Environment

Water Community

Solution Exchange for the Water Community Discussion Summary

Strategy for Improving Urban Water Supply – Issue 3 - 24/7 Water is Inequitable and Unfair to the Poor

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From David Foster, Centre for Energy, Environment, Urban Governance and Infrastructure, Administrative Staff College of India, Hyderabad

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The quality of service in urban water supply in most Indian cities remains low, notwithstanding high subsidies and major investments in the sector. Leakage rates are high, most of the poor are not even connected to the water lines, and the rate of water borne disease is among the highest in the world. Further, despite high subsidies, when coping costs are included (household pumps, storage, and treatment, as well as lost time), the real cost to the consumer for this water is often higher than in other Asian countries that offer significantly better service.

To overcome these problems many organizations have sought to increase the water supply available through water tankers and public stand posts. Others have focused on Point of Use (POU) in-home treatment systems or sought to develop self-sustaining water kiosk systems where residents can purchase 10 litre containers of water at a nominal price.

The E-discussion process

This E-Discussion focuses attention on an option that has previously been all but dismissed and is now gaining new attention, not simply as a luxury good for the rich but as an essential service with major benefits for the urban poor: The role of Continuously Pressurized (24/7) Water Supply. No longer simply a "Pipe Dream", 24/7 Water has long been provided not only in the West but also in many Asian, Latin American and African countries. And within the last few years, successful demonstration programmes have been launched in such Indian cities as Navi Mumbai, Badlapur, Hubli-Darwad and Jamshedpur.

As a prelude to this discussion I would like to first list some of the major objections that are often raised in response to proposals for 24/7 water supply. We will then discuss each of these issues to determine if they are genuine obstacles, major but surmountable challenges, or only simple misunderstandings. We will break the debate around this subject into these four issues, run each issue for one week and provide an interim summary of the discussions. At the end of the process, we will provide an overall summary of the discussions along with recommendations that will hopefully give us some clarity on the subject of 24/7 water supply.

Common issues, covered under the discussion, will include the following:
1. “24/7 water supply requires too much water, encourages waste and would not be sustainable for most Indian cities.”
2. “24/7 water is too expensive for India. The poor can’t afford it and the rich don’t need it.”
3. “24/7 Water is Inequitable and Unfair to the poor.”
4. “Is 24/7 Water really a Luxury or is it critical to protecting water quality and public health?”

We have already had a vibrant discussion on the first two topics and are now moving onto the third one. We look forward to your inputs.

Issue # 3 “24/7 Water is Inequitable and Unfair to the Poor.”

Background: Since water resources are in limited supply and, therefore, must be rationed, the only fair way to ration water supply is by limiting the hours of availability per day. If the rich receive 4 hours per day and the poor receive 4 hours per day then both will be treated equally, but 24X7 water supply is a luxury designed for the rich. Furthermore, water tariffs are kept low to protect the poor and finally, if the poor can’t afford even the subsidized monthly rates, then city will provide them with free water via public fountains, standpipes or tank trucks.

Nobody, irrespective of socio-economic status, needs running water in the middle of the night. Therefore, constant water supply is a luxury, just like 5 Star hotels and restaurants or fancy private automobiles and is not required to meet basic public needs. It certainly should not be supplied by cash strapped local governments that can barely cover their expenses. If cities have the money, they should be spending it on providing better roads, schools or hospitals. It should never be the role of cities to provide luxuries for the few but they should focus instead on meeting the basic needs of the many.

I seek the Community’s inputs on the following:

1. What are the subsidies for existing water supply, and who do they benefit most?
2. Who will benefit from a 24/7 and fully metered water supply – the rich or poor, large or small users, and why?
3. Who is adversely impacted when people illegally tap into, or install suction pumps on the water mains, and what can be done about it?
4. If the water board adopts a policy of strictly enforcing bill payment requirements who is most likely to benefit?

The results of this discussion will feed into the on-going policy debate at the Administrative Staff College of India and help us to develop a framework on continuously pressurized water supply for cities.

Responses were received, with thanks, from

1. **Sanjeev Kumar Das, PMU Cell, HUDD, Government of Orissa, Bhubaneshwar**
2. **Shrikant Daji Limaye, Ground Water Institute, Pune**
3. **Atul Rawat, DMV Business & Market Research Pvt. Ltd., Hyderabad**
4. **David Foster, Centre for Energy, Environment, Urban Governance and Infrastructure, Administrative Staff College of India, Hyderabad (Response 1) (Response 2) (Response 3) (Response 4)**
5. **Tlaloc Tokuda, Auroville Water Harvest, Auroville, Tamil Nadu**
6. **Veena Srinivasan, Environmental and Earth Systems Science Department, Stanford University, USA (Response 1) (Response 2)**

7. **Bhaskar Kolluri, Burgess and Niple, Arizona, USA**
8. **Arunabha Majumder, Jadavpur University, Kolkata**
9. **Ramesh Jalan, United Nations Development Programme (UNDP), New Delhi**
10. **Johnson Rhenius Jeyaseelan, Wateraid, Lucknow**
11. **P. Anbazhagan, RWS Engineering Specialist, Chennai**

Further contributions are welcome!

Summary of Responses

The current urban supply regime in most cities is heavily subsidized benefitting largely the well-off. These have been quantified in the previous part of this discussion. In this section there is a consensus that the poor may benefit from continuous water supply. The caveat is the pricing mechanism that has to ensure that water is not priced out of reach of the poor.

Subsidies are required whenever the cost of a service is greater than the revenue collected. However, a subsidy need not favour the poor, as happens in the case of urban water supply. This is because most of the poor are not connected to the municipal water supply system. The poor usually pay 10-20 times what the rich do for water. Further, when revenues are insufficient to cover the cost of operation and maintenance, it increases the chances that the water utility will be unable to repair leaks, further decreasing the amount of water available to the poor. On the other hand, if more poor households are connected to the water lines, then the subsidy can be more accurately targeted to the poor.

While 24X7 water supply may be more equitable than an intermittent one, the utility will have to develop a rational structure and effective billing mechanism. In most cities everybody will benefit from a properly managed continuously pressurized supply system. Despite the fact that many people still regard 24/7 water as a luxury for the rich, studies have shown it is actually the poor who have the greatest improvement in their lives. The rich have already invested in domestic water storage systems, that may become redundant. But the poor have no resources to do so and will therefore be the greatest beneficiaries of a continuous water supply.

Most 24X7 water supply systems should have a slab rate system (telescoping tariffs). These will keep water charges low for the poor and low volume consumers while providing necessary disincentives for the rich and high volume consumers. In Navi Mumbai, where half the city now receives 24/7 service (including most of the slums), the charge for water to the slum population is less than Rs. 5/kiloliter.

Another pre-condition for a successful 24X7 system is removal of all illegal connections and suction pumps that people install on the water mains. These reduce the willingness to pay. They also waste water since they are done by unqualified plumbers. In addition, they create a vacuum in the water pipelines increasing the chances of contamination from dirty water. These connections flourish since the cost of legal connections are often out of reach for the poor. Also, people living in slums do not have the papers required for a legal connection since they have no formal residence permits.

While the poor create illegal connections, the rich are responsible for installing illegal suction pumps. These pumps are a classic example of the "Prisoner's Dilemma" in Game Theory, in which individuals seeking to protect their own interest wind up harming everyone involved. Ironically, people install these pumps to increase their personal water supply but whenever many people have installed those pumps, they do not get extra water. In addition, they pay more money to create negative pressure within the water line thus sucking contaminated water (including raw sewage) right into the water line. This creates a health hazard.

If the water utility enforces its own billing system, everybody stands to gain. Every uncollected bill not only reduces revenue but encourages others who might have paid their bills to withhold payment as well. Ironically, in most communities it is often the rich families that fail to make their payments on time. The poor families are more often so grateful to have water connections that they are better at paying their bills. Regardless of who is worse about paying bills, whenever bills are not collected and revenues fall short of providing the funds necessary to operate and maintain the system, it is invariably the poor who will be first to suffer from poor service.

Effective billing can also address another concern of 24X7 water supply, that it will lead to enormous water wastage. However, the discussion has indicated there are concerns about the agency that sets the water tariffs, the mechanism to do so and the redressal mechanism for bill-related complaints. These are some of the issues that came up during this stage of the discussion.

Related Resources

Recommended Documentation

Dying Wisdom *(from Tlaloc Tokuda, Auroville Water Harvest, Auroville, Tamil Nadu)*
Book; by Anil Agarwal and Sunita Narain; Centre for Science and Environment
Available at: 41, Tughlakabad Institutional Area, New Delhi 110062; Tel: 91-11-29955124, 29956394; Fax: 91-11-29955870, 29955879; cse@cseindia.org

> *Provides a comprehensive overview of India's millennia old tradition of water harvesting, which triggered a nationwide interest in community-based water management*

From Shweta Tyagi, Consultant

The Saga of 24/7 Water Supply
Article; by S. Vishwanath; January 2008;
Available at: http://rainwaterharvesting.wordpress.com/2008/01/13/247-water-supply-in-cities-of-india/

> *Discusses how continuous water supply in the cities of India will have to entail ensuring the safety and sustainability of water*

National Water Policy 2002
Policy Paper; Ministry of Water Resources; New Delhi; 2002
Available at http://wrmin.nic.in/writereaddata/linkimages/nwp20025617515534.pdf (PDF; Size: 56KB)

> *Provides details about the institutional mechanisms required for managing water resources, including drinking water supply*

Is a 24 hour Water Supply Possible?
Article; by S. V. Suresh Babu; October 2003;

Available at: http://www.indiaenvironmentportal.org.in/node/38780

The article debates whether continuous 24/7 drinking water supply is a sustainable option in the Indian context

36 Roofs for 24/7 Water: Harvesting Rainfall in Badlapur
Article; by Cizar Tigno, Asian Development Bank; December 2007;
Available at: http://www.adb.org/Water/Actions/IND/Badlapur.asp

Explains how a rainwater harvesting unit installed in Badlapur, Maharashtra has aided in 24/7 water supply in the region

Divining round the Clock Water
Article; by Bharat Lal Seth; Down to Earth; Centre for Science and Environment; October 2009; Available at:
http://www.downtoearth.org.in/full6.asp?foldername=20091031&filename=news&sec_id=9&sid=41

The article traces the experience of five cities to find out if continuously pressurized 24/7 water supply is a viable and sustainable option for implementation

From Sunetra Lala, Research Associate

Pani Panchayat in Orissa, India: The Practice of Participatory Water Management
Article; by Basanta Kumar Sahu; Palgrave Macmillan; England; March 2008; Available at http://www.ingentaconnect.com/content/pal/dev/2008/00000051/00000001/art00021

Argues the need for strengthening existing local institution such as panchayats, for ensuring equity in water access, which will lead to better development of water resources

Needed, A Paradigm Shift
Article; by Vibhu Nayar and V. Suresh; The Hindu; October 2008;
Available at
http://www.thehindu.com/thehindu/mag/2008/10/26/stories/2008102650130400.htm

Discusses how only new initiatives between state institutions, such as panchayats and the citizen, based on transparency, can ensure fair access to water for everyone

Public Private Partnerships and the Poor in Water and Sanitation
Report; by Water, Engineering and Development Centre (WEDC) and Department for International Development (DFID); United Kingdom; 2003
Available at http://www.dfid-kar-water.net/projects/files/R7388.html

Describes sustainable and practical processes for water supply services to the poor through public-private partnerships

Recommended Organizations and Programmes

Centre for Science and Environment (CSE), New Delhi *(from Tlaloc Tokuda, Auroville Water Harvest, Auroville, Tamil Nadu)*
41, Tughlakabad Institutional Area, New Delhi 110062; Tel: 91-11-29955124, 29956394; Fax: 91-11-29955870, 29955879; cse@cseindia.org; http://www.cseindia.org/programme/nrml/nrml-index.htm

NGO working on environmental issues, runs various campaigns on water harvesting and is working on issues of urban water supply

From Shweta Tyagi, Consultant

Central Water Commission (CWC), New Delhi

Sewa Bhawan, R.K. Puram, New Delhi 110606; Tel: 91-11-23172483; Fax: 91-11-26195516; smdte@mail.nic.in; http://cwc.gov.in/main/webpages/activities.html

CWC is working with state governments to ensure sustainable water supply in all parts of the country, advices the government on various water related policies

Water and Sanitation Management Organisation (WASMO), Gujarat
3rd Floor, Jalsewa Bhavan, Sector 10-A, Gandhinagar 382010 Gujarat; Tel: 91-79-23247170; Fax: 91-79-23247485; wasmo@wasmo.org; http://www.wasmo.org/cms.aspx?content_id=15

Focuses on community-managed drinking water supply, with the involvement of panchayats, coordinates the activities of the Village Water and Sanitation Committees

United Nations Children's Fund (UNICEF), New Delhi
73, Lodi Estate, New Delhi 110003; Tel: 91-11-24690401, 24691410; Fax: 91-11-24627521, 24691410; newdelhi@unicef.org; http://www.unicef.org/india/wes.html

Supports the national and state governments in developing and implementing a range of replicable models for water supply and sanitation

From Sunetra Lala, Research Associate

Kerala Rural Water Supply and Sanitation Agency, Kerala
PTC Towers, S. S. Kovil Road, Thampanoor, Thiruvananthapuram, Kerala; Tel: 91-471-2337002; Fax: 91-471-2337004; mis@jalanidhi.com; http://www.jalanidhi.com/index.htm

Works through Panchayats for the implementation of its drinking water supply schemes. 3699 water supply schemes, managed by beneficiary groups have been completed so far

Swajaldhara, New Delhi
9th Floor, Paryavarn Bhawan, CGO Complex, Lodhi Road, New Delhi 110003; Tel: 91-11-24361043; Fax: 91-11-24364113; jstm@water.nic.in; http://ddws.nic.in/swajaldhara.htm

Programme focuses on decentralised implementation of rural drinking water supply, involving the participation of panchayats and communities

Jalswarajya, Maharashtra
1st Floor, Mantralaya, Madam Cama Road, Nariman Point, Mumbai 400032, Maharashtra; Tel: 91-22-22885144; Fax: 91-22-22814623; director@mahagsda.org; http://www.mahawssd.gov.in/dataentry/Performance_page.asp

A World Bank funded project, the project is designed to strengthen the implementation of water sector reforms all over the state, including those for drinking water supply

Jalanidhi, Kerala
PTC Towers, S. S. Kovil Road, Thampanoor, Thiruvanthanpuram 695001, Kerala; Tel: 91-471-233700; Fax: 91-471-2337004; mis@jalanidhi.com; http://jalanidhi.com/decentralization.htm

State-level project assisted by the World Bank to provide water and sanitation services, and augment groundwater resources in the state

Recommended Portals and Information Bases

India Water Portal, Arghyam, Karnataka *(from David Foster, Centre for Energy, Environment, Urban Governance and Infrastructure, Administrative Staff College of India, Hyderabad; response1)*
http://www.indiawaterportal.org/post/2198; Tel: 91-80-41698941; Fax: 91-80-41698943; Deepak Menon; Product Manager; deepak@arghyam.org

Provides an interactive spreadsheet, which helps to calculate the hidden cost of "free water" and argues the need for 24/7 water supply in the Indian context

From Shweta Tyagi, Consultant

India Environment Portal, Centre for Science and Environment, New Delhi
http://www.indiaenvironmentportal.org.in/taxonomy/term/2150; Tel: 91-11-29955124; Fax: 91-11-29955870; cse@cseindia.org

A portal on environmental issues initiated by Centre for Science and Environment, has a lot of useful resources on water supply both in the urban and rural context

Related Consolidated Replies

Strategy for Improving Urban Drinking Water Supply: Issue 1 - 24/7 Water Supply is Wasteful, David Foster, Administrative Staff College of India, Hyderabad. Water Community, Solution Exchange India,
Issued 17/09/09. Available at http://www.solutionexchange-un.net.in/environment/cr/cr-se-wes-16020901.pdf (PDF, Size: 184KB)
Seeks inputs regarding whether a 24/7 water supply encourage people to conserve water and if a well-managed continuously pressurized water supply system requires more water

Strategy for Improving Urban Drinking Water Supply: Issue 2 - 24/7 Water Supply is too Expensive, David Foster, Administrative Staff College of India, Hyderabad. Water Community, Solution Exchange India,
Issued 01/12/09. Available at http://www.solutionexchange-un.net.in/environment/cr/cr-se-wes-02030901.pdf (PDF, Size: 202KB)

Seeks inputs regarding whether a 24/7 water is too expensive for India - the poor can't afford it and the rich don't need it

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Responses in Full

Sanjeev Kumar Das, PMU Cell, HUDD, Government of Orissa, Bhubaneshwar

1. What are the subsidies for existing water supply, and who do they benefit most?
Most of our utilities are not run on a 'Product-Services- cost centre-profit centre concept'. These are mostly supply driven without any recourse to achieving service level benchmarks, cost recovery, equity and so on. In the context of Orissa, we are no different. Our experience from Bhubaneswar reveals that piped water supply still remains an illusion for most of the urban poor who constitute more than 30% of the urban population. Present supply is more than two times the existing consumer demand. First thing is that the operations are not ring fenced, secondly subsidies are not spelt out and mostly passed on to the rich and affluent unnoticed.

2. Who will benefit from a 24/7 and fully metered water supply – the rich or poor, large or small users, and why?
Continuous metered water supply would ensure equitable water supply which is environmentally sustainable and will benefit all categories of people provided rationalized tariff structure with clearly defined subsidies/cross-subsidies are in place.

3. Who is adversely impacted when people illegally tap into, or install suction pumps on the water mains, and what can be done about it?
Illegal tapping affects everybody including the urban poor. The only solution to do away with such situation is to provide continuous water supply with sufficient pressure.

4. If the water board adopts a policy of strictly enforcing bill payment requirements who is most likely to benefit?

Better revenue means better services and vice-a-versa; it will benefit both the Board and the consumers. However, we must service the customers well to develop inclusive partnership with them which will certainly help in timely payment of bills.

Shrikant Daji Limaye, Ground Water Institute, Pune

Unfortunately in India, the city water supply scenario is not so simple and logical. Many slums in Pune, with large number of voters crowded in a small area, have public taps running with full pressure for 12 to 24 hours and these people do not pay for water. The taps are often leaking and water is wasted. In the neighboring apartment complexes, where people pay for water, the pressure is low and the supply is for 4 to 8 hours only. In some other areas, the elected representatives are operating water-tanker service, either openly or in secret partnerships. The pressures are kept low with the specific purpose of promoting the demand for tankers. I do not think that any logical discussion is helpful when cities are growing fast, the elected representatives/Councilors are of sub-standard educational and moral caliber and the voting power of slums has a capacity to attract water like a magnet.

Atul Rawat, DMV Business & Market Research Pvt. Ltd., Hyderabad

1. "24/7 water supply requires too much water, encourages waste and would not be sustainable for most Indian cities."

I totally agree with above mentioned statement. In India, people still have not recognized the need of fresh water. They don't realize that 85 % of the rural population in India is solely depended on groundwater, which is depleting at a fast rate. In the urban areas though about 60% of the population is depended on surface water sources, the availability and quality are questionable. The 10 minutes of shower means wastage of 50 gallons of water, brushing under the running tap takes 4 gallons of water whereas the same work can be done with 0.25 gallon of water if the tap is turned off. These are small example of the general tendency of people, when they do not get 24/7 water supply.

2. "24/7 water is too expensive for India. The poor can't afford it and the rich don't need it."

The poor people residing in slums rely on the water supply from the tap provide by the municipal corporation or gram panchayats. It would be tough for them to arrange money for taking separate water connection. 24/7 water supply will only encourage people to waste water as they won't be able to understand the importance of water.

3. "24/7 Water is Inequitable and Unfair to the poor."

24/7 water supply will increase the threat of water related diseases in the rural and slums areas. About 10 per cent of the rural and urban population does not have access to regular safe drinking water and many more are threatened. Most of them depend on unsafe water sources to meet their daily needs. Moreover, water shortages in cities and villages have led to large volumes of water being collected and transported over great distances by tankers and pipelines. Chemical contaminants namely fluoride, arsenic and selenium pose a very serious health hazard in the country. It is estimated that about 70 million people in 20 states are at risk due to excess fluoride and around 10 million people are at risk due to excess arsenic in groundwater. Apart from this, increase in the concentration of chloride, TDS, nitrate, iron in ground water is of great concern for a sustainable drinking water programme.

4. "Is 24/7 Water really a Luxury or is it critical to protecting water quality and public health?"

It is critical to protect water quality and public health. Pollution of ground and surface waters from agrochemicals and from industries poses major environmental health hazards. Ingress of seawater into coastal aquifers as a result of over extraction of groundwater supplies more saline water, which is unsuitable for drinking.

David Foster, Centre for Energy, Environment, Urban Governance and Infrastructure, Administrative Staff College of India, Hyderabad *(response 1)*

In discussions regarding water supply in India during the past several years one of the most commonly voiced concerns has long been the question of whether 24/7 supply would be inequitable to the poor? In fact, one of the most often repeated comments has been: "24/7 supply is an unnecessary luxury: The rich don't need it and the poor can't afford it." When the issues are closely examined, however, it becomes evident that both rich and poor can be major beneficiaries and, surprisingly, the poor will often benefit the most.

Several members have already provided thoughtful responses pointing out both some of the advantages of 24/7 water and some of the many challenges that lie ahead. Looking again at the questions one by one:

1. What are the subsidies for existing water supply, and who do they benefit most?

Subsidies are required whenever the cost of a service is greater than the revenue actually collected for providing that service. Currently most cities in India fail to bill and collect enough money even to cover the cost of O&M (Operation and Maintenance) and almost no city recovers the cost of capital expenditures. In fact, water supply in India is one of the most heavily subsidized services in the world. Just because a service is subsidized, however, tells us nothing about whether the service is "Pro Poor". While the rationale for keeping monthly water charges low, for example, is invariably "to protect the poor", in most cases the poorest people are not even connected to the water supply lines and receive little or no benefit from those subsidies. As Sanjeev Kumar Das rightly points out, most of the subsidy goes not to the poor but to the rich. Even where the poor have access to "free" water from public stand posts or water tankers, the relatively small quantity of water that they actually receive in that fashion plus the amount of time that they must expend in obtaining that water means that water for the poor invariably costs 10 to 20 times as much per kiloliter as water for the rich and 60% to 80% of the subsidy typically goes to APL families (families Above the Poverty Line). If you have not done so already, please check out the Indian Water Portal web site to get a better understanding of the true cost of "free water": http://www.indiawaterportal.org/post/2198

Furthermore, whenever revenues are insufficient to cover the cost of O&M it greatly increases the risk that insufficient funds will be available to adequately identify and repair leaks thus even further decreasing the amount of water available to the poor. Conversely, when more of the poor are connected to the water lines (as has been done in Vijayawada, Bangalore, and Navi Mumbai) then the subsidy can be more accurately targeted to the poor. Likewise, when leakage rates can be reduced then the pumping and treatment costs will also be reduced as well as the overall need for subsidies.

2. Who will benefit from a 24/7 and fully metered water supply – the rich or poor, large or small users, and why?

In most cities both rich and poor will benefit from a properly managed continuously pressurized (24/7) supply system. Despite the fact that many people still regard 24/7 water as a luxury for the rich, it is actually the poor who will observe the greatest improvement in their lives. While most upper income families have already invested in storage tanks, pumps and treatment systems in order to compensate for their water board's failure to provide 24/7 service, the poor can never afford such investments. Furthermore, the metering system recommended for most

24/7 systems will also enable increasing block rate (telescoping) tariffs that can keep water charges low for the poor and low volume consumers while providing necessary incentives for the rich and high volume consumers. In Navi Mumbai, where half the city now receives 24/7 service (including most of the slums), the charge for water to the slum population is less than Rs. 5/kiloliter.

3. Who is adversely impacted when people illegally tap into, or install suction pumps on the water mains, and what can be done about it?

Illegal connections and "suction pumps" that tap directly into the water main are harmful to everyone, rich and poor alike. Not only do unauthorized illegal connections reduce the revenue required necessary to maintain the water supply system but the continued existence of illegal connections inevitably reduce the willingness of those with authorized connections to pay their own water bills. In addition, illegal connections are typically made by unskilled plumbers who not only create leaky connections but often shake up existing connections making those connections more leak-prone as well. Interestingly, one of the most effective means of reducing illegal connections is to reduce the cost and administrative requirements in obtaining legal connections. Most people who obtain illegal connections do so not because they refuse to pay the monthly charges but because they can not get permission and/or comply with the high cost of connections.

Just as the poor are often guilty of creating illegal connections, it is the rich who are primarily responsible for installing illegal suction pumps. These pumps are a classic example of the "Prisoner's Dilemma" in Game Theory, in which individuals seeking to protect their own interest wind up harming everyone involved (for a more detailed explanation of Prisoner's Dilemma check out Games Indians Play by Dr. V. Raghunathan). Ironically, people buy and install these pumps to increase their personal water supply but whenever large numbers of people install these pumps not only do they fail to get any additional water but they actually pay more money to create negative pressure within the water line thus sucking contaminated water (including raw sewage) right into the water line.

4. If the water board adopts a policy of strictly enforcing bill payment requirements who is most likely to benefit?

Harsh as it may sometimes seem, strict enforcement of billing and collection benefits everyone. Every uncollected bill not only reduces revenue but encourages others who might have paid their bills to withhold payment as well. Ironically, in most communities it is often the APL families that fail to make their payments on time. BPL families are more often so grateful to have water connections that they are better at paying their bills. Regardless of who is worse about paying bills, whenever bills are not collected and revenues fall short of providing the funds necessary to operate and maintain the system, it is invariably the poor who will be first to suffer from poor service.

In Navi Mumbai the managers of the water system openly admit that one of the secrets to their success is "ruthless" enforcement of billing and collection. This strict enforcement enables them to maintain over 95% collection efficiency and that efficiency provides the required revenue to identify and repair leaks and maintain their water supply system. When we asked: "What happens when a politician fails to pay their water bills?" the response was that: "Everyone (including politicians) gets three warnings and then we disconnect them from the water system."

David Foster, Centre for Energy, Environment, Urban Governance and Infrastructure, Administrative Staff College of India, Hyderabad *(response 2)*

believe that Shrikant Daji Limaye raises some excellent points regarding equity and water supply. In addition to the issues we have already raised regarding the inefficiencies and high

costs (to consumers and ULBs) in providing water via public stand posts, Shrikant also points out the all too common waste of water at public taps. He also points out that water-tankers are often the result of secret and corrupt partnerships between politicians and the owners of the water tankers. For these and the other reasons previously discussed, we see direct household connections as a far more efficient and more equitable system of providing water.

Where I would disagree with Shrikant, however, is regarding implied suggestion that we should not discuss improving the water supply "when cities are growing fast". Once again, India is not urbanizing faster than many cities that already provide 24/7 water and intermittent supply is clearly no solution to problem of rapid growth. The idea that water supply improvements should be deferred during periods of rapid growth is rather like suggesting that I should avoid feeding my young son because he is growing so fast.

David Foster, Centre for Energy, Environment, Urban Governance and Infrastructure, Administrative Staff College of India, Hyderabad *(response 3)*

Atul Rawat has raised a number of important issues regarding equity and has addressed them below to each of the four basic issues most often raised regarding 24/7 water supply. Nonetheless, while the responses are thoughtful and the issues are important, I still disagree with some of the conclusions.

Atul, for example, still believes that 24/7 water will lead to too much wastage of water despite the evidence from Singapore, Phnom Penh, Navi Mumbai and many other cities in Asia and Africa. Atul is right that un-metered water could easily lead to excessive use and even wastage of water but cities throughout the world that have developed comprehensive programs (including leak detection and repair, effective metering and appropriate tariffs, efficient billing and collection and good public awareness systems) have been able to minimize waste of water and provide equitable distribution.

Atul Rawat also points out that the high cost of obtaining water connections can be a formidable barrier to the poor and for this reason we have pointed out the successful programs in Vijayawada, Bangalore, and Navi Mumbai have all helped to provide household water connections for the poor. Thus we see high cost of water connections as a reason of reforming the connection fees rather than a reason for further delaying 24/7 water supply

Finally, Atul Rawat goes on to emphasize that "24/7 water is critical to protect water quality and public health. On this we fully agree. As will be further discussed next week, one of the most important reasons for providing 24/7 water is precisely to prevent the infiltration of contaminated water that so often occurs during periods of intermittent water supply. Thus while we may disagree regarding some of the intermediate challenges, we completely agree on the long term value of 24/7 water in protecting public health.

Tlaloc Tokuda, Auroville Water Harvest, Auroville, Tamil Nadu

I have not followed the entire stream of discussions on 24/7 water supply, so I'm sorry if I'm going over old ground. The main issue from a sustainable/ecological point of view is: where is this huge volume of water going to come from (because demand is going to jump through the roof!)? Will they come from Indian rivers? The Centre for Science and Environment, Delhi (CSE) has documented that all of India's rivers are sewage flows (along with illegal dumping of toxic and hazardous waste). Or do we tap our over stressed aquifers? Thanks to political interests, the Green Revolution and organizations with financial interests, which continue to subsidize electricity

to farmers, the falling water tables create saltwater intrusion or bone dry aquifers. The proponents of 24/7 seem too caught in an old paradigm where nature is infinite.

Do we look forward to the past (please refer to the book Dying Wisdom by CSE) and start to use India's ingenious indigenous rainwater harvesting techniques? However, much of the catchments flow through the shitting fields (which are prone to open defecation). I would like David to explain where all this water is supposed to come from?

Veena Srinivasan, Environmental and Earth Systems Science Department, Stanford University, USA *(response 1)*

2. Who will benefit from a 24/7 and fully metered water supply – the rich or poor, large or small users, and why?

My hypothesis is that the benefits are maximum at both ends of the spectrum, least in the middle. Low-income consumers benefit because obviously they no longer have to collect and store (and perhaps discard) water. They simply turn on the tap or standpipe when they need water. This is of course assuming public standpipes are left and there is some kind of increasing block-rate tariff in place.

Large commercial and residential consumers (hotels, hospitals, office complexes, even large apartment complexes) in intermittent systems, don't get enough water in the few hours water is available (based on some back-of-the-envelope estimations). Consumers with in-house sumps living in single or multi-family residences benefit the least - they already have reasonable reliability and won't get the benefits of the improved quality anyway, particularly if they don't rip their sumps off (if they are rational they won't).

I have a couple of related questions though (perhaps they've been addressed before, in which case I apologize):

a) What happens with existing sumps in the push to 24/7? I am presuming people don't rip them off right away. What is known about how existing sumps affect demand, attitudes, metering, etc in the transition to 24/7?

b) Are there any problems with current metering technologies in low-pressure zones? A colleague of mine once raised the issue of the "chicken-and-the-egg", wherein meters were not working because pressure was too low, but having full-fledged metering was essential to getting to 24/7. Is this really true?

Bhaskar Kolluri, Burgess and Niple, Arizona, USA

24/7 water supply - Sounds good, but is it plausible?

I have seen all posts, but no one really addressed (if someone already did then this is just my 2 cents) the cost of infrastructure to maintain a 24/7 supply. 24/7 supply needs a lot of infrastructure, from treatment plants, booster pump stations, storage, meters, etc. The costs of labour might be cheap, but the material costs tend to be the same as western world.

1. Let us assume the lpcd (liters per capita per day) in India is 100, therefore to serve a city with population of about 10 lakh = 100 Million LPCD is needed
2. Add to this 100 Million LPCD pumping capacity the storage capacity of 40 Million Liters, in addition to piping, electrical costs.

3. The total cost of infrastructure, treatment and maintenance costs wouldn't be affordable by the poor. (Assuming the water is readily available, which is not the case in many cities)

Obviously the costs are dependent upon case by case basis.

David Foster, Centre for Energy, Environment, Urban Governance and Infrastructure, Administrative Staff College of India, Hyderabad *(response 4)*

Veena Srinivasan from the Environmental Earth Systems, Science Department, Stanford University, has raised an interesting hypothesis regarding the differential impact of 24/7 water supply. While I fully agree that the most noticeable immediate benefit will be to the BPL families not currently connected to the water lines and who lack in-house facilities to store, pump and treat their water, I believe that the data clearly show that in a properly managed system there will be benefits to all consumers.

To understand why the middle class will also benefit, we need to first understand that for years municipal water boards have been achieving false economies by pushing costs away from the water board and on to the consumer. When the water board, for example, fails to protect water during distribution, then all consumers (including the middle class) in incur an unnecessary cost for in-home treatment. When the water board fails to provide adequate pressure, then the consumer incurs a cost for in-home pumping. And, when the water board fails to provide reliable service (24/7) then the consumer incurs a cost for in-home storage.

Not only are these costs unfairly passed on to the consumer but they are far more expensive and less efficient when handled at the household level. Not only are thousands of small household storage tanks far more expensive than a few large municipal tanks but all of the small household pumps require far more energy than a few highly efficient large capacity municipal pumps.

Veena also asks what happens to the existing sumps (presumably household cisterns plus water pumps) once 24/7 supply is provided. Although I know of no plan to "rip" this equipment out once it is made redundant by newly improved (24/7) service, the homeowner would still experience considerable savings by no longer having to maintain and operate this equipment. For example, in many Indian cities today the consumer pays more just to operate the household pumps than they do for their monthly water bills. This would result in an immediate savings to the consumer and, overtime, additional savings would accrue when they no longer needed to replace that equipment when it wore out. In addition, many homes also have illegal "suction pumps" that they use in a race with their neighbours to draw water directly from the water mains. These pumps are illegal because they create negative pressure within the water line and suck contaminated water into the main. Existing rules against these illegal pumps should be enforced.

Finally, Veena asks another good question regarding the accuracy of water meters under conditions of low pressure and intermittent supply. Although the accuracy and longevity of water meters varies substantially, it is true that intermittent supply places a special burden on these meters. When the water is contaminated and the water mains are turned off and on repeatedly throughout the week, this subjects the meters to frequent shaking and getting wet and dry. This, in turn, allows deposits to build up on the meters and substantially reduces their useful life.

Veena Srinivasan, Environmental and Earth Systems Science Department, Stanford University, USA *(response 2)*

Firstly, I entirely agree with **David's** point regarding savings in treatment costs for all households. However, we need to show that these middle-class households with sumps will in fact experience quality improvements. The reason I asked the question about sump removal, is because my understanding is that its not just a matter of letting the pumps fall into disrepair. Every sump that I have seen (in Chennai) has been such that the piped mains were physically disconnected from the taps in the house. The technical question I have is how is the water from the mains going to the taps, without households having to retrofit plumbing. Perhaps these are minor costs, perhaps not. But I don't see how these quality benefits will materialize without some retrofitting. Or is the main argument that having pressurized pipes eliminates 90% of the contamination so that the contamination from sumps and overhead tanks is relatively insignificant?

Secondly, while it is true that having sumps at the individual household-level is ultimately more expensive than having improved centralized infrastructure, the latter argument only works BEFORE households have sumps. AFTER households have sumps they represent sunk costs, so households won't consider them other than ongoing pumping costs of about Rs 2/kL.

I don't see how the current O&M costs of Rs 2/kL (of sump and pump maintenance) are going to compare with tariff hikes (Rs 10/kL?) that are being proposed.

David, while I am on the same side as you, but there is a difference between what is socially optimal and what is privately optimal. I have relatively little sympathy for households with sumps, I think it is important to recognize that they have little incentive (economically and politically) to push for 24*7. I was hoping for some discussion on how to align the incentives better.

Arunabha Majumder, Jadavpur University, Kolkata

- The basic subsidy for water supply is the price. In most of the cities and towns, there exists a large budget deficit; a big gap between revenue and expenditure. The rich community enjoys these benefits more.
- The rich and bulk consumers will get benefit more from 24/7 water supply.
- The poor get are worst-affected. The water quality may deteriorate because of suction pumps used on the water mains. Household treatment facilities are also not available to them.
  4. The poor will get benefits only because rich defaulters' owe large amounts to water utilities.
- In a city, if 35% people are residing in slums, then 24/7 water supply will not benefit them. We have to improve the quality of life of the people, and as such holistic efforts are necessary.

Ramesh Jalan, United Nations Development Programme (UNDP), New Delhi

If the water at the municipal level is treated properly and supplied to the homes directly 24X7 it may lead to improvement in water quality thereby making the overhead tank and underground storage tanks redundant. However, I agree with Ms. Veena Srinivasan that retrofitting of the plumbing would be essential to supply this water directly to all the taps of each household and some degree of storage in the overhead tanks would be essential, which could also happen directly from the mains.

However, I believe that with one third of the world already facing water stress and by 2030, more than two-thirds of the world is expected to be water stressed , the utopic solution of water supply 24X7 seems to be far fetched and is unlikely to see the light of the day even if all the

water conservation measures available to us are put in practice and each of them succeed to the extent we desire.

Most of the cities in India are using ground water to supply to the residents and the residents have also installed bore wells to pump water to the overhead tanks. The rate at which water extraction from underground sources is taking place in the next decade most of these bore wells will become dry and the water table may decline by a further 10-15 m at least.

Therefore, the need of the hour is to focus more on water conservation then even oil . As oil has substitutes and alternatives but there are no substitutes for fresh water and it continues to be the life source for all living species on the planet earth.

Johnson Rhenius Jeyaseelan, Wateraid, Lucknow

I was going through all the interesting discussions and my observations are as follows:

Who will benefit from a 24/7 and fully metered water supply – the rich or poor, large or small users, and why?

Yes it will benefit the poor and small users but who will decide the user charges? If it is politicians then like waiving farmer loans, they will also waive off water tariff to get votes. Who manages and controls the system is crucial and it will be better if RWAs (resident welfare associations) or institutions where politicians have less say should manage these institutions.

Who is adversely impacted when people illegally tap into, or install suction pumps on the water mains, and what can be done about it?

It is those living in the far end or in higher elevations who are affected. And we are known for tampering with meters, like autos tamper even with tamper-proof meters. So we should have a technology that is tamper proof. Though it may be costly it will benefit in long term.

If the water board adopts a policy of strictly enforcing bill payment requirements who is most likely to benefit?

The worst affected will be poor and also the water board will have upper hand. If there is illegal tapping and the bill is high, what are the redressal mechanisms? In India it is usual to pay brines to the linesman so that the connection is not cut, so how will these issues be addressed?

P. Anbazhagan, RWS Engineering Specialist, Chennai

24 x 7 water supply? We need to put a lot of effort in adapting this concept to Indian conditions. We think only about the cities, but villages cannot be deprived of water from where it is been transferred to cities. The users are different but we will try to teach rural people for water conservation and recharge, even as the urban elite never cares for these things. I hope members will give equal thought to rural and urban populations.

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 with the subject heading "Re:

[se-watr] Query: Strategy for Improving Urban Water Supply - 24/7 Water is Inequitable and Unfair to the Poor. Additional Reply."

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