



## Environment

### Water & Environmental Sanitation Network (WES-Net India)



## Solution Exchange for WES-Net India Consolidated Reply

*Query: Community - Based Water Quality Monitoring & Surveillance, from UNICEF, Kolkata (Experiences).*

Compiled by Pankaj Kumar S., Resource Person; additional research provided by Ramya Gopalan, Research Associate  
12 October 2006

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### Original Query: Ross Nickson, UNICEF, Kolkata

Posted: 15 September 2006

I am working with UNICEF in West Bengal, where the National Rural Drinking Water Quality Monitoring and Surveillance Programme (recently launched by the Government of India), is being implemented.

The programme is designed to institutionalize surveillance systems to monitor drinking water quality. For this purpose, the programme envisages involving ASHAs (village level health workers from the National Rural Health Mission), Anganwadi workers, science teachers, health personnel and other grassroots level workers to collect and test water samples.

In this context, I would request members to share their experiences/learnings (i.e. case studies, projects, documents) on the following:

1. Experiences from other states/projects where sanitary surveillance or implementation of a simple water quality monitoring system has resulted in community-based action to improve drinking water quality (e.g. by protecting a spring, refurbishing a hand pump platform etc.).
2. Qualitative and quantitative outcomes that resulted from such programmes.
3. Learnings of members in designing and scaling up community surveillance and testing programmes.

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### Responses received with thanks from:

1. [R. K. Sood](#), Centre for Health Promotion, Palampur, Himachal Pradesh
2. [Dony Phillip](#), Socio-Economic Unit Foundation (SEUF), Kerala
3. [Ridhima Sud](#), Development Alternatives, New Delhi
4. [Ajit Seshadri](#), The Vigyan Vijay Foundation, New Delhi
5. [P. Anbazhagan](#), TWAD Board, Chennai
6. [Devjani Patra](#), National Hydroelectric Power Corporation Ltd., Faridabad

7. [Arunabha Majumder](#), AIHPH and Jadavpur University, Kolkata
8. R. Srikanth, WaterAid India, New Delhi ([Response 1](#); [Response 2](#))
9. [Nupur Bose](#), A.N.College, Patna
10. [Julie Thekkudan](#), PRIA, New Delhi
11. [S. Damodaran](#), WaterPartners International India Liaison Office, Tiruchirappalli
12. [Viren Lobo](#), Society for Promotion of Wastelands Development (SPWD), Udaipur
13. [Kalyan Paul](#), Pan Himalayan Grassroots Development Foundation, Ranikhet
14. [B. L. Kaul](#), Society for Popularization of Science, Jammu
15. [Jyotsna Bapat](#), Independent Consultant, New Delhi
16. [S. Ramesh Sakthivel](#), WES-Net India c/o Plan International, New Delhi
17. [Ayan Biswas](#), People's Science Institute, Dehradun
18. [V. Kurian Baby](#), Socio-Economic Unit Foundation (SEUF), Kerala

*Further contributions are welcome!*

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## Summary of Responses

Does community-based water quality monitoring (WQM) lead to community action on improving drinking water quality? Members discussed this question in response to a query and presented examples and learnings from a number of initiatives in WQM from across the country. They pointed that the **need for community-based WQM** arose since the testing undertaken by government agencies was unreliable and plagued with problems like inadequate water sample collection, irregular supply of reagents, and untrained staff. In this context, community-based WQM could ensure reliable and usable data on water quality and could increase the sense of ownership and alertness of village people about water quality issues.

Referring to a number of **successful examples of WQM** from across the country where communities were trained to carry out basic water quality tests, respondents effectively dispelled the common perception that WQM was too technical for communities to take up. In [Kerala](#), an ongoing project has set up systems for regular collection and testing of water samples, ensuring adequate supply of reagents, and creating awareness on water quality among water users. The model comprises training "Water Quality Surveillance Groups" to collect and test water samples on a monthly basis. The project also links with a centralized lab for advanced tests once in a quarter, presenting the analysed data in a monthly multi-stakeholder meeting. In this context, members mentioned another successful experiment in [West Bengal](#) where Anganwadi workers were trained to use field testing kits for WQM.

Respondents also listed **mechanisms for embedding WQM** within society. In the Kerala project, communities tested water samples on a monthly basis, while those in the West Bengal project tested samples on a quarterly basis. Additionally, the Kerala project has institutionalised WQM under the Block Panchayats, which pay for testing samples from public sources while user groups pay for testing samples from private sources. The West Bengal project sensitised and awarded communities for WQM, along with ensuring proper documentation, data analysis, reporting and implementing remedial measures. Here, a nominal charge per family covered the testing costs and refilling of the reagents. In states with inaccessible habitations such as **Uttaranchal**, members suggested creating a focal point for water quality testing between groups of villages. Also, in [Himachal](#) an NGO mobilised local communities to pressurise the Government to replace old and rusted galvanised iron (GI) pipes to improve water quality.

The group also outlined the basic physical (e.g. turbidity and temperature), chemical (e.g. pH, iron, fluoride, chloride, residual chlorine, nitrate, and hardness) and bacteriological **tests needed to ascertain water quality**. Touching briefly upon contamination, members cautioned that while calculating intake of flouride, care needs to be taken to include flouride intake through vegetables in addition to that through contaminated water. Additionally, members mentioned revisiting established norms about arsenic contamination, to make them more relevant to Indian conditions. They added that regular field level tests need to concentrate on certain prioritised factors such as fecal coliform, nitrate, arsenic, iron, turbidity, etc. rather than detailed testing for all parameters.

The various types of [field testing kits](#) for water quality testing was another issue discussed. While agreeing that on selected parameters, field test kits demonstrate performance quite close to advanced techniques, members stressed that in some cases, a linkage of field testing with a centralised and advanced lab could be beneficial. In using field kits, a major problem respondents reported was the lack of easy availability of reagents for the tests. **Organizations supplying water-testing kits** mentioned were [People's Science Institute](#), [Development Alternatives](#), [Tamil Nadu Water Supply and Drainage Board](#), [Central Pollution Control Board](#), [Hach](#) and [UNICEF](#).

Respondents underlined the crucial role of **training** of personnel for collection and testing of water samples in this regard. They warned that the process of testing of water quality could lead to raising an unnecessary alarm within the community if initial tests turned out to be negative. Thus, dissemination of test results needs to be done with much circumspection and public concern need to be invoked only when contaminations could lead to serious ill-effects (as with arsenic and flouride). The testing agency also needs to follow up the tests with a commitment to take suitable steps to correct the source/s of contamination.

Among **corrective measures** for poor water quality, respondents suggested point of use chlorination, replacing GI pipes with High Density Poly Ethylene pipes, getting communities to invest in water seal toilets, ensuring diets free from flouride and rich in calcium, and ascertaining easier availability of field water testing kits.

The discussions revealed that empowering communities to take up water quality surveillance and monitoring has technical and institutional problems, but is a step in the right direction. Members agreed that community ownership over the process of tracking water quality could be the beginning of long term water governance by and for communities. However, they felt that increasing the stake of local governance institutions, training key personnel, incorporating revenue models and integrating local level testing with centralized testing systems were needed to ensure sustainability of community-based WQM.

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## Comparative Experiences

### Kerala

#### **Community Managed WQS, Alappuzha District** (from [Dony Phillip](#), *Socio-Economic Unit Foundation (SEUF), Kerala*)

Under Jeevadhara program, SEUF introduced the "Community Managed WQS". Women's groups called WQS Group (WQSG) are responsible for management and operation of the WQS system. For each block there is one WQSG trained in sample collection and analysis. Each WQSG receives one water analysis kit after training. Data on health aspects is also collected. User groups & private owners pay for their WQA while Block Panchayat pay for WQA of public resources.

### **Drinking Water Contamination Across the State** (from [V. Kurian Baby](#), *Socio – Economic Unit Foundation (SEUF), Kerala*)

An SEUF study revealed that drinking water sources of domestic wells, community/PRI supplies & KWA sources are contaminated at varying levels. Towards this under Jananidhi program, institutionalizing Community Based WQSM (CWQSM) through IEC/demand generation, supply of testing kits, chloroscopes for testing residual chlorine & trainings in WQS was promoted. This however yielded limited results, due to failure in marketing the concept via demand generation.

### **Bihar**

#### **Use of Field Test Kits** (from [Nupur Bose](#), *A.N.College, Patna*)

In a UNICEF sponsored project, NCL, Pune developed field test kits (FTKs) to determine arsenic contamination in groundwater. The results sent to Sriram Institute of Industrial Research, New Delhi, for retesting found positive correlation (>0.6) between Atomic Absorption Spectrometer (AAS) & FTK test results, implying that FTKs can be used for rapid, repetitive water quality monitoring procedure. It is cost-effective but requires trained lab technicians to conduct tests.

### **West Bengal**

#### **Community Based Management System using Anganwadi Workers, Medinipur District** (from [Arunabha Majumder](#), *AIHPH and Jadavpur University, Kolkata*)

AIHPH initiated the WQS program through community based management system associated with Anganwadi workers. Water testing field kits for chemical & bacteriological analysis were developed. This includes periodic water sample collection & testing, remedial measures, documentation, data analysis etc. Villagers contribute Rs. 1 per family per month. Training users & following guidelines ensures reliability of testing kit to the extent of semi- quantitative analysis

### **Himachal Pradesh**

#### **Signature Campaign to End Contamination** (from [Julie Thekkudan](#), *PRIA, New Delhi*)

NISHTHA, Rural Health, Education and Environment Centre in Rakkar work in the Kangra valley where they found a high incidence of diarrhoea. This led to a signature campaign of the villagers after which government officials tested the water and found that the water was contaminated. NISHTHA also conducted independent tests with matching results. Rusted pipes were found to be the cause for the contamination of the water, which were subsequently changed.

From [Ramya Gopalan](#), *Research Associate*

### **Gujarat**

#### **Community Rainwater Harvesting to Fight Fluoride, Patan District**

Balisan village under the acute grip of fluoride contamination amidst drought ventured a community drive along with UTTHAN to solve the crises. The villagers started to desilt a 3.05m long canal through which they diverted rainwater to a 300-year-old tank. Adjacent to the tank, is a 45m deep recharge well that was fitted with an ultra-poly vinyl chloride, & carries water to the recharge well.

### **International**

#### **Bangladesh**

#### **Community Participation in Safe Water Options**

Sustainable community-based safe water options are operating in two 'upazilas' involving 531 villages with a population of 497,488. Testing of tubewells (51,685) for arsenic was carried out on a census basis by trained village health workers (VHWs) using the Merck field testing kit and further verified both in field and laboratory. Moreover, community involvement while implementing safe water options ensured local participation and knowledge.

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## Related Resources

### *Recommended Organizations*

**Socio-Economic Unit Foundation (SEUF), Kerala** (from [Dony Phillip](#), and [V. Kurian Baby](#))

T.C. 16/309, Easwaravilasom Road, Post Bag 507, Thycaud P.O. Trivandrum 695014; Tel: 91-471-2325907, 91-47-2338434; Fax: 91-471-2325914. [seuf@sify.com](mailto:seuf@sify.com)

<http://www.seuf.org/html/jeevadharaoff.html>

*Recommended as the organization is in the process of developing its own water quality testing kit at its regional office in Alappuzha under the Jeevadhara Program*

**Development Alternatives, New Delhi** (from [Ridhima Sud](#) and [Ajit Seshadri](#), *The Vigyan Vijay Foundation, New Delhi*)

B-32, Tara Crescent, Qutab Institutional Area, New Delhi 110016; Tel: 91-11-685-1158, 696-7938; Fax: 91-11-686-6031; [tara@sdalt.ernet.in](mailto:tara@sdalt.ernet.in)

<http://www.devalt.org/active.htm#Environment%20Monitoring%20Facilities>

*Developed a Jal – TARA water testing kit, portable and user friendly, it can test 14 parameters of drinking water quality and specifically for fluoride & arsenic contaminants*

**TWAD Board, Chennai** (from [P. Anbazhagan](#))

Head Office, Managing Director, TWAD Board, 31, Kamaraj Salai, Chepauk, Chennai 600005; Tel: 91 - 44 28416420, 91 – 44 – 28412341; Fax: 91-44- 28548623. [twadboard@dataone.in](mailto:twadboard@dataone.in)

[http://www.twadboard.com/main\\_public\\_quality.html](http://www.twadboard.com/main_public_quality.html)

*For developing user friendly water quality testing kits that are safe for children to handle, with instantaneous and accurate results*

**People's Science Institute, Dehradun** (from [Devjani Patra](#), *National Hydroelectric Power Corporation Ltd., Faridabad* and [Ayan Biswas](#))

252 Vasant Vihar-I, Dehra Dun 248 006; Tel: 91 – 135 – 2763649, 2773849

*Recommended for water testing kits and for successfully training the community on different aspects of water quality monitoring around the country*

**Central Pollution Control Board, New Delhi** (from [Devjani Patra](#), *National Hydroelectric Power Corporation Ltd., Faridabad*)

Parivesh Bhawan, CBD-cum-Office Complex, East Arjun Nagar, New Delhi 110032; Tel: 91-11-22305792, 23303717. [cpcb@nic.in](mailto:cpcb@nic.in)

<http://www.cpcb.nic.in/water.htm>

*Recommended for water quality test kits and nationwide network of water quality monitoring comprising 1019 stations in 27 States and 6 Union Territories*

**UNICEF, Hyderabad** (from [S. Ramesh Sakthivel](#), *WES-Net India c/o Plan International, New Delhi*)

United Nations Children's Fund, "Gulmarg", D. No. 865, Street No. 19, Himayathnagar, Hyderabad 500029, Andhra Pradesh; Tel: 91-40-2332.5832, 2332.5864; Fax: 91-40-2322.7207;

[hyderabad@unicef.org](mailto:hyderabad@unicef.org)

<http://www.unicef.org/india/wes.html>

*Recommended for their projects focused on Water Quality Monitoring and the development of field test kits in this context*

From R. Srikanth, WaterAid India, New Delhi ([response 1](#))

#### **Hach, U.S.A**

Click [here](#) to view link

*Recommended as an organization that manufactures water quality test kits*

#### **WaterAid India**

25, Navjivan Vihar, Malviya Nagar, New Delhi 110017; Tel: 91-11-26682206, 91-11-26693724;  
Fax: 91-11-26691468

Click [here](#) to view link

*Is involved in 9 states in building the capacity of community in water quality monitoring through its NGO partners*

### **Recommended Documentation**

From [Ramya Gopalan](#), Research Associate

#### **Balisana Village: Story of Fluoride Contamination and Solution**

<http://www.rainwaterharvesting.org/Rural/Balisana1.htm>

*Provides an account of a community drive to resolve the fluoride pollution experienced by the district amidst drought.*

#### **Bringing Safe Drinking Water to Rural India**

[http://www.ionindia.com/pdf/rural\\_indiasafewater.pdf](http://www.ionindia.com/pdf/rural_indiasafewater.pdf) (Size: 326 KB)

*Provides a brief on the partnership approach for sustainability of solutions, demonstrated in projects undertaken in Raigad and Yavatmal districts of rural Maharashtra.*

#### **Sustainable community-based safe water options to mitigate the Bangladesh arsenic catastrophe – An experience from two upazilas**

Md. Jakariya *et al.*

<http://www.ias.ac.in/currensci/jul252003/141.pdf> (Size: 39 KB)

*Details the sustainable community based safe water options project which combines close integration with the community at all stages and appropriate technical solutions.*

### **Recommended Contacts**

From [Ridhima Sud](#) Development Alternatives, New Delhi and [Ajit Seshadri](#), The Vigyan Vijay Foundation, New Delhi

#### **Usha Srinivasan**

[usrinivasan@devalt.org](mailto:usrinivasan@devalt.org)

Development Alternatives, B-32, Tara Crescent, Qutab Institutional Area, New Delhi – 110016;  
Tel: 91-11-685-1158, 696-7938; Fax: 91-11-686-6031

*For details/procurement on the test kits developed by Development Alternatives for water testing*

and

#### **Ridhima Sud**

[rsud@devalt.org](mailto:rsud@devalt.org)

**Prof. (Dr) A.K. Susheela** (from [S.Ramesh Sakhivel](#), WES-Net India c/o Plan International, New Delhi)

Fluorosis Research & Rural Development Foundation, New Delhi

<http://education.vsnl.com/fluorosis/>

*For details on fluoride intake - the principle of "Lesser is the Better" & resulting consequences in case of accumulation*

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## Responses in Full

**R.K. Sood, Centre for Health Promotion, Palampur, Himachal Pradesh**

I strongly feel that community level testing of water quality can be an empowering measure to drive rural people into action towards improving their health through source protection, reduction of pollution and monitoring of chlorination of water sources. Our experience in Himachal Pradesh shows that independent monitoring is necessary as Irrigation and Public Health Department labs certify samples to be safe even during epidemics of waterborne diseases, which is unbelievable.

Also, kits have been developed for water quality testing by various agencies, but we have not been able to procure them. Using simple tools like these kits and a microscope, we feel that a people's campaign for right to safe water can be initiated.

(If anybody can supply us these kits, or give reference for obtaining these tools, we will be very happy)

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**Dony Phillip, Socio-Economic Unit Foundation (SEUF), Kerala**

I am Dony Philip, working with Socio Economic Unit Foundation (SEUF), Kerala. SEUF is a professional organisation working with communities to promote sustainable socioeconomic development with focus on water, environmental sanitation and empowerment of deprived groups – especially women - and with concern for the environment.

Various initiatives in Water Quality Surveillance (WQS) by multilateral and state level agencies in the past have failed because of various reasons. The government run district level labs fail because of absence of water sample collection facilities, inadequate supply of reagents, inadequate operating staff, etc. Yet another important reason for failure of WQS is lack of seriousness by consumers until they fall sick or until the water becomes totally unpalatable due to source pollution.

From its two decades experience in water and sanitation, SEUF has realised that WQS is an important activity that ensures sustainability of sources, environmental stability and health of the community. SEUF is experimenting with regular community managed WQS under a major community managed water and sanitation programme called Jeevadhara in fifteen panchayats of Idukki and Alappuzha districts of the state. The programme is attempting integration of water resource management and WQS.

In Idukki District, since water quality is not as critical as in Alappuzha, existing systems of Public Health department are being used by the User Groups and Gram Panchayat. However, in Alappuzha District, an innovative method called "Community Managed WQS" has been introduced. The responsibility of management and operation of the WQS system has been entrusted to women's groups called Water Quality Surveillance Group (WQSG) as a self-employment programme. In fact, the WQSG is a sub group of Programme Support Group (PSG), an institutional arm of Jeevadhara Programme comprising of local community members. It is operating as follows:

- For every Block (300 – 500 Sources), there is one WQSG consisting of one trained Lab technician, and two sample collectors. The WQSG were trained by SEUF with the help of All India Institute of Hygiene and Public Health in simple techniques of collection and analysis of water sample using the Water Sample Analysis Kit promoted by UNICEF.
- After successful completion of the training, one Water Sample Analysis kit is given to each WQSG along with reagents and accessories necessary for one year.
- Subsequently, the sample collectors collect and analyze water samples from all predetermined sources (All public sources in use, all private sources on payment for analysis of their samples) once in every month. In addition to Bacterial Quality, the Kit can analyze all-important chemical parameters as well.
- While User groups and private owners pay the charges to the WQA for their respective sources, the Block Panchayat pays for checking water quality of public sources such as ponds, public wells and other public sources against production of reports countersigned by the users of these sources.
- In addition to WQ analysis, the WQSG also collect data on health aspects on a predetermined format from the users of the sampled water sources in order to correlate any health hazards with the change in water quality.

This compiled data is presented in a meeting convened once in a month or on the outbreak of an epidemic, whichever is earlier. The meeting is attended by the User Committee, WQSG, Gram Panchayat, health department, Kerala Water Authority and Water Quality lab at Alappuzha.

However, a centralized well-equipped laboratory is needed for the detailed analysis of water samples from various Panchayats since the existing laboratory facility in SEUF regional office at Alappuzha is not adequately equipped and needs upgradation. Therefore, once in three months the WQSG take 10% of the samples to a central lab and get analyzed.

SEUF is now in the process of developing its own water quality testing kit at its regional office in Alappuzha. Parameters that can be tested by this field kit are - Physical Qualities such as Turbidity & Temperature, Chemical Qualities such as pH, Iron, Fluoride, Chloride, Residual Chlorine, Nitrate, Hardness and Bacteriological Quality - Presence of undesirable bacteria. Further details on the water quality testing kit can be availed from [seuf@sify.com](mailto:seuf@sify.com).

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**[Ridhima Sud](#), Development Alternatives, New Delhi**

I am working with an organization called Development Alternatives. One of the key areas of our work is addressing the water and sanitation issues. We have developed a Jal -TARA water testing kit, which is a portable kit to test for 14 parameters of drinking water quality. We also have customized kits for fluoride and arsenic. These kits are easy to use and come with a user-friendly manual.

If you are interested in procuring the same, please contact me at [rsud@devalt.org](mailto:rsud@devalt.org).

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**[Ajit Seshadri](#), The Vigyan Vijay Foundation, New Delhi**

It is very pleasant to note that you are working in communities on drinking water issues etc. There is a lead NGO Development Alternatives at New Delhi who have easy test kits for water testing. Please contact Ms. Usha Srinivasan, Environmental Consultant ([usrinivasan@devalt.org](mailto:usrinivasan@devalt.org)) or Ms. Ridhima Sud ([rsud@devalt.org](mailto:rsud@devalt.org)) for more details on the test kit etc.



Please be in touch for any remediation of raw water problems. Our NGO has done more a large number of projects on environment and on watershed, rainwater harvesting, wastewater recycling for reuse, bio-waste composting, bio-gas plants and with environmental education and awareness to the communities and schools etc.

Please be in touch.

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**P. Anbazhagan, TWAD Board, Chennai**

TWAD Board, Chennai, Tamil Nadu has developed a user-friendly water quality testing kit. The advantage is very safe for children to handle and that you do not need to heat or wait for the results. All are instantaneous and more accurate.

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**Devjani Patra, National Hydroelectric Power Corporation Ltd., Faridabad**

For Water testing Kits, you can contact the following:

- a. Peoples Science Institute, 252/1, Vasant Vihar, Dehradun-248006. Ph: 0135-2763649, 2773849.
  - b. Central Pollution Control Board, New Delhi. Contact: Dr Pratima Akolkar.
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**Arunabha Majumder, AIIHPH and Jadavpur University, Kolkata**

We (AIIHPH) initiated the water quality monitoring and surveillance program in Medinipur District of West Bengal during 1993 and 1996 through community based management system. Anganwadi workers were associated with the program. Water testing field kits for chemical and bacteriological analysis were developed. The program included periodic water sample collection and testing (each source 4 times per year), sanitary survey of all water sources, tube wells, dug wells, etc, remedial measures, documentation, data analysis, and reporting.

Use of the field kits generated great enthusiasm among the villagers. Moreover, they were sensitized, awarded and motivated. This helped in generating fund through contribution of Rs 1/- per family per month for the sustainability of the program. The fund was used for refilling the chemicals. The project was supported by UNICEF. Today questions are raised on the reliability of field-testing Kits. UNICEF's approach is different in different states of the country. If quality control is maintained during field kit manufacturing, Chemicals are of AR/GR Grade, users are properly trained and if the guidelines are followed, then the testing kit is reliable to the extent of semi- quantitative analysis. We may not analyze Arsenic by using field kit, as it is a toxic chemical. In West Bengal, 55 NGO run laboratory may be involved in WQMS program at Block level lab. Besides this, 30 District level Lab of PHED will also be in the WQMS network.

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**R. Srikanth, Water Aid India, New Delhi (response 1)**

It is nice that this issue has come up for discussion. WaterAid India (WAI) is involved in 9 states in building the capacity of community in water quality monitoring through its NGO partners. Water quality monitoring is part of WAI strategy before providing intervention based on the data generated by the community. This is done by using portable water quality monitoring kits

supplied by People's Science Institute, Dehradun and Development Alternatives, New Delhi. There are other agencies that are selling portable kits including the imported ones by 'Hach'.

Through this surveillance, it is possible to bring awareness among the communities, However, the major issues arising out of such monitoring are:

1. Many of the water sources are contaminated by half dozen inorganic parameters above the standards (nitrates, iron; TDS; Hardness; salinity, fluoride; sulfates etc) apart from fecal coliforms and protozoans like Giardia and cytoporidium. Therefore, it is impossible for any single agency to offer the solutions based on this monitoring programme. There is a need to do a 'trade off' and concentrate on parameters that are immediate health concerns like Fecal coliform; nitrate, arsenic, turbidity ;iron on a priority basis, rather than going by WHO/ BIS standard on water quality for all parameters (which would make majority of water sources not potable in India).
2. Once the community comes to know that the water is bad or contaminated as per guidelines (WHO/BIS), they look for a quick solution which is not always possible in prevailing conditions, except for addressing bacterial contamination through disinfection. Therefore, community-based surveillance should take into account community expectations arising out of this programme and therefore requires extra care and element of caution before disseminating the results of the monitoring.
3. In Indian context very few cases of 'Blue baby syndrome' are detected even in places where nitrate value exceeds several folds higher than prescribed limits. Therefore nitrate safe limit at 40ppm as per WHO norms requires rethinking.
4. Point of use chlorination can address water quality issues in the villages where contamination occurs during storage, transport and handling even though the source is well protected.
5. Capacity development of partners and community on water quality should not lead to scare the community from using the existing facility based on WHO/BIS standard except in the case of arsenic and fluoride. For example, if water is hard and rich in calcium and magnesium fluoride, this does not cause health risk even if found above the standards.
6. Government agencies do not readily accept the finding of NGOs and community since there is no ready answer to host of water quality problems.
7. "Water quality network" needs to be setup in India on a priority basis to address issues arising out of community based water quality monitoring.
8. Simple household remedial measures like " point of use chlorination", slow sand filters, etc. can help in disinfection and removal of turbidity and inorganic contaminants to some extent. Environmental sanitation and hygiene can also go a long way in tackling water quality issues.

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**[Nupur Bose](#), A.N.College, Patna**

I am one of the core personnel of the UNICEF sponsored project on detection of arsenic contaminated ground water sources in Bihar. The field test kits (FTKs) used by my team were developed by NCL, Pune. The FTK test results were sent to Sriram Institute of Industrial Research, New Delhi, for confirmatory retesting. Positive correlation (of more than 0.6) was found between the Atomic Absorption Spectrometer (AAS) and FTK test results. This implies that these FTKs can be safely used for rapid, repetitive water quality monitoring procedure. It is also very cost-effective. However, its effectiveness can be sustained only if trained lab technicians conduct these tests.

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**[Julie Thekkudan](#), PRIA, New Delhi**

The example below could be an example of an alert NGO thinking laterally on monitoring water quality issues in the village that it is working in. NISHTHA, Rural Health, Education and Environment Centre in Rakkar works in the Kangra valley in Himachal. The primary activity is the running of a health centre. With the start of a community centre, they initiated a demographic profiling of the areas. The organisation found a high incidence of diarrhoea. A quick calculation revealed that the health centre spent about Rs 57,000 every year on the treatment of diarrhoea. They started a campaign to pressurise the government PHED (Public Health and Engineering Department) department to test the quality of water. They led a signature campaign of the villagers after which the government officials tested the water and found that the water was contaminated. NISHTHA also conducted independent tests and the results matched the government report. Pressure by the village youth and the NGO personnel led to government action. Rusted pipes were found to be the cause for the contamination of the water, which were subsequently changed. In addition to the work done by NISHTA, linking up with non-governmental health care institutions could take this initiative further.

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**S.Damodaran, WaterPartners International India Liaison Office, Tiruchirappalli**

I am happy to know about the issues in Water Quality Surveillance. With regard to WQS, I seek clarification on two points and offer a comment.

- 1) What will happen after identifying the source as polluted? Who will do what and how will mitigation efforts be initiated? How will people be made aware of water quality issues? What follow up activities need to be undertaken by the Government, local panchayats, NGO or CBOs?
  - 2) If an NGO/CBO is interested in water quality testing, where will the materials and the testing kits be available (apart from the sources already listed)? I heard that reagents are in short supply and are not available in the open market.
  - 3) The community managed WQSG should not only engage in water quality testing but also engage or motivate the local people to maintain water quality of sources by ensuring that overhead tanks are cleaned every fifteen days and adequately chlorinated in a systematic manner.
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**Viren Lobo, Society for Promotion of Wastelands Development (SPWD), Udaipur**

I have some further questions to the group in response to Srikant's message.

The data on fluoride contamination in Rajasthan shows a sharp increase, coinciding with the rapid depletion of the ground water. Such an alarming increase requires that awareness on the issue is increased.

However the solutions currently in place/proposed are not adequate, as acknowledged by you. Apart from treatment of water, what is the experience of augmentation of groundwater (through watershed management for instance) on water quality?

You have mentioned not creating a scare about existing water in the absence of alternatives except for arsenic and fluoride. In case of fluoride is there some way of determining the health risks before it becomes serious?

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**R. Srikanth, WaterAid, New Delhi (response 2)**

Dear Viren, I agree with your findings that fluoride levels in water get enhanced with ground water depletion; this is the case in other parts of India just as it is in Rajasthan. Apart from treatment, which requires capacity building of community on higher scale, augmentation of water through watershed management may theoretically lead to dilution in fluoride concentration but it may be a long term solution and may take a few years before a noticeable change can occur. Again this concept may work where fluoride concentration is not alarmingly high. But to the best of my knowledge, there are very few success stories on this front. Roof top rain water harvesting and storage followed by disinfection can safely augment water quality for drinking and cooking in case groundwater has very high levels if there are no alternate sources and groundwater is contaminated with fluoride and arsenic. The storage tank should take into account of family size, drinking and cooking needs for the year. The primary health risk in case of fluoride is the coloring of teeth in children (dental fluorosis). Proper health survey of the community can determine the risk. One also needs to take into account daily dietary intake of fluoride while assessing the risk, since fluoride accumulates in food stuffs also and may reach the body through food. Diets rich in calcium can help in elimination of fluoride from human system.

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**Kalyan Paul, Pan Himalayan Grassroots Development Foundation, Ranikhet**

We have trained a group of local youth to conduct regular water quality tests in various watersheds in Uttarakhand. The data is discussed at the community level for appropriate action. Mostly, the 'solution' seems to be in motivating communities to invest in water seal sauchalayas [toilets]. To widen the scope of this activity, we have also trained youth from other voluntary organisations in the region.

The lessons of this partnership would reveal within the next year or so whether we could further decentralise the concept of water quality testing - maybe for a cluster of villages there could be a focal person. The idea is to collect sufficient data over a period of time, which would enable communities to take the matter of water quality testing into their own hands.

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**B.L.Kaul, Society for Popularization of Science, Jammu**

The complaint of contaminated water supply due to rusted and leaking pipes passing through drains is quite common in all parts of the country, causing untold number of people to suffer from diarrhea, dysentery and hepatitis due to contaminated water every year. In most cities the pipes laid half a century ago are still there. A solution lies in replacing G.I.pipes by High Density Polyethylene pipes, as is the practice in the developed countries. These pipes are more hygienic because nothing accumulates inside them and there is no danger of rusting.

These pipes, however, are not popular with P.H.E. engineers, because they can not be pilfered as there are no buyers for them in the open market. An enterprising person started manufacturing plastic water pipes in eighties at Jammu. He had to wind up within ten years and incur losses because his pipes were not used by the P.H.E. Department as the engineers did not encourage their use for obvious reasons. Personal interests come first in every sphere of public life, which explains why there are scams reported almost every day in the media.

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**Jyotsna Bapat, Independent Consultant, New Delhi**

In my past experience on studies related to water quality monitoring in early 90s, I have found that many small towns / settlements, that have initially emerged in Maharashtra as a

result of sugar mill processing and other agro based industry possibility, start facing water when they grow beyond a size.

Most of these settlements initially tap the surface water coming into the mill and distribute it through pipes with overt or covert permission of the industry. When the population increases and there is need to set up an over head tank to pump water, water quality becomes an issue. This is when they use primary treatment like adding chlorine before distribution. They are especially sensitive about monsoon and out break of epidemics and they deal with it by just adding more chlorine. When asked why they shy away from a full fledged water treatment facility they said that it requires more money and equipment. So unless they had some legal means of recovering costs, they cannot afford the treatment facility, as they operate under semi formal arrangements for domestic water supply and so have not legal status.

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**S.Ramesh Sakthivel, WES-Net India c/o Plan International, New Delhi**

I agree with Viren and Srikanth that appropriate measures to combat water quality issues must also be part of the water quality programme. If remedial measures are not taken up quickly, there is every chance for further confusion in the villages poor water quality is tested.

There was an attempt to address high fluoride level in the groundwater through Water Harvesting Initiatives in Andhra Pradesh supported by UNICEF, Hyderabad in the 90s. Studies conducted showed improvement in the quality of ground water. More details can be obtained from UNICEF, Hyderabad.

In the case of fluoride intake, it is better to follow the principle of "Lesser is the Better" as it accumulates over a period of time in the body before causing serious health problems. Apart from drinking water, some food items including milk contains fluoride, therefore, it is advisable to adopt the prescribed maximum standard of 1.5mg/l in case there is no protected source, while following the maximum permissible limit of 1.0mg/l when there is a protected supply (as per GOI standards). Symptoms like fatigue, pain in the joints, loss of appetite, improper digestion, etc., apart from discoloured teeth especially among children are some of the early warning of the problem.

For details, contact: Prof. (Dr) A.K. Susheela, Fluorosis Research & Rural Development Foundation, New Delhi. Website: <http://education.vsnl.com/fluorosis/>

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**Ayan Biswas, People's Science Institute, Dehradun**

The term 'monitoring' has been present in development discourse for a long time. It is generally associated with a body of skills and tools, which only experts in the development sector seem to possess. Water quality monitoring is one such example. The general impression is that village communities are not experienced in handling a technical component like water quality monitoring on its own since this requires special skills. This narrow view of monitoring stifles people's active contribution in solving their own problems of water quality.

People's Science Institute, a Dehradun based NGO, has been successfully training the community on different aspects of water quality monitoring around the country. PSI has developed several customized, user-friendly and portable Water Quality testing kits in this context. Numerous experiences in various states in India has shown that the village community based WQM is possible, in spite of having just elementary education and minimum scientific exposure. I agree that there are limits to community based WQM, as some parameters might require specialized

scientific training and technical expertise. Nevertheless, the community can carry out tests for most of the general WQ parameters.

Even the Govt. acknowledges that communities must be facilitated to address issues related to their water and health, as endorsed by the 73<sup>rd</sup> amendment of constitution and the recently launched National rural drinking water mission. Our role should be limited to conscientization and facilitation.

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#### **V. Kurian Baby, Socio – Economic Unit Foundation (SEUF), Kerala**

In India, we have high access to pipes, low access to drinking water and little access to quality water. Addressing issues of water quality shall start from the basic fact that, quality assurance at the delivery point is the fundamental responsibility of the provider, whether it is water board, private or PRI/Communities. Quality assurance process should start from source identification and protection down to treatment, supply and final consumption (behavior change). Despite significant investments made and manpower supported for establishing and maintaining quality testing facilities mainly by water boards, little has been done to share the data generated (particularly on their own supply ) with the consumers. An essential prerequisite would hence be to insist that the water quality testing are to be done regularly and the data horizontally shared with the PRIs at the respective level at least once in every six months and published in the official web site. This horizontal flow and transparency mechanism could be institutionalized; discussions could be enabled at the PRI level involving communities with accountability provisions for feedback and corrections.

A study by SEUF for Kerala has revealed that drinking water sources of domestic wells, community/PRI supplies and KWA sources are all contaminated at varying levels. In a State like Kerala, where 70% of the households are using domestic wells for drinking, quality assurance is also a household affair.

Our implementation experience in institutionalizing Community based water quality surveillance and monitoring (CWQSM) through IEC/demand generation, supply of testing kits and even chloroscopes for testing residual chlorine and trainings in Water quality surveillance in Jananidhi programme have yielded limited results, apparently because of the failure in marketing the concept through demand generation.

Measuring the health impact or outcome of QWS programme is a complex, expensive and uncertain process. Typically, for example, diarrhoea rates naturally fluctuate greatly, making it hard to attribute any changes to a specific intervention. It is therefore better to measure the impact of a programme on those intermediate process indicators known to have a direct impact on health.

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**Many thanks to all who contributed to this query!**

*If you have further information to share on this topic, please send it to Solution Exchange for WES-Net at [se-wes@solutionexchange-un.net](mailto:se-wes@solutionexchange-un.net) with the subject heading "Re: [se-wes] Query: Community-Based Water Quality Monitoring & Surveillance, from UNICEF, Kolkata (Experiences). Additional Response."*

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