



Environment

Water Community



ICT for Development Community



Solution Exchange for the Water Community **Solution Exchange for the Information and** **Communication Technology for Development Community** **Consolidated Reply**

Query: Drinking Water Case Studies Using ICT Tools - Examples

Compiled by Ramya Gopalan and Gitanjali Sah, Research Associates

Issue Date: 29 November 2007

From [Megha Phansalkar](#), Water Supply and Sanitation Department,
Government of Maharashtra, Mumbai

Posted 28 September 2007

I am Dr. Megha Phansalkar working as Knowledge Management Specialist with the Water Supply and Sanitation Department, Government of Maharashtra.

We are scaling up 'community driven approaches' in the drinking water sector, through external and internal funding projects. We are therefore interested in learning about projects/initiatives in the sector, where Information and Communication Technologies (ICTs) tools have facilitated interaction by supplying information and encouraging learning to help in participatory decision making. (for e.g. preparation of PRA maps on the computer, data base of related water resources stored and analyzed by the community, natural resource mapping done with the help of some computer application etc.) We would further like to document such initiatives (including the before and after situation, and other related aspects).

Thus, I would like to request Solution Exchange members of the Water and ICT for Development Communities to please share the following:

- Case studies where ICTs have been used as a tool for participatory decision-making in the drinking water sector, including pilot projects, which have not been scaled up
- Suggestions on the possibility of using ICTs in villages to collect data on drinking water

Our compilation of case studies would help implementers like us, to take a few successful initiatives to scale. Additionally, the case studies would be available as ready reference material for usage by stakeholders.

Responses were received, with thanks, from

1. [K. A. Raju](#), National Institute of Rural Development, Hyderabad
2. [Jagdish Barot](#), ARTI, Gandhinagar, Gujarat
3. [Ranvir Singh](#), Jawaharlal Nehru University, New Delhi
4. [Vikram Vyas](#), St. Stephen's College, Delhi University, New Delhi
5. [T. N. Anuradha](#), FAO, New Delhi
6. [Nitya Jacob](#), Writeshop Infotech Pvt. Ltd., New Delhi
7. [M. Nahas](#), Centre for IT Services, Trivandrum

Further contributions are welcome!

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[Comparative Experiences](#)
[Related Resources](#)
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Summary of Responses

In response to the query, seeking case studies on using Information and Communication Technologies (ICTs) as tools for participatory decision-making in the drinking water sector, including pilot projects, members recommended several projects utilizing Geographic Information Systems (GIS), Remote Sensing, Satellite Image Processing and other software tools to assess water quality and enable efficient management of water resources.

Respondents shared a number of [documents](#) containing details on various ICT projects in the water sector. In addition, they listed several [organizations](#) involved in the development of ICT tools for evaluating drinking water quality, levels of groundwater pollution, rooftop rainwater harvesting, agriculture and integrated water resource management. Members also mentioned several [websites and portals](#) with case studies on ICT applications for e-governance, rural livelihood interventions and water management.

Respondents further highlighted experiences from several initiatives, which combine ICT tools and their application to water resources management. They compared two tools- [SimTanka and Jal-Chitra](#) applied in [Rajasthan](#), iterating that although the tool Jal Chitra provides very comprehensive information, SimTanka was the preferred application since it was simple and provided specific information for immediate use by villagers. Another experience mentioned was a system in [Tamil Nadu](#) that facilitates remote sensing online decision support, used primarily for advisory services to farmers. Additionally members noted the experience of the [CLEAN-India Programme](#), which conducts water quality monitoring tests. The programme enlists the help of schoolchildren who use Jal-TARA, a portable water testing kit, to gather data. The results are displayed through an interactive digital map showing municipal and groundwater quality for different areas in Delhi, Noida and Gurgaon.

Finally, respondents briefly discussed e-governance projects launched in different districts of the country that attempt to establish redressal mechanisms for non-functioning water points and display employment opportunities in the water supply and irrigation sector. Citing the MIS used by the [Department of Drinking Water Supply](#) to track sanitation, drinking water and the Nirmal Gram Puraskar, members commended the system as an excellent, updated and accessible example of using ICT in the water sector. They also highlighted an ICT based drinking water and wastewater quality Monitoring System established by the E-Governance Initiative of Central Laboratory of [Kerala State Pollution Control Board](#).

This system enables water quality analysis and process automation functions, adaptable to other water quality testing Laboratories.

On a concluding note, members emphasized that using ICT applications in the water sector is best captured when the user's learning curve is low and there is a need to speed up the data collection and planning process.

Comparative Experiences

Tamil Nadu

Use of Village Resource Centres for Water Management (from [K. A. Raju](#), *National Institute of Rural development, Hyderabad*)

Aimed at providing multiple services such as remote sensing online decision support, farmers' advisory services, e-governance services, weather services and water management, the project promotes a need based single window delivery system. The service is free of cost for villagers, users located at one node can interact with other nodes through video and audio links. Centers are provided with 20 computers and PCO booths to enable voice communications. Read [more](#).

Rajasthan

IT Software for Water Resources Management (from [Vikram Vyas](#), *St. Stephen's College, Delhi University, New Delhi*)

Jal-Chitra and Sim Tanka were developed, using IT to meet water needs of a rural community. Ambitious, Jal-Chitra requires devolution of power to village communities, schoolchildren collect the water related information, and the analysis is then shared with "Gram Sabha", who then acts on it. Although Jal-Chitra provides information that is, more comprehensive the community accepted SimTanka for its simplicity and usefulness as a tool. Read [more](#).

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

West Bengal

Mapping Arsenic Presence by GIS and Remote Sensing, North 24 - Pargana District

Unique example of applying GIS and Remote Sensing for environmental mapping, mapping the arsenic presence, the contour of its concentration and depth of its presence in the district. GIS and Satellite Image Processing was used to identify, locate, map and analyze the existing data on the district for modeling the hazard zones. The [study](#) presently at block level for a single district acts as a precursor to the whole process to initiate and set a strategic model subsequently.

International

Asia

Upscaling Water Productivity Using GIS and Remote Sensing, Indus Basin

Data for monitoring land/water productivity over vast areas are usually not available/accessible. The [study](#) thus combines Satellite measurements with ancillary in situ data into a GIS. Remote-sensing measurements are converted to crop yield, to actual evapotranspiration and, indirectly, to net groundwater use and for each of the canal commands, water productivity is calculated. Results show a constant productivity value of water at a spatial scale of 6 million ha and higher.

Related Resources

Recommended Documentation

NRSA Funds Water Management Study in Maharashtra (from [Ranvir Singh](#), Jawaharlal Nehru University, New Delhi)

Article; by The Hindu Staff Reporter; GIS News; Tiruchi; 4 September 2007

Available at http://www.gisdevelopment.net/news/viewn.asp?id=GIS:N_zagxnfktw

Details a project aimed at utilizing mapping systems to find solutions for drinking water problems and to develop models to augment water resources in parts of Maharashtra.

Geomatics Information System (GIS) Based Digital Water Quality Map for Delhi (from [T.N. Anuradha](#), FAO, New Delhi)

Results of Interactive Digital Map; CLEAN-Delhi Programme; Development Alternatives; New Delhi

Available at <http://www.cleanindia.org/jaltara.ppt> (PPT Size: 415 KB)

Water quality map which displays municipal and ground water quality for areas in Delhi, Noida and Gurgaon, records past data and helps in formulation of water quality trends

Rooftop Rainwater Harvesting (from [Vikram Vyas](#), St. Stephen's College, Delhi University, New Delhi)

Tool Brief; India Water Portal

Available at <http://www.indiawaterportal.org/tt/rwh/courses/DebbieRTRWHPresentation.pdf> (PDF Size: 1 MB)

Details the utility and performance of Sim Tanka, a software programme for simulating performance of rainwater harvesting systems with covered water storage tank

From [Ramya Gopalan](#), Research Associate

Arsenic Mapping for North 24 - Pargana District of West Bengal – Using GIS and Remote Sensing Technology

Geospatial Application Paper; by Balen Basu and Samik Sil; PCI Software Pvt. Ltd.; GIS Development; Calcutta

Available at <http://www.gisdevelopment.net/application/environment/water/mi03204.htm>

Aimed at mapping the arsenic presence, the contour of its concentration and the depth of its presence in the district using GIS and Satellite Image Processing

Integrated Remote Sensing and Factor Analytic GIS Model for Evaluating Groundwater Pollution Potential

Geospatial Application Paper; by O. P. Dubey and D. C. Sharma; Irrigation Research Institute; GIS Development; Roorkee

Available at <http://www.gisdevelopment.net/application/environment/water/wapl0002.htm>

Illustrates the proven capability of remotely sensed data in providing many above surface, surface and sub surface characteristics of a land unit for groundwater pollution potential

Information and Communication Technology (ICT) Applications in Water Resources Development and Management in India: A Tenth Plan Perspective & Prospective

Paper; by Madaswamy Moni; National Informatics Centre; Ministry of Information Technology; New Delhi

Available at <http://waterinfo.nic.in/news/ictwr.pdf> (PDF Size: 940 KB)

Proposes that ICT Applications in water resources development and management be given adequate attention during 10th Plan, to facilitate decision support systems

Upscaling Water Productivity in Irrigated Agriculture Using Remote-sensing and GIS Technologies

Paper; by Wim Bastiaanssen, Mobin-ud-Din Ahmad and Zubair Tahir; Environment and ICT; International Water Management Institute

Available at http://www.iwmi.cgiar.org/pubs/Book/CA_CABI_Series/Water_Productivity/unprotected/0851996698ch18.pdf (PDF Size: 901 KB)

Meets the need for reliable information on water depletion for agricultural production especially with scarce freshwater resources, combining satellite measurements with GIS

From [Gitanjali Sah](#), Research Associate

Ensuring Adequate Water Supply in India

Article; by Seemantinee Sengupta; Swajaldhara; i4d (Information for Development) Online; Features; New Delhi; July 2004

Available at <http://www.i4donline.net/july04/swajal.asp>

Focuses on e-Governance efforts undertaken by Department of Drinking Water Supply, delivering web based information to government agencies for better planning/monitoring

Developments in ICT Tools, Modelling and Decision Support Systems in Integrated Water Resources Management

Article; by Denise Senmartin; Dg Communities; 4 October 2005

Available at

<http://topics.developmentgateway.org/water/rc/ItemDetail.do~1048001?itemId=1048001&itemId=104801&itemId=1048001>

Discusses how ICT tools, like information systems, modeling systems and decision support systems, plays an important role in Integrated Water Resources Management

Designing ICT Tools to Support Participative Catchment Management Processes

Paper; by Amanda Swinford & Paul Jeffrey; School of Water Sciences, Cranfield University; Publisher; Cranfield, UK

Available at <http://siti.feem.it/mulino/dissemin/intcon/swinfor.pdf> (PDF Size: 221 KB)

Presents a critical analysis of the design of ICT tools in supporting stakeholder dialogue processes in catchment management, identifies gaps and suggests design guidelines

Recommended Organizations and Programmes

CLEAN-India Programme, Development Alternatives, New Delhi (from [T.N. Anuradha](#), FAO, New Delhi and [Nitya Jacob](#), Writeshop Infotech Pvt. Ltd.)

B-32, Tara Crescent, Qutab Institutional Area, New Delhi - 110016; Tel: 91-11-26134103/26890380; Fax: 91-11-26130817 cleanindia@devalit.org;

<http://www.cleanindia.org/resoucewatch/watermain.htm>

Conducts seasonal monitoring of water sources, done by school children using portable water testing kit Jal-TARA to assess variations in water quality across Indian cities

Department of Drinking Water Supply, New Delhi (from [Nitya Jacob](#), Writeshop Infotech Pvt. Ltd., New Delhi)

Ministry of Rural Development, GoI, 9th Floor, Paryavarn Bhawan, CGO Complex, Lodhi Road, New Delhi - 110003; Tel: 011-24361043, 24369006; Fax: +91-11-24364113 jstm@water.nic.in;

http://ddws.nic.in/mis_prog.htm

Contains an updated and publicly accessible example of the use of ICT and water wherein an MIS helps track sanitation, drinking water and the Nirmal Gram Puraskar

Central Laboratory, Kerala State Pollution Control Board, Kochi (from [M. Nahas](#), Centre for IT Services, Trivandrum)

Gandhi Nagar, Kochi - 682 020; Tel: +91-484-2207783/2207786; ces@keralapcb.org;
<http://www.keralapcb.org/index.htm>

Established an ICT based drinking water and wastewater quality Monitoring System which takes care of water quality analysis and laboratory testing process functions

From [Nitya Jacob](#), Writeshop Infotech Pvt. Ltd.

Dhan Foundation, Madurai

18, Pilliayar Koil Street S.S. Colony, Madurai - 625 016; Tel: 91-452-2610794/2610805; Fax: Fax No. dhanf@vsnl.com; <http://www.dhan.org/ict4p.html>

Uses ICTs for inputs on land preparation, seed preparation, crop production, post harvest and water management.

Jamsetji Tata National Virtual Academy (NVA) for Rural Prosperity, M.S. Swaminathan Research Foundation (MSSRF), Chennai

3rd Cross Street, Institutional Area, Taramani, Chennai - 600113; Tel: +91-44-22542698/22541229; Fax: +91-44-22541319 hmrc@mssrf.res.in; <http://www.mssrf.org/iec/601/index.htm>

Aims to provide information and knowledge on drought, climate management, water augmentation, maximizing crop yield, etc to develop skills and capacities of the rural poor

Recommended Portals and Information Bases

Rural Water Supply & Sanitation, ICT4RD, National Institute of Rural Development (NIRD), Hyderabad (from [K. A. Raju](#), National Institute of Rural development, Hyderabad)

http://www.ict4rd.net.in/projects.aspx?cat_id=19; Contact Dr. Durga Prasad; Tel: +91-40-24008472/1473/466/526; pdp@nird.gov.in

Compiles rural water supply case studies using ICTs as tools such as ICTs for improving rural livelihoods and village resource centres for water management applications

From [Ramya Gopalan](#), Research Associate

Waste Water Management & Urban Issues, ICT International, Australia

<http://www.ictinternational.com.au/wastewater.htm>;

Includes various case studies/ papers on ICT instruments for wastewater management, introduces soil water sampling lysimeters and other specialised applications

ICT Water Resources, Water Resources Informatics Division, New Delhi

<http://waterinfo.nic.in/>

Contains a number of resources, articles, papers etc., on e-governance and ICT applications in the water sector

Recommended Tools and Technologies

Interactive Digital Map of Water Quality (from [J.N. Anuradha](#), FAO, New Delhi)

Software Application; Owned by Clean-Delhi Program, Development Alternatives, New Delhi

Available at <http://www.indiawaterportal.org/data/datastats/dh/>

Presents the interactive digital map as a downloadable software application and results of a water quality survey across Delhi, including trends, and household tips for purification

Sim Tanka and Jal Chitra (from [Vikram Vyas](#), St. Stephen's College, Delhi University, New Delhi)

Software; Owned by The Ajit Foundation, Scientific Resource Centre, Jaipur

Available at <http://homepage.mac.com/vsvyas/science.html#mission> Contact Vikram Vyas; The Ajit Foundation; visquare@satyam.net.in

Considers computers as a tool for sustainable development, details mathematical modelling and information technologies to help Panchayats manage their water resources

Responses in Full

[K. A. Raju](#), National Institute of Rural Development, Hyderabad

We are compiling case studies using ICTs as tools. We have a website www.ict4rd.net.in wherein you can see under rural water supply, some projects making use of ICTs in some form or other.

Secondly, you may like to contact Dr Durga Prasad of National Institute of Rural Development, Hyderabad, on email, pdp@nird.gov.in

[Jagdish Barot](#), ARTI, Gandhinagar, Gujarat

Greetings from Windsor/Canada.

Your initiatives in ICT and inquiries are praiseworthy. Community education and participation has started yielding good results. The best example of it is seen in Gujarat.

Thanks to the sincere efforts of WASMO. I hope you are aware about WASMO! WASMO's success lies in decentralization of work through dependable NGOs. And the NGOs are able to bring out the hidden potential of people through innovative ideas.

I recommend you to contact WASMO and the NGOs associated with them. You can contact Mr. Ghadhavi-Chairman through their website.

All the best wishes in your mission.

[Ranvir Singh](#), Jawaharlal Nehru University, New Delhi

I am Ranvir from JNU doing my Ph.D. in the field of Public Health and recently completed my M.Phil. Research on Health GIS issues. In response to the Query from Megha Phansalkar, Water Supply and Sanitation Department, Government of Maharashtra, Mumbai seeking studies, which show the influence of mapping in water management studies, I would like to share the following information with you.

NRSA Funds Water Management Study in Maharashtra

GIS News, 4 September 2007, Tiruchi

http://www.gisdevelopment.net/news/viewn.asp?id=GIS:N_zagxnfktw

Details National Remote Sensing Agency (NRSA) sanctioned project aimed at utilising mapping systems to solve drinking water problems and develop models to augment water resources in parts of Maharashtra.

[Vikram Vyas](#), St. Stephen's College, Delhi University, New Delhi

I have been involved in the development of two such tools SimTanka and Jal-Chitra.

SimTanka is a tool for determining an optimum size of the storage tank in RWHS. Other was Jal-Chitra, which keeps track of maintenance, water quality and the overall water budget of a village. It is centred on the map of the village.

From the responses, I have got, and this is not what I had expected, SimTanka has turned out to be more useful than Jal-Chitra, even though Jal-Chitra provides far more comprehensive information to the community. The reason for this I believe is that tools, which are simple and provide specific information that can be used immediately, are more easily accepted by the community. While more ambitious tools like Jal-Chitra require a true devolution of power to the village community and an integration of various institutions. For Jal-Chitra, school children are supposed to collect the water related information. The analysis of Jal-Chitra is then supposed to be shared with "Gram Sabha" and then the village panchayat is supposed to act on that information.

Jal-Chitra was developed in close collaboration with the Barefoot College, Tilonia. In particular, I worked very closely with Lalita and Laxman Singh and their experience of using Jal-Chitra would be far more valuable than my subjective response.

I am including with this message with a PDF presentation which I found on the India Water Portal, <http://www.indiawaterportal.org/tt/rwh/courses/DebbieRTRWHPresentation.pdf> (Size: 1 MB) which describes the use of SimTanka.

T.N. Anuradha, FAO, New Delhi

Development Alternatives under its CLEAN-India Programme

(<http://www.cleanindia.org/resoucewatch/watermain.htm>) conducts extensive water quality monitoring (<http://www.cleanindia.org/resoucewatch/watermain.htm>) across various cities in India. Seasonal monitoring of water sources is done to assess the variation. The monitoring is conducted through schoolchildren using portable water testing kit – Jal-TARA.

The result of such rigorous monitoring is an interactive Geomatics Information System (GIS) based Digital Water Quality Map for Delhi (<http://www.cleanindia.org/jaltara.ppt#4> Size: 415 KB). The water quality map developed through the CLEAN-Delhi programme, displays the municipal and ground water quality for different areas in Delhi, Noida and Gurgaon. A cumulative index for the water quality has been prepared, which helps the database to grade the quality of water as 'Safe for use', 'Check before use' and 'Purify before use'. This is depicted in different colors like GREEN for "safe", YELLOW for "check" and RED for "purify" so that everyone can relate to it. The water quality map also contains past data and helps in formulation of water quality trends.

The map is available for download at <http://www.indiawaterportal.org/data/datastats/dh/>

Nitya Jacob, Writeshop Infotech Pvt. Ltd., New Delhi

Some of the e-governance projects launched in different districts of the country have attempted to establish a redressal mechanism for non-functioning water points such as hand pumps and tube wells. I saw this in Gyandoot, Dhar, MP, and in a film on Assam's brush with e-governance. I believe it has been incorporated into other e-governance schemes as well but this is sporadic.

Mostly, e-governance has been used to post employment opportunities e.g., under government schemes, some of which apply to the water supply and irrigation sector. So when an irrigation project is planned, the district e-governance system manager will send out an alert to the taluks/blocks concerned about it. The redressal mechanism I mentioned earlier works in reverse, where villagers or their representative can approach the nearest e-governance kiosk and send a complaint to the district or taluk HQ about dysfunctional pumps.

The Department of Drinking Water and Sanitation's website, <http://ddws.nic.in/>, has an excellent MIS that tracks sanitation, drinking water and the Nirmal Gram Puraskar. This is the best example of the use of ICT and water, better than the e-governance part, because it appears to be quite updated and is publicly accessible. True transparency.

Several organizations in India has used ICT applications, mostly GIS, for watershed mapping and planning. Development Alternatives in Delhi (<http://www.devalt.org>), Dhan Foundation (<http://www.dhan.org>) and MS Swaminathan Foundation (<http://www.mssrf.org>) in Chennai have used this in their work. You can visit their websites for more information or get in touch with them. This is probably the best use of ICTs in the water sector as the learning curve is low for users and it speeds up data collection and planning.

M. Nahas, Centre for IT Services, Trivandrum

I would like to bring to your notice the E-Governance Initiative of Central Laboratory of Kerala State Pollution Control Board, Ernakulam of Kerala State Pollution Control Board <http://www.keralapcb.org/>

The Central laboratory has established an ICT based drinking water and wastewater quality Monitoring System. The solution takes care of water quality analysis and water testing laboratory process automation functions.

The solution is adaptable for other Water quality testing Laboratories.

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 the Water Community in India at se-wes@solutionexchange-un.net.in and/or the Information Communication Technology for Development Community in India at se-ictd@solutionexchange-un.net.in with the subject heading "Re: [se-watr][se-ictd] Query: Drinking Water Case Studies Using ICT Tools - Examples. Additional Reply."

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