



Environment

Water & Environmental Sanitation Network
(WES-Net India)



Solution Exchange for WES-Net India Consolidated Reply

Query: Cost-effective & financially sustainable urban water supply & sanitation services/from IWMI, Gujarat/Comparative experiences

Compiled and additional research provided, by Preeti Soni

16 June 2005

Original Query: Tushaar Shah, IWMI, Anand, Gujarat

Posted: 6th June 2005

I am the director of the IWMI-Tata Water Policy Program at the IWMI field office in Anand, Gujarat, where we are charged with providing practical solutions to a range of water management problems by translating research findings into policy recommendations. One of the areas we have been asked to explore relates to urban infrastructure for water supply and sanitation.

Given the fact that India is urbanizing at a frantic pace, its urban water supply and sanitation (WSS) infrastructure is unable to keep pace with urban growth. We are looking at (a) capital investments and (b) institutional/management approaches to ensure efficient, cost-effective and financially sustainable WSS service provision in Indian towns and cities.

My question to the Community is: can anyone tell me of any relevant experiences or innovations that we can look into? We would be interested in both **cost-effective solutions for urban WSS infrastructure investments as well as institutional or management improvements** you have been involved in or are aware of.

I look forward to your responses.

Tushaar Shah
International Water Management Institute (IWMI)
Elecon, Vallabh Vidyanagar, Gujarat, India

Solution Exchange received Responses, from:

1. [Mihir Maitra](#), ICEF, New Delhi
2. [Nupur Bose](#), A N College, Patna
3. [Deepa Joshi](#), University of Southampton, UK
4. [A J James](#), Pragmatix Research & Advisory Services, Gurgaon
5. [Lalit M Sharma](#), S.M. Sehgal Foundation, Gurgaon
6. [Biraj Swain](#), WaterAid India, New Delhi

Further contributions are welcome

Summary of Responses

Network members cited a wide range of examples, experiences and additional readings covering the topic of cost-effective and financially sustainable approaches for provision of urban water supply and sanitation services. Among the numerous avenues warranting investigation, the following were cited:

Infrastructure investment

Infrastructure development: Cost-effectiveness of infrastructure is related to several factors including the source of raw water, size and socio-economic situation of target population, and management and level of services provided. Examples mentioned include rainwater harvesting, public hand pumps from local groundwater aquifers, and water conservation and recycling schemes. The **Academy of Rural Research and Development** is targeting recycling of water by dividing water usage into three separate categories so as to curtail the load on aquifers and distribution systems and to address environmental sanitation concerns. It is important to ensure linkages between infrastructure development and community awareness, stakeholder participation, water quality monitoring and other factors. Governance and policy issues are also relevant in this context.

Investment financing: Substantial multilateral and bilateral financing is flowing into the sector. Donor supported programmes include by the **World Bank** in Karnataka, Tamil Nadu and elsewhere; **AusAid** in Bangalore, Shillong, Gantok; **Netherlands** in Kerela, Andhra Pradesh, Gujarat; **France** in Delhi, Manipur, Jaipur, Kolkatta; **Japan** in Mumbai, Bangalore; **ADB** in Madhya Pradesh, Kolkatta; **Danida**; and **DFID**. It was noted however that donor financing is often considered to be inadequate, sporadic and concentrated in mega cities or urban areas in well-performing states like **Karnataka**. Further analysis of the projects is needed to understand fully their sectoral implications. Innovations in local revenue generation and community-financed investment schemes have been tried in **Maharashtra**.

Institutional and management improvements

Willingness to pay: The example posted on the network was that of Bangalore city. Under an AusAid-financed project, **Bangalore Water Supply and Sewerage Board** (BWSSB) is improving the quality of the delivery of water supply, sewerage and environmental sanitation services. In a contingent valuation survey in 2000-1, the willingness to pay for two groups of users – the slum dwellers and those in residential colonies – was estimated. For the latter, realistic options for improved water supply was limited by what BWSSB Chief engineers were willing to promise and what the users were willing to pay. Slum dwellers, on the other hand, were offered options ranging from 24-hour supply through BWSSB tankers fitted with water-vending machines to shared tap connections. Though the shared tap option was approved, it faced non-acceptance by the people. Similar options are being explored under the World Bank's **Greater Bangalore Water Supply and Sanitation Project**.

Management alternatives. Although water and sanitation services are predominantly provided by government agencies, there are instances of private sector and NGO involvement. Privatisation is being experimented with in **Ajmer** and with some **World Bank**-funded initiatives. Private sector involvement includes informal private initiatives that are in partnership with the government, as well as some that have come about on their own due to existing demand. The latter mainly deal with bottled water and tankers, but examples also include corporate

involvement in rainwater harvesting and construction of public hand pumps. NGO and community involvement is also increasing (e.g. in **Tiruchirapalli**), and have been particularly active in initiatives that involve awareness creation. **Sulabh International** has introduced a sanitation system at the community level and through commercial centers on a pay and use method. **SPARC** (Society for the Promotion of Area Resource Centers) has been involved in construction of community sanitation facilities in slums areas in Pune, Bangalore and Mumbai. Management improvements of Water Boards/Municipalities are being introduced under donor-financed schemes in **Karnataka, UP** and **Kerala**. **Nagpur** has had success regularizing illegal water connections and applying metered policy.

Comparative Experiences

Karnataka

The World Bank Urban Water sector Improvement Project, Karnataka. The project will (a) assist the State Government in finalizing its policy reform agenda; and, to prepare private sector participation processes for service provision in Karnataka; (b) improve service provision in selected demonstration zones; and improve the efficiency of bulk supply operations, and distribution networks, and (c) finance the project's incremental operational costs, and studies related to project management and implementation, financial management systems related costs; training and the incremental operating cost. Projects on similar lines or containing relevant components are also underway or are being developed in other Indian states such as Andhra Pradesh, Tamil Nadu, and Uttar Pradesh. See www.worldbank.org/in

Bangalore, Karnataka

The Water Supply And Environmental Sanitation Masterplan Project, Bangalore (referred to by [A J James](#)). The project aims at improving the capacity for the delivery of water supply, sewerage and environmental sanitation services to the City of Bangalore with emphasis on the urban poor and vulnerable groups and within a process of long-term environmental, economic, social and institutional sustainability. See <http://www.developmentgateway.com.au/bangalore/htm/home.htm>

Bangalore Water Supply Project envisages BOOT (build, operate, own, transfer) arrangement for sourcing 500 mld of water. This project also incorporates establishment of two tertiary treatment plants of total 60 mld capacity with HUDCO's assistance with the private sector industries undertaking laying of feeder mains in the project. <http://www.teriin.org/events/docs/regconf/Background%20Paper1/Water.pdf>

Multi-utility water kiosks, Bangalore. Government of Karnataka has initiated steps to open water kiosks for residents of Bangalore. These kiosks will accept water bills (and property taxes), and will be linked to various government departments. (<http://www.teriin.org/events/docs/regconf/Background%20Paper1/Water.pdf>)

Patna, Bihar

Initiatives of a Research Group (contributed by [Nupur Bose](#)). A research group is experimenting with the rainwater harvesting model which is sponsored by the corporate sector. In addition, it recommends mobile tanks of potable water for reaching the masses, and construction of public hand pumps with access to deeper aquifers. The initiative requires stakeholder participation.

Ajmer, Rajasthan

Privatizing the operation and maintenance of Urban Water Supply. The Public Health Engineering Department in Ajmer has privatised the operation and maintenance of the filtration plant, pipelines and pumping stations of the water supply scheme from Bisalpur Dam. This has reduced labor management problems, time taken for repairs and in the operation and maintenance cost for the Public Health Engineering Department. Consumers also benefit from a better maintained and reliable drinking water service. Given the advantages to various stakeholder groups, it is clearly one way to improve urban water supply. Using the contracting method would, however, require a careful scrutiny of the ground realities, an assessment of the nature and size of the market, availability of private sector operators and, of course, willingness of the Government agencies to privatize water supply. (*WSP Field Note, 1999.*
http://www.wsp.org/publications/sa_amjer.pdf , 336.6 KB)

Madhya Pradesh

Urban Water Supply and Environmental Improvement Project, ADB. The project is in the six cities in Madhya Pradesh, and thereafter in the other cities in the state. The Project comprises three parts. Part A for the urban water supply and environmental improvement covers the improvement and expansion of the following municipal infrastructure and services: urban water supply, sewerage and sanitation, storm water drainage, and solid waste management. Part B for urban governance and institutional development consists of a comprehensive capacity development for urban governance reform, and two community-level funds that will provide the framework for participatory planning between the municipal authorities and communities at neighborhood level, for integrating slum improvements with citywide infrastructure.
(<http://www.adb.org/Documents/Profiles/LOAN/32254013.ASP>)

Maharashtra

Nagpur, Maharashtra

Initiatives of the Nagpur Municipal Corporation (NMC). The problem facing NMC was huge losses in distribution due to illegal and un-metered water connections which also caused acute water shortage. In late 2001, NMC initiated a programme for regularizing illegal water connections and applying metering policy. For identifying unauthorized and un-metered connections, the licensed plumbers were involved in the programme. The incentive of Rs 50-100 for every illegal connection motivated about 200 plumbers, who were organized into teams and assigned to the seven water zones for convincing the illegal connection holders to regularize their connections, getting the connections sanctioned, fixing meters and reporting those who refused to regularize to the respective zonal office. The water connections of those who refused to avail the scheme were immediately disconnected. The NMC staff working on the team was also motivated by a fixed monthly target of revenue collection from respective zones. With insignificant expenses of about Rs. 0.2 million as incentives for plumbers and a minimum amount spent on publicity drive, the programme achieved regularization of about 25,000 (71%) connections within a short period of four months. There was significant and evident increase in revenue generation as the quantity of water billed translating into over three-fold increase in revenue from Rs. 148.3 million in 1998-99 to Rs 500 million in 2001-02.

The NMC has also deals with private sector participation. After receiving a very high quotation for one of its water supply and sanitation expansion schemes, the NMC decided to go in for a target oriented and focussed tendering process. This brought in a lot of new ideas along with substantial reduction in the costs and time span for project completion.

(*S Sule, 2005. Mixed results for municipal water reforms,*
<http://www.indiatogether.org/2005/jun/gov-mahwater.htm>)

Thane, Maharashtra

The Reduced Water Rate Deposit Scheme or The Reward Scheme was launched by Thane Municipal Corporation (TMC) in 2002, in order to raise capital for investment in their water works. The consumers were offered a five-year service by paying one-time charges for 55 months. The main incentive for participating in the Scheme was immunity from the projected 15% annual increase in water tariff and payment at the current rate for 55 months instead of 60 months. Additional facilities offered included transferability of the Rewards Certificate with transfer of property and an option for one or more families to participate in the scheme individually or jointly. The local politicians supported the venture and organized local citizens meetings in order to explain the scheme and encourage them to participate. However, the main criticism of the scheme has been that the number of households who participated in the scheme was less than 25%, consisting mainly of those households who regularly pay their water taxes anyway. In years to come the corporation will find it hard to maintain the recovery percentage as the regular payers who participated in the scheme will not be paying taxes for the next five years. Further, Thane has a large population coming from outside to live here for short periods of employment in rented accommodation who were reluctant to participate in the scheme.

(S Sule, 2005, *Mixed results for municipal water reforms*

<http://www.indiatogether.org/2005/jun/gov-mahwater.htm>)

Outside India

Pakistan

The Khuda-ki-Basti (“God’s own settlement”) approach. Saiban (an NGO) works in partnership with government agencies, purchases land, subdivides it as per zoning regulations into small plots and then markets these to the poor. Payment schedules are flexible and burdensome paperwork is kept to a minimum. The approach has provided housing with adequate water and sanitation facilities to over 6,000 families and has benefited around 40,000.

<http://www.schwabfound.org/schwabentrepreneurs.htm?schwabid=1698>

Related Resources

Recommended Documentation

Balanyá B, Brennan B, Hoedeman O, Kishimoto S, and P Terhorst (2005). **Reclaiming Public Water: Achievements, Struggles and Visions from Around the World**, Amsterdam:

Transnational Institute and Corporate Europe Observatory.

Written with a focus against water privatization, the book has excellent examples of municipal managed and community-regulated, cost-effective and pro-poor 'working' urban water utilities.

<http://www.tni.org/books/publicwater.pdf> , 706 kb)

Gulaty S, Goswami A, and V Dudeja. **Water supply and sanitation in India**, New Delhi: The Energy and Resources Institute.

Provides a good overview of the sector in India

<http://www.teriin.org/events/docs/regconf/Background%20Paper1/Water.pdf> , 255 KB)

Ministry of Water Resources 2002. **National Water Policy India**. New Delhi: Ministry of water resources. (<http://wrmin.nic.in/policy/nwp2002.pdf> 159 KB)

Planning Commission 2002. **Water Supply and Sanitation**. New Delhi: Planning Commission *A comprehensive report detailing the water and sanitation sector in India*

<http://ddws.nic.in/wtrsani.pdf> 1.03 MB)

Planning and Development Collaborative and Urban Institute 2003. **Innovations and Solutions for Financing Water and Sanitation. Background Paper.** Washington, D.C. *Strategies, processes and players used by both industrialized and developing countries to finance water and sanitation projects, including the Ahmedabad Municipal Corporation Bond Issue and Tamil Nadu Water and sanitation Pooled Fund in India. A version of the paper was presented at the World Water Forum in 2003.*

(www.oecd.org/dataoecd/16/42/22145238.pdf, 644 KB)

WaterAid India 2005. **Community managed toilets: Understanding where it can work,** New Delhi: WaterAid India. (contributed by [Biraj Swain](#)) *Case study on community-based water and sanitation facilities for urban slums in Tiruchirapalli city.* (<http://www.solutionexchange-un.net.in/environment/cr/res16060502.pdf>, 234KB)

WaterAid India 2005. **Drinking water and Sanitation Status in India: Coverage, Financing and Emerging Concerns,** New Delhi: WaterAid India. *Provides a good overview of the status of the drinking water and sanitation, in terms of coverage, financing and emerging concerns, in urban and in rural areas of India* (<http://www.solutionexchange-un.net.in/environment/cr/res16060501.pdf> 427KB)

Recommended Websites

ABD projects www.adb.org/Documents/Profiles/default.asp?key+ctry&val+Loan&scpe+12
Lists and provide links to details for ADB projects in water supply, sanitation and waste management in India.

Bangalore Water Supply And Environmental Sanitation Masterplan Project.

<http://www.developmentgateway.com.au/bangalore/htm/home.htm>

The project details of the Bangalore Water Supply And Environmental Sanitation Masterplan Project, aimed at improving the capacity for the delivery of water supply, sewerage and environmental sanitation services to the City of Bangalore with emphasis on the urban poor and vulnerable groups and within a process of long-term environmental, economic, social and institutional sustainability.

Department of Drinking Water Supply <http://ddws.nic.in>

The Department's official site which contains information programmes, newsletters, documents and policies related to drinking water supply in India. It also contains brief details and status of externally funded projects in India

IRC International Water and Sanitation Centre. <http://www.irc.nl/>

A wide range of information, news, advice and research on low-cost water supply and sanitation in developing countries.

Ministry of Urban Development and Poverty Alleviation <http://urbanindia.nic.in>

This official web-site of the Ministry provides a good insight into the policies and programmes related to urban development including for water supply and sanitation. It also gives a listing of all the externally aided water supply and sanitation projects in India that have been completed or are in different stages of implementation.

South Asia Consortium for Interdisciplinary Water Resources Studies (SaciWATERS).

<http://www.saciwaters.org/about.html>

SaciWATERS is a Consortium comprising of senior scholars based in academic institutions and NGOs in the different South Asian countries. The site contains information on its activities as well information related to water and sanitation sector.

Water Justice <http://www.waterjustice.org>

Recommended by [Deepa Joshi](#). It contains a resource centre and public discussion forum for promoting alternatives to privation in the water sector.

WatsanWeb <http://www.skat.ch/watsanweb/>

Developed by Skat Foundation with the financial support of the Social Development Division of the Swiss Agency for Development and Cooperation for people working in the water and sanitation sector. The site provides information on events, documents, networks, technologies etc related to the sector with a focus on developing countries.

Recommended Organizations

AusAid <http://www.usaid.gov.au/country/country.cfm?CountryId=9> supports projects for improvement in water supply services.

SPARC <http://www.sparcindia.org/> Works for development in urban slums including for providing adequate sanitation facilities.

Sulabh International <http://www.sulabhinternational.org/pg11.htm> Has developed cost-effective and appropriate sanitation systems which are also termed as a global urban best practice.

United Nations Development Programme www.undp.org/water Supports water related projects in their efforts towards empowerment of communities through a process of social mobilization and people-centered development.

United Nations International Children's Education Fund <http://www.unicef.org/india/wes.html> Has an active water and sanitation programme in India

WaterAid <http://www.wateraid.org.uk/> Is dedicated exclusively to the provision of safe domestic water, sanitation and hygiene education.

World Bank's Water and Sanitation Programme <http://www.wsp.org> Is an international partnership to help the poor gain sustained access to improved water supply and sanitation services.

Event

Roundtable Discussion on Private Sector Participation in Urban Water Supply in India. 15-16 June 2005 in Bangalore. The roundtable discussion for representatives from the state government agencies is proposed to understand private sector participation options in improving urban water supply and their potential contributions. The objective of the discussion is to create awareness among decision makers in State Governments on the potential for enlisting the participation of private sector in the delivery of water services, with the end in view of maximizing efficiency in service delivery. (<http://www.adb.org/documents/events/2005/Roundtable-PSP-IND/>)

Mihir Maitra, India Canada Environment Facility (ICEF), New Delhi

You are aware that cost effectiveness of infrastructure is directly related to other factors like Source (location) of raw water, Size of target population and the level of Services to be provided. Urban Water Supply is still in the hands of Water Boards, Municipalities, PHEDs. There have been talk about privatization but so far Private suppliers are happy with dealing only with tankers and bottled water. This is a policy change and governance issue.

Management improvement of the Water Boards/Municipalities/PHEDs have been tried under a few bilateral and multilateral funding agencies e.g Dutch/Dane in Kerala, World Bank in UP etc. It would be worth while to look in to what kind of changes these programmes have brought about in Institutional Management and capture the lessons for further improvisation.

Nupur Bose, Resource Person, Department of Environment and Water Management, A.N.College, Patna

I would like to offer you some suggestion that is based on our current research work in Bihar.

Urban India has 2 water related problems:

1. Water availability during the lean months
2. Deteriorating water quality

Regarding the first issue, my research group is experimenting with the rainwater harvesting model. This is being sponsored by the corporate sector. Second, we are creating awareness at the domestic level, to conserve water. Third, it is to be remembered that the economic situation of urban households do not permit large scale use of mineral water. Hence, mobile tanks of potable water can be reached to the masses. Fourth, Public handpumps can be constructed with access to deeper aquifers. In all community participation with Govt. and NGOs is must. In respect to the second issue, continous water quality monitoring is required. Remedial measures would involve prevention of microbila contamination, and , most important, bioremediation processes to minimize and even eliminate chemical contamination. In all these solutions, the immediate requirement is integration of work among all the stakeholders of this issue of Water resources in Urban India. Without linkages , no remedial measure can succeed.

Deepa Joshi, University of Southampton, UK.

If you are looking for examples outside India, look up the book, Reclaiming Public Water. Written with a focus against water privatization, the book has excellent examples of municipal managed and community-regulated, cost-effective and pro-poor 'working' urban water utilities. The complete book was available online to read at www.waterjustice.org

A J James, Environmental and Natural Resource Economist, and Director, Pragmatix Research & Advisory Services Pvt. Ltd., Gurgaon, Haryana

What I am aware of is that AusAid have funded work with the Bangalore Water Supply and Sewerage Board (BWSSB) in Karnataka, to try and improve the quality of services. I helped carry out a contingent valuation survey in 2000-1 for TARU Leading Edge, one of the Indian consultancy firms involved in this work. The study estimated willingness to pay for two groups of

users: slum dwellers and those in residential colonies. For the latter, realistic options for improved water supply was limited by what BWSSB Chief engineers were willing to promise (3 hours of water supply per day, but at specified time and with guaranteed water pressure), and for this users in residential colonies were only willing to pay Rs. 105, on average, compared to Rs. 100 that they were already paying (on average) as monthly water charges. Slum dwellers, on the other hand, were offered 3 options, ranging from 24-hour supply through BWSSB tankers fitted with water-vending machines at the back (like Mother Dairy booths), to shared tap connections. They were willing to pay, on average 25 paise per litre of water (they were already buying water at Rs.2 per bucket, but available only once in 3 days from local water vendors).

I believe the shared tap option has been finally approved and implemented by the BWSSB, but I have no information on the details. More details may be available from Somnath Sen of TARU (ssen@taru.org) or from Biraj Swain of Wateraid India (biraj@wateraidindia.org) – who may know the current status.

[Lalit M Sharma](#), Programme Leader - Water Management, S.M. Sehgal Foundation, Gurgaon, Haryana

Presently we are supplying the well treated subsidized water in the cities for all the purposes like drinking, bathing, flushing, car washing etc. We did not sensitize the users, in the past, about the limitations of present aquifer/distribution system. As a result everybody is using the same water for all the purposes as much as he/she can without realizing that this resource is not unlimited over and above some of the uses do not need that level of clean water.

- In case we categorize the uses of water based on the requisite quality and reuse the refusal/waste water coming out of category I (like kitchen, bath etc), for the category II (like flushing, irrigating lawns, car wash etc) after a primary / minimal treatment. This way we are not only curtailing the load on aquifers/distribution system but also the load on sewage treatment plants will be reduced considerably. We are soon starting the construction of Academy for Rural Research and Development at Gurgaon where we are targeting for 100% recycling of water dividing the uses in three categories.
- At the same time we need to create awareness and sensitize the users about the scarcity of water and school children could be the best carriers of this message.

[Biraj Swain](#), Policy Research Officer, WaterAid India, New Delhi

Regarding urban experiences & material on services in the urban sector, I understand we had shared an Urban Bibliography. In terms of the latest issues, financing remains a concern in view of the increasing rate of urbanization & decreasing finance sources available to the urban local bodies.

Multi-lateral Development Bank funding is also an emerging reality for financing water supply and sanitation (WSS) in urban areas but they are few & far between & mostly concentrated in the mega-cities or urban areas in well-performing states.

As for shared tap connection or shared toilets, BWSSB did try to explore its acceptability but I am told by Public Affairs Centre that it was never accepted by people. They are re-looking at the same in their World Bank funded Greater Bangalore Water Supply & Sanitation Project now.

BWSSB is trying out a citizen's participation model mainstreamed through Janagraha, but it is early days to comment upon it. That might throw some innovative solutions too. Bangalore sure will throw some light on all the questions i.e. cost, institutions, technology et al.

We are doing an assessment of sustainable WATSAN services for the urban poor in a few of the ADB funded cities. We can share the findings ones the study is final.

Many thanks to all who contributed to this query!

Moderator's Note: This was the first query posted on the network, and it has drawn varied and interesting responses. I thank you all for following or/and participating in the discussion. I am sure that many of you have a lot more examples and experiences, and maybe you too will like to share it Prof. Tushaar Shah and the rest of us! The query is still open, and we invite your insights and responses.

If you have further information to share on this topic, please send it to Solution Exchange for the Water and Environmental Sanitation Network in India at se-wes@groups.solutionexchange-un.net.in with the subject reading 'Re: [se-wes] Query: Cost-effective & financially sustainable urban water supply & sanitation services/from IWMI, Gujarat/Comparative experiences'

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