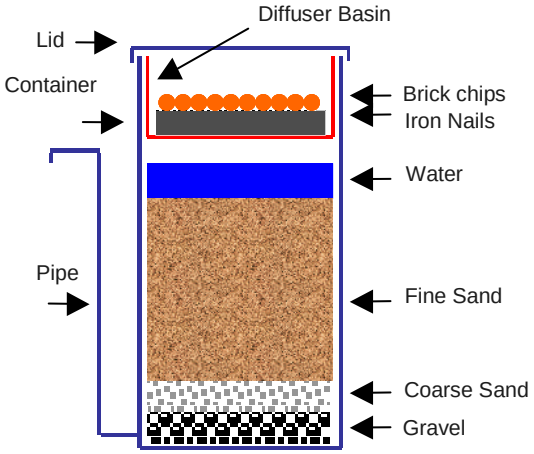
IGSSS currently has a full team equipped with the water quality technology based at its field unit at Lakhimpur, Assam. With the timely support of Welthungerhilfe (WHH) the follow up of ECHO Flood Rehabilitation project in Assam, IGSSS is promoting and demonstration KAF and Bio-sand filter in 60 villages of Lakhimpur and Dhemaji district of Assam. This technology has been appreciated by targeted users, local administration, Public Health and Engineering Department (PHED) and also by NGOs and INGOs such as Catholic Relief Services/NE Office, DanChurchAid South Asia office, Oxfam India etc.

Catholic Relief Services (CRS) currently is exploring replication and transfer of technology with us for their DRR project in Assam, while few local NGOs have been trained by the team. DanChurchAid South Asia office has supported IGSSS for similar programme in other new 25 villages of IGSSS operational area in Dhakuakhana, Assam.

Awareness cum demonstration of the KAF has been given to Public Health and Engineering Department (PHED) and Panchyat member of two districts of Lakhimpur and Dhemaji. Technology is appreciated by the PHED they expressed however there is no effort taken up by government for filtering arsenic contaminated water in Assam.

Effectiveness of Kancharn Arsenic filters:

The Kanchan Arsenic Filter (KAF) is an innovative household level filter for removing arsenic, pathogens, iron, turbidity and odor from drinking water. KAF was developed jointly by Massachusetts Institute of Technology (MIT), Environment and Public Health Organization (ENPHO) and Rural Water Supply and Sanitation Support Programme (RWSSSP), based on slow sand filtration and iron hydroxide adsorption principles.



Effectiveness of Kanchan Arsenic ENPHO, Nepal

BSF/KAF: Source filter Booklet by

Parameters	Typical Range
Arsenic Removal	85% to 95%
Iron Removal	93% to 95+%
Coliform Removal	60% to 100%
Turbidity Removal	80% to 95+%
Flow Rate	15 to 20 L/hour
Iron Nails Media Life	At least 3 years

Cost effectiveness of the technology: IGSSS have trained volunteers in project area for construction of KAF and Bio-sand filter they are constructing filter in the target villages. Through our experience it is realized that the KAF filter is highly cost effective costing around Rs.1,200.00 per unit that give 20 ltrs drinking water per hour for household use. The technology is simple that KAF and Bio-sand filter can be constructed by local mason with proper training and monitoring.

Conclusion: The recent report in local news paper The Assam Tribune dated 25th January 2011 reported "A joint survey conducted by the State Public Health Engineering Department (PHED), UNICEF and the IIT, Guwahati has found that 7,22,603 people of 1, 970 habitations in 73 development blocks of 18 districts of the State are at risk of arsenic poisoning. Assessment of

ground water quality in three development blocks in Dhemaji district in this respect is yet to be completed"

Understanding the situation of arsenic contamination in Assam there is urgent requirement to create awareness among the vulnerable community on the adverse impact of consuming arsenic contaminated water. IGSSS continues to advocate and promote mitigation measure for arsenic contaminated water through Arsenic filter (KAF) that is cost effective and simple technology that can be constructed by local masons. This technology can be transferred to all arsenic affected districts where community are exposed and consuming Arsenic contaminated water in the State. Advocacy with the government and to civil society organizations through the Inter-Agency Group Assam (IAG) for use of technology is also taken up as a result the popularity is gaining momentum and we are able to reach out to larger group of vulnerable community.

Disaster Risk Reduction
Indo Global Social Service Society
www.igsss.org

SERVICES AVAILABLE FOR VILLAGERS, PRI, CBOs AND NGOs/AID AGENCIES :

- ☞ Training on construction and promotion of Bio sand filter and kanchan™ Arsenic filter
- ☞ Water quality testing & monitoring for handpumps, ringwells and also during emergency response

Water Quality Monitoring & Management/DRR Unit
Team Leader - Mr. Netaji Basumatary
Milan Nagar, Ward No. 10, Lakhimpur,
N. Lakhimpur District, PIN - 787001, Assam
lakhimpur@igsss.net, netaji@igsss.net , Tel: 09435406347

North East Regional Office:
5th Bye Lane, Rajgarh Road, Guwahati-781003, Assam,
Ph: 0361-2457707 / 2458087, Fax: 0361-2458087,
E-mails: nero@igsss.net, guwhati@igsss.net

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Head Office
Indo-Global Social Service Society
28, Institutional Area, Lodi Road, New Delhi - 110 003 Email:
ed@igsss.net :: www.igsss.org

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WATER QUALITY MONITORING & MANAGEMENT
(Disaster Risk Reduction Unit)

IGSSS as part of DRR programme is continuously carrying out water quality monitoring at North Lakhimpur and Dhemaji district. The sample water test result of 20 water points (15 hand pumps and 5 ring wells) is alarming as all of them contain arsenic and out of 15 hand pumps 6 have been detected beyond permissible limit (0.05 mg/L).

To address the issue IGSSS has recently launched Technical support on Construction of Kanchan™ Arsenic Filter (KAF) and Water Quality Monitoring and Management unit at Lakhimpur, Assam under its Disaster Risk Reduction Programme equipped with water quality monitoring tools.

The initiative is supported by a Technology Transfer on promotion and construction of KAF from the Environment and Public Health organization (ENPHO) Nepal and water quality monitoring technology received from TARA (Development Alternative) New Delhi.

With the launch of this facility funded by Werlthungerhilfe (WHH), IGSSS plans to ensure access to quality water for households exposed to multiple contaminants including arsenic.

IGSSS initiative to mitigate arsenic and other contaminants :

IGSSS is promoting a cost-effective localized household bio-sand filter has efficiency to filter pathogens and arsenic. The team has successfully tried out on local version of the KAF model with encouraging results. Our driving force is to reduce the cost without compromising mitigation effectiveness and make it affordable for every needy household by localizing the production in Assam.

What is Arsenic?

Arsenic is king of poison and has no colour, odour/smelt and easily water soluble. Long exposure to arsenic through drinking water and/or food can results in adverse health effects.

Kanchan™ Arsenic filter (KAF):

The KAF is innovated from slow sand filtration and iron hydroxide adsorption principle for household drinking water treatment device for removing arsenic, pathogens, iron, turbidity, odour and some other contaminants in drinking water. Iron rust (ferric hydroxide) is an excellent adsorbent for arsenic. In KAF model iron is use to remove the arsenic. Other pathogen are removed by 1.Trapping, 2. Predation, 3.Adsorption/attraction, 4.Natural death

Effectiveness of KAF:

Parameters	Typical Range
Arsenic Removal	85% to 95%
Iron Removal	93% to 95+%
Coliform Removal	60% to 100%
Turbidity Removal	80% to 95+%
Flow Rate	15 to 20 L/hour
Iron Nails Media Life	At least 3 years

WATER QUALITY MONITORING:

IGSSS team is equipped and trained in the use of Jal-TARA, that is cost effective, portable, compact and easy to operate water testing kit developed by Development Alternatives. The kit can be used to perform basic tests to ensure water portability.

Features of Jal-TARA water testing kit:

The kit can test **14 essential parameters** for drinking water and river water quality. **Physical** - pH, Temperature, Turbidity, Chemical- Fluoride, Chloride, Residual Chlorine, Hardness, Iron, Phosphate, Ammonia, Nitrate, Dissolved Oxygen, **Biological** - Coliform Bacteria, Benthic Diversity