

**NATIONAL URBAN
WATER AWARDS 2008**

Compendium of Good Initiatives

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**Secretary
Ministry of Urban Development
Government of India
Nirman Bhavan, New Delhi**



Dr. M. Ramachandran

Foreword

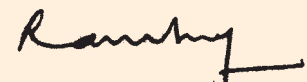
Serving the urban population with adequate and safe water and sanitation services remains a serious challenge for state and urban local governments in India. Enhancing water service delivery levels is also crucial to furthering India's progress in achieving the Millennium Development Goals (MDGs). The urban local bodies are making concerted efforts to experiment and innovate in more ways than one to extend services to the urban communities especially to the poor and the marginalized. These innovations relate to areas like technical, financial, services to poor, management practices, citizen participation, waste water recycling, etc.

The Ministry of Urban Development, Government of India, with a view to achieve universal access to water supply has prioritized water supply projects under *JnNURM*. The Ministry is also encouraging sector reforms under *JnNURM*. With a view to further reforms in the sector and to promote innovation and competitiveness among the local bodies and utilities, the Ministry has instituted the **National Urban Water Awards** in association with the Administrative Staff College of India (ASCI) and Confederation of Indian Industry (CII) to be given each year beginning from 2008.

I congratulate all those who won the Awards as well as all those who participated in the competition this year. This compilation of sixteen shortlisted nominations covers a spectrum of innovative practices and has potential for scaling up and replication.

I am confident that this Award programme will encourage competitiveness and innovation among the local bodies and utilities in the years to come.

The Ministry of Urban Development wishes to thank ASCI and CII for their support in organizing the Award Programme and in the preparation of this compendium.


Secretary (UD)



**Joint Secretary
Ministry of Urban Development
Government of India
Nirman Bhavan, New Delhi**



A.K. Mehta

Message

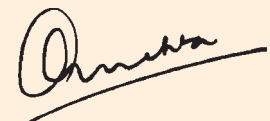
It is with great pride that we present the First Compendium on “Exemplary Contributions to Urban Water Supply in India”. The compendium covers the top sixteen nominations to the National Urban Water Awards 2008 instituted by the Ministry of Urban Development (MoUD), Government of India, in association with the Administrative Staff College of India (ASCI) and the Confederation of Indian Industry (CII) to recognize outstanding contributions to urban water management.

While the coverage of water supply in terms of infrastructure is over 90% in urban areas, the service levels are quite dismal with reference to quantity, frequency and duration of supply and reliability; severe inadequacy in access to the poor and quality. Further, the challenge in the urban water sector is exacerbated given the complex interfaces of policy and regulatory authorities, institutions, accountability, technology, financial resources including pricing, cost recovery and human resources. Urban areas throughout the country are making efforts to improve access, quality, quantity, efficiency and sustainability of urban water and sanitation services by redefining policies, using better technologies, improving management practices, targeting subsidies and forging new partnerships. The Government of India’s Jawaharlal Nehru National Urban Renewal Mission (JNNURM) programme is providing a much needed impetus to cities accelerate ambitious initiatives to achieve this change; even with locally based and small scale initiatives lead to larger outcomes and it is very important to recognize our cities and water boards at work.

These awards are instituted, for the first time with the explicit purpose of honouring urban local bodies, water boards and organizations who have taken significant steps towards effective water management, improvements in service delivery and consequent improvement in quality of life. The awards cover a spectrum of good practices, i.e. (i) Technical innovation, (e.g. Non-revenue water (NRW) reduction, energy audit, metering, 24/7 water supply initiatives) (ii) Financial reform (e.g. Accounting reforms, tariff rationalization, cost recovery and bill-collection improvements) (iii) Services to the poor (e.g. Improved access, targeted subsidies and incentives, participatory planning mechanisms) (iv) Citizen services and governance (e.g. Improved communication strategy, customer satisfaction, e-governance, public disclosure & transparency initiatives) and (v) Public-private partnerships (e.g. Provision of services, contracting out O&M services, engaging management expertise).

The First National Urban Water Awards have succeeded in providing visibility to the various successful initiatives in different parts of our country. We would like to commend and express our heartfelt gratitude to all those city managers and water boards who have entered nominations. The jury received several outstanding nominations and selecting the top entries was not easy to do. We hope that the compendium will help enrich your understanding of the key developments in urban water supply management and find inspiration from reading about the various initiatives made across the length and breadth of the country.

I extend my sincere thanks to ASCI and CII for their support and help in organizing the Award Programme and in drafting this compendium.



Joint Secretary (UD)

Introduction

Serving the urban population with adequate and safe water and sanitation services remains a serious challenge for state and urban local governments in India. Enhancing water service delivery levels is also crucial to furthering India's progress in achieving the Millennium Development Goals (MDGs).

In terms of the physical infrastructure for water supply, coverage is over 90 per cent in urban areas. However, the service levels are quite dismal in terms of quantity, frequency, reliability, duration of supply, and adequacy of access to the poor. The challenges of the urban water sector are further exacerbated by the complex interface between policy, regulatory authorities, institutions, accountability, technology, financial resources including pricing, cost recovery and human resources. Urban areas throughout the country are making efforts to improve the access, quality, quantity, efficiency and sustainability of urban water and sanitation services by redefining policies, using better technologies, improving management practices, targeting subsidies and forging new partnerships. The Government of India's Jawaharlal Nehru National Urban Renewal Mission (JNNURM) programme is providing a much-needed impetus to cities to accelerate ambitious initiatives to achieve this change. Even locally based and small-scale initiatives can lead to larger outcomes, and it is very important to recognize our cities and water boards at work.

The Ministry of Urban Development, GoI, in partnership with the Administrative Staff College of India (ASCI) and the Confederation of Indian Industry (CII), has instituted the National Urban Water Awards (NUWA) for urban local bodies and water utilities to recognize, inspire and celebrate excellence in urban water management. The NUWA scheme was launched in 2008. Conceived as an annual event, the awards explicitly aim to honour urban local governments and water boards that have taken significant steps towards effective water management and improvement in service delivery. The awards cover a spectrum of good practices that enhance the quality of service delivery to citizens at large and the poor and marginalized sections in particular. These include: (i) technical innovation, (e.g., non-revenue water (NRW) reduction, energy audit, metering, 24x7 water supply initiatives); (ii) financial reform (e.g., accounting reforms, tariff rationalization, cost recovery and bill collection improvements); (iii) services to the poor (e.g., improved access, targeted subsidies and incentives, participatory planning mechanisms); (iv) citizen services and governance (e.g., improved communication strategy, customer satisfaction, e-governance, public disclosure and transparency initiatives); and (v) public-private partnerships (e.g., provision of services, contracting out O&M services, engaging management expertise).

The NUWA programme elicited a very positive response in the first year of its launch. Over 60 nominations were received from various cities across the country. Of these, 16 were shortlisted for consideration by the NUWA Advisory Committee, chaired by Mr. A. K. Mehta, IAS, Joint Secretary, Ministry of Urban Development, GoI. The committee, an independent body, comprised urban sector specialists and representatives from academia, government and non-government organizations.

All the nominations were evaluated on the parameters of sustainability, replicability, innovation, and pro-poor and community-based approaches. ASCI and CII technical teams undertook field validation of the shortlisted nominations. The nominees were invited to make a presentation on 15 May 2008. Based on the presentations made by the shortlisted nominees to the advisory committee, and field assessment reports prepared during the validation process, the following initiatives were declared as winners:

- 24x7 water supply system in Badlapur town—by Maharashtra Jeevan Pradhikaran, Maharashtra
- Operation and maintenance practices in the water supply system—by Surat Municipal Corporation, Gujarat
- Community and private sector participation in underground sewerage management—by Alandur Municipality, Tamil Nadu
- 24x7 water supply—by Navi Mumbai Municipal Corporation
- Innovative device for tapping potable drinking water—by Uttaranchal Jal Sansthan, Uttaranchal

Special awards were given to the following initiatives:

- Utilization of recycled domestic waste water for power generation and effective customer grievance redressal system—by Chennai Metropolitan Water Supply and Sewerage Board, Chennai, Tamil Nadu
- Reforms in revenue collection—by Kerala Water Authority, Trivandrum

The awards were presented by Dr. M. Ramachandran, Secretary, Union Ministry of Urban Development (MoUD). Civil society members, private sector organizations, media persons, and representatives from city governments and water utilities across the country participated in the event.

Preparations for the National Urban Water Awards 2009 are underway. ASCI and GTZ are partnering with MoUD for promoting the initiative, receiving nominations, field validation, shortlisting, documentation and dissemination.

Srinivas Chary Vedala

Director-Urban Governance
Administrative Staff College of India (ASCI)
Hyderabad.

Keynote Address**

It is a matter of great pleasure to be here today at the First National Water Awards function. It is even more delightful that the function is being attended by both elected representatives, and municipal and water board functionaries. I also find that the representation today is from across the country. There is Kerala from the south, Uttarakhand from the north, and Maharashtra and Gujarat from the west.

Even at a relatively low level of urbanization, 28 per cent in our country, India's urban system is already the second largest in the world, after China. Not surprisingly, given this scale, the urban sector accounts for over 60 per cent of the nation's GDP. Poverty, while still primarily a rural feature, is taking on a unique urban face with over 70 million urban inhabitants at or below the poverty line. As far as urbanization levels are concerned, we have Delhi at 93 per cent, Tamil Nadu at 43.9 per cent, Maharashtra at 42.4 per cent and Gujarat at 37.4 per cent, which are all higher than the national average.

Our cities have to change. And in that process, among the various civic issues to be addressed, water distribution is an important one. We are at a level of 91 per cent as far as urban water access is concerned. The Eleventh Five-Year Plan aims at 100 percent coverage for supply of drinking water. To make this happen, it is estimated that investment to the tune of Rs. 54,000 crore would be required. We have to remember that both quantity and quality have to be as per norms. We heard in the presentations made today that there are still many cities which have not been able to meet the preferred norm of 135 litres per capita per day of water supply. We are still not in a position to claim that cities now provide 24x7 water supply.

If Indian cities are to attain world-class status, urban water systems will need to contribute to economic productivity through improvements in the health condition of households. In order to achieve this, they will have to move towards 24-hour delivery and universal access. But this is a major challenge. Currently, in many cities in India, water is available only for two to three hours per day or just every other day. Moreover, formal, effective access is limited only to a portion of customers. Unaccounted-for water, including losses due to technical and commercial factors, is close to 50 per cent in many urban areas. Cost recovery is very much an exception with average tariffs in Indian cities remaining well below the cost of service delivery. This poor service delivery, both in water and sanitation services, is preventing India's urban centers from fulfilling their potential to raise urban productivity.

Recognizing the importance of providing high-quality water services for enhancing the productivity of our cities and towns, and we have 5,161 of them, and taking advantage of policy support from the Government of India, urban areas throughout the country are making efforts to improve the access, quality, quantity, efficiency and sustainability of urban water and sanitation services. This is being done by redefining policies, using better technologies, improving management practices, providing targeted subsidies to the poor and forging new technologies. The Jawaharlal Nehru National Urban Renewal Mission is helping cities take new initiatives to bring about this much required change. Of the total of 324 projects, worth more than Rs. 30,000 crore, sanctioned so far for the 63 mission cities, 99 projects (36.8 per cent of the total) worth Rs. 11,100 crore are in the water supply sector alone. This shows the importance attached to this sector. While putting up these projects before the mission for getting the funds sanctioned, cities have committed to levying user charges for the water supplied and ensuring that the projects are sustainable.

Inadequate availability of drinking water, improper treatment of sewage, uncollected solid waste, etc., severely affect the quality of life, undermine the urban environment and lower the investment climate. We cannot expect to make a

* Union Secretary, Ministry of Urban Development, Govt. of India.

** Adapted from the keynote address of the National Urban Water Awards 2008 function held on 15 May 2008 at the Administrative Staff College of India (ASCI), Hyderabad.

favourable impression on investors and international business communities if India's cities and towns appear to be falling behind their counterparts in other developing countries. The Eleventh Five-Year Plan aims to tackle all such urban issues. Providing safe drinking water and adequate sanitation facilities to the entire population will lead to an improvement in the urban environment. In order to achieve this, the following strategy is required:

- State governments and urban local bodies to formulate city-specific development plans with due emphasis on the provision of basic amenities— such as water supply, sewerage, low-cost sanitation, solid waste management and drainage facilities—for the entire community.
- A road map to be developed for using the available funds to implement various schemes on a year-to-year basis.
- Since water supply, sewerage, drainage and solid waste management in a city are interlinked, the state governments and urban local bodies in cities and towns to prioritize and prepare comprehensive project reports in an integrated manner for the provision of these facilities.
- Priority to be given to projects relating to the management of unaccounted-for water through water auditing, replacement of old and dilapidated pipelines, refurbishment of pumping machinery and equipment, energy audit, etc. Such measures will conserve precious treated water and reduce operation and maintenance (O&M) expenditure.
- Metering of all consumers.

We intend to lay down some deliverable targets for the various water boards and local governments for this year. This will enable the reform process covering the drinking water sector to bring about some perceptible changes as far as water management is concerned. We would want the service delivery agencies to focus on key issues like specific reduction in wastage levels, improvement in hours of supply and efficiency improvements in terms of revenue collected, O&M costs, etc. These should be accounted for, and details of the performance should be made known to the public. Benchmarking of performance in the water sector is another initiative we are introducing this year so that the public becomes aware of the quality of service and the improvements brought about. Our water boards and urban local bodies have to focus on these issues and gradually bring about the desired changes. We have examples worthy of emulation like that of the Manila water supply system, which was corporatized. Thanks to the substantial improvements brought about, today the employees are equity shareholders in that utility. Multilateral institutions like the World Bank and the ADB have been holding workshops in different cities to explain how privatization of water distribution can bring about efficiencies. We have to carefully look at the options—but of course with public involvement so that the ultimate user is convinced that the change is for her/his good.

I am glad that the Ministry of Urban Development, in partnership with the Administrative Staff College of India and the Confederation of Indian Industry, has instituted the National Urban Water Awards for urban local bodies and water utilities to recognize, inspire and celebrate excellence in urban water management. No doubt, the elected mayors, chairpersons and other functionaries are attempting to make new beginnings, but the system has to support such efforts. I am delighted that the awards, being given away for the first time this year, have been conceived as an annual event. It is an effort to recognize the work of urban local governments and water boards that have taken significant steps towards effective water management and improvement in service delivery. The awards cover a spectrum of good practices that enhance the quality of service delivery to citizens at large and the poor and marginalized sections in particular. I wish all the 16 participants the very best. I have gone through a brief description of each of the initiatives, and I must say each one of them represents impressive performance. The case studies that have been shortlisted for the final selection of winners reflect quality improvement, performance upgradation, public-private partnership, innovativeness, revenue enhancement and service improvement. While all of you cannot get the awards, the fact that you have made it to the shortlist is itself remarkable.

This is a new beginning in the series of initiatives we have taken to change the face of our cities, a reform-backed scheme to bring about basic infrastructure improvements. Excellence in the delivery of urban services should be the motto of Indian cities. And I am sure this initiative will prove to be a big morale booster for our water boards and urban local bodies and functionaries.

NATIONAL URBAN
WATER AWARDS 2008

Compendium of Good Initiatives

W I N N E R S

From Intermittent to Continuous Water Supply in Kulgaon-Badlapur

Kulgaon- Badlapur switches to a continuous water supply regime on a pilot basis, using a hydraulic modeling process to successfully provide round the clock and reliable potable water supply . Having successfully carried out leak management, upgradation of distribution network, efficient practices and financial reforms in the pilot zone, the efforts of the Maharashtra Jeevan Pradhikaran , the Water Board , is now focused on providing continuous water supply to the entire city.

City Profile

Badlapur, also known as Kulgaon-Badlapur, is one of the fastest growing cities in Mumbai conurbation, India. Due to the population pressure in the nearby cities like Mumbai and Thane, many people working in Mumbai and other cities have migrated to Badlapur. It is a 'B' class municipal council, with a population of 0.14 million and an area of 36 sq km. The city is divided into 34 municipal wards. Maharashtra Industrial Development Corporation (MIDC) has developed an industrial area within the limits of Kulgaon-Badlapur Municipal Council. A majority of the population belong to working middle class.

Context

Maharashtra Jeevan Pradhikaran (MJP) which was responsible for water supply system in Badlapur as in many other cities in the state was supplying water to the city for less than four hours a day with an average of 156 liters per capita per day (lpcd). The energy charges to pump water to storage and overhead tanks were very high. There was a tendency on the part of consumers to store more water and throw away the stored water on getting fresh supply each day. The revenue recovery per month was 75%. During the non-supply hours, there was a high risk of infiltration of contaminated water/sullage through leaks, into the water supply system. Intermittent supply also increased the possibility of 'no supply' to poor hamlets.

Implementation

To overcome the problems caused by intermittent supply, a hydraulic model was developed for achieving continuous water supply. Various activities were initiated to support this model. The existing water infrastructure was reviewed and its operation mapping was recorded. Geographical Information Systems (GIS) tools were used to assess the distribution network. Taking the development plan of the town into consideration, a population forecast was made using the Density Method. Operational zones were reorganised to assess various possibilities. Studies on unaccounted for water (UFW) were conducted and various leak reduction techniques were adopted to plug leakages. The existing distribution network was upgraded to ensure proper management of pressure. *With these reforms, 30% of the entire city moved from intermittent to continuous water supply regime.*

Steps taken for implementation of 24X7 water supply

Satellite images of Badlapur were procured from National Remote Sensing Agency (NRSA), Hyderabad. A digitised map of the entire city was prepared. A map showing the road network, house properties (with house ID numbers), etc., was prepared in Auto CAD, which was subsequently used as a backdrop of the hydraulic model. The water distribution network of Badlapur town was also prepared in Auto CAD and then superimposed on the digitised map.

The water distribution pipe network of city was reorganised into 10 operational zones (OZs). Each OZ was further divided into three or four district metered areas (DMAs) with about 1,000 connections in each DMA. A Property Survey was carried out to determine the total number of people residing in 28,000 houses. This survey recorded the demand at the nearest node, which was then compared with the population figure computed by the density method.

The distribution network was simulated using the latest WaterGem software, and a hydraulic model was prepared. The data was validated and the pipe network was calibrated. This model served as a basis for taking decisions in the field. According to the model design, OZs and DMAs were hydraulically isolated at the site of work. As per the analysis carried out by the hydraulic model, new pipelines were laid and some old pipes were replaced.

Using DMA methodology, non-revenue water (NRW) for each OZ and DMA was worked out. The OZs and DMAs with high NRW (i.e., where there is high water leakage and/or large quantities of water provided at no charge) were taken up initially for leak detection and repair. Eight out of 34 wards were selected in first phase for 24X7 water supply system, and the remaining wards were to be covered in two phases. European Economic Community (EEC) mark meters were installed.

Innovations

A hydraulic model for transforming intermittent water supply to 24X7 continuous water supply was prepared for the first time in India. The model described simulated behaviour of the system and helped MJP engineers to hydraulically isolate the operation zones (OZs) as well as the district meter areas (DMA). By hydraulically isolating OZs and DMAs and repairing visible leaks, the MJP was able to transform the water supply of eight wards into a continuous water supply system. The model proved to be a very useful tool in working out the metering strategy. Instead of using two or three bulk meters costing 4 to 5 lakhs each, this model permitted the use of a single meter, thus optimising the usage of expensive bulk meters to an extent. The model helped MJP to save nearly Rs. 60 lakhs. Finally, the transition to a continuous water supply system helped MJP to increase revenue and improve service delivery.



Underground and Overhead Tanks

Impact

The shift from intermittent to continuous water supply reduced water contamination and led to better health conditions. This, in turn, increased consumer satisfaction and enhanced consumers' willingness to pay water bills even in slum pockets. Consumers, especially housewives, are able to manage their time more effectively and allot more time to other activities and most importantly the living standard of families has improved. The 24X7 water supply also increased the accessibility of water to poor consumers. With the implementation of this initiative, the overall health of the people (especially in slums which constitute 5% of population) has improved dramatically.



Visit of International Team of HSBC

This initiative has increased cost recovery of water supply in Badlapur from 75% to 90%. Prior to this initiative, cost recovery amounted to Rs. 4.50 lakh per month. With continuous water supply, MJP has earned additional revenue of Rs. 4 lakh per month, which enabled it to recover the expenditure of Rs. 26 lakh incurred on 24X7 activities.



The steady pressure in the pipelines is expected to increase the life of the distribution network. The pipe network also requires less chlorine, and valves suffer less wear and tear. The elaborate metering and effective leakage control has resulted in better management of demand. Reservoir capacities were fully utilised. Adoption of DMA methodology requires no zoning and less manpower. This unique model optimised the number of expensive bulk meters to be procured for determining net night flow in DMAs. Out of the 127 bulk meters estimated

initially , MJP required only 50 meters resulting in a saving of Rs. 60 lakh. The shift to the 24X7 water supply system benefited MJP engineers as their capacities were enhanced especially in reducing NRW significantly. They are now well trained in the computation of water balance.

Finally, the availability of good quality of water is expected to improve the city's economy and attract more industries and businesses.

Sustainability

The success and achievements in eight wards in Badlapur area has increased the demand for extending the 24X7 water supply system to other wards as well. This model helps to distribute water equitably to all the parts of the city.

The 24X7 water supply experiment at Badlapur could be replicated, provided the hydraulic modeling work for the other cities is carried out with GIS mapping and digitised maps. The MJP is now all set to extend the 24/7 water supply regime city wide.

For further details contact:

Mr. S. V. Dahashashra

Member Secretary

Maharashtra Jeevan Pradhikaran

4th Floor, Express Towers

Nariman Point, Mumbai – 400 021

Operation & Maintenance Practices in Water Management

Surat Municipal Corporation has succeeded in institutionalizing reforms in the operation and maintenance practices in water management through optimal investments in technology, refining procedures and practices and standards. With minimal investments, operating practices have improved, additional monitoring instruments were procured, plant downtime has been reduced, and customer satisfaction has improved.

City Profile

Surat, located in the western part of India in Gujarat, is one of the most dynamic cities, with a fast growth rate due to immigration from various parts of India. As per the Census 2001, the present population of Surat urban agglomeration is 28,11,614. The city has seen an unprecedented growth in last four decades recording one of the highest growth rates in the country and a 10-fold population rise. The city is known for its textile trade, diamond-cutting and polishing industries. The outbreak of plague in 1994 highlighted the highly inadequate urban infrastructure of the city. Surat is known for its strengths converting adversity into advantage.

Context

Surat Municipal Corporation (SMC) has developed a well-established, networked supply system providing drinking water to 30 lakh people with 3.25 lakh service connections in the city limits comprising 334 sq km. There are ten major water distribution stations and four pumping stations for the effective distribution of treated water in various parts of the city. All waterworks, water distribution stations and pumping stations are connected to the grid network, which interconnects them in such a way that in case of poor functioning or shutdown of any individual waterworks, water can be supplied by the other waterworks or distribution stations. The water supply system comprises a large network, 2,550 km. Presently, SMC is supplying more than 680 million liters water per day (MLD) of water against the installed capacity of 828 MLD. However, with the increase in demand for water supply, there is a requirement to enhance storage capacity and construct associated infrastructure like water treatment plants (WTPs), distribution stations, etc., It was also observed that the operation and maintenance (O&M) practices in the existing system were highly inadequate.

The O&M staff carried out only routine maintenance, particularly during breakdowns. They were not aware of the quantity-related measurements, critical operating parameters and did not have equipment to measure them. They were not clear about their roles and responsibilities and unaware of minimum safety measures. Preventive and predictive maintenance activities were not conceptualised for electrical and mechanical machines. Critical operating parameters like power factor, voltage, ampere, contract demand for power, water flow rate etc. were not measured or checked. Routine shutdown for cleaning and energy-conservation measures, and related improvements, were not practised. This led to the mismanagement of water treatment plants in maintaining the desired quality of treated water.



Implementation

All operational functions of waterworks were standardised in accordance with Quality Management System ISO 9001:2000 and responsibilities were clearly delegated. Preventive and predictive maintenance schedules for electrical and mechanical machinery and those relating to routine breakdown, as well as water quality control measures were formulated and executed. A dedicated electrical and mechanical maintenance team for preventive and predictive maintenance work was constituted. Calibration, service and maintenance works of the instruments/equipment was contracted out to authorised service agencies.

Safety measures relating to electrical and mechanical systems as per the Factory Act, including mock drills, were taken up. A Quality Control Engineering Department for quality monitoring of engineering materials departmentally, was created. An Online Water-Quality Monitoring System to monitor and judge the performance of WTPs was established. Material management software to maintain inventories and to generate periodic reports for material under stock, re-order quantity etc., was introduced.



Deweeder Machine at WTP

Through a unique grid network approach, a capability and self-sufficiency plan was developed to ensure uninterrupted water supply even in a contingency/ abnormal situations. Flow meters were installed at water treatment plants, distribution stations and for industrial customers. Security measures at waterworks stations and reservoir levels were strengthened with the assistance of the Central Industrial Security Force. Finally, a vendor-appraisal system was developed for a smooth and transparent tendering process.

As a part of O&M reforms, several innovative practices were introduced. They include:

- a grid-connected water network was put in place to maintain continuity in water supply, to ensure consistent quality and quantity of water supplied, and for transmitting water via energy-efficient routes;
- an Emergency Response Centre was established to ensure uninterrupted water supply even during emergencies;
- conventional coagulant alum was replaced with advanced coagulant—poly aluminium chloride (PAC)—since 2003–04;
- a weeding machine was purchased for removal of floating, submerged and rooted vegetation.

Impact

Preventive and predictive maintenance have become part of regular maintenance. With a dedicated electrical and mechanical maintenance team in place, breakdowns in electric and mechanical systems have reduced significantly.

Installation of ultrasonic-type flow meters for water quantity measurement helped the Hydraulic Department of the SMC to assess water losses during water treatment. Online water-quality monitoring system has minimised the wastage of chemicals and assured better quality of water to the customers. Timely calibration of inspection has enabled the Department to generate reliable data on performance of instruments/ equipments.



Certificate of appreciation

Sustainability

Technical and financial measures , in particular the institutionalization of predictive and preventive maintenance have resulted in a marked reduction in failures of equipment and downtime of plants. Further , the a significant increase in revenue from industrial consumers, has also resulted. Overall customer satisfaction is also perceptible.

For further details contact:

Ms. S. Aparna, IAS
Municipal Commissioner
Surat Municipal Corporation
Muglisara, Surat – 395 003.

Public-Private Community Participation in Implementation of Underground Sewerage System

Alandur Municipality has succeeded in connections to an underground sewerage system to all its residents including the urban poor. This was achieved through a combination of effective leadership, political will, mobilizing people's participation, financial planning and forging the right partnerships.

City Profile

Alandur, a selection grade municipality is part of Kanchipuram district of Tamil Nadu, adjacent to Chennai at a distance of 14 km on the southern side and forms a part of the Chennai Metropolitan Development Area (CMDA). With hardly any industrial base, the town has developed as a residential suburb of Chennai. According to 1991 Census of India, the town has a population of 1,25,444, with 32,000 households spread over to 19.5 sq km. Approximately one-fourth of its population lives in slums.

Context

Alandur municipality had no underground sewerage system ; households either had septic tanks or holding tanks and the municipality was responsible for collecting the sewage periodically in tankers and disposing it in the low-lying areas. To address these problems, an underground sewerage system was designed for its current population as well as for an estimated population of 300,000 in 2027 with the objectives of improving the standard of living of the residents; providing for disposal of sewage through an exclusive drainage network; avoiding recurring expenditure on septic tank cleaning; and preventing groundwater contamination.

Implementation

In 1997, the Government of Tamil Nadu decided to provide a sewerage system in 12 selected major urban centers including Alandur in the context of a World Bank Project . The Chairperson of the Municipality, Mr. R. S. Bharati took up the task of implementing this. It was decided to approach the Tamil Nadu Urban Infrastructure Finance Services Ltd. (TNUIFSL), the state asset management company, to finance the sewerage scheme. Considering the lack of financial and technical resources at the municipal level to undertake such an infrastructure project, it was decided by TNUIFSL and the municipality to undertake the project on a BOQ (Bill of Quantities) basis, and the sewerage treatment plant (STP) on a BOT (Build, Operate and Transfer) basis.

The project entailed a) construction of an underground Sewerage scheme with a network of sewer pipelines and manholes, of 120 kms (including 19 km main and 101 km branch lines); b) construction of a pumping house and installation of pumping machinery; and c) construction of a sewage treatment plant with a capacity of 24 MLD (2 units 12 MLD each) on BOT basis to IVRCL and VATEc for a period of 14 Years . The project work was carried out in two phases. In the first phase (first two and a half years), 50% of the branch sewers, main sewers, pump house including installation of machinery, pumping main and one 12 MLD capacity sewage treatment plant were completed and commissioned. The remaining work relating to the project was to be carried out in the next phase.

The particular challenges addressed were communication and consultations with citizens to secure their buy in and contribution to the sewerage scheme, technical bottlenecks such realignments necessitated by construction of subways and MRTS, terrain conditions and procedural delays in approvals

To reduce the repayment burden on the local body, it was decided to collect deposits from at least 10,000 residents before calling for tenders ; this was also to ensure effective participation of people in the project. The names of the depositors were displayed in public places to motivate others to pay.

Officials and non-officials, especially the chairperson of Alandur municipality, organised detailed discussions with the residents of the city and resident associations to explain the project details and benefits of the sewerage project as

part of assessing the willingness to pay. Effective and timely communication ensured participation of key stakeholders and beneficiaries in the initiative. An election-style campaign was launched. Television and newspapers were roped in to motivate the public. Sanitary workers also conducted a door-to-door campaign in support of the project. To ensure the inclusion of the poor and slum residents, provision was also made for community toilets connected to the sewerage system.

The total project cost was estimated at Rs. 34 crores with the break up as in Table

Sources of Funds

(Rs. in Cr.)

Source	Contribution	% of Total
TNUIDCO Loan	16	47.06
Citizen's contribution	8	23.53
TNUIFSL Loan	3	11.76
TNUIFSL Grant	4	8.82
Interest on deposits	2	5.88
TNUIDCO Grant	1	2.94
Total	34	100.00

To recover costs on operation, maintenance and debt servicing, the municipality decided the tariff structure through consultative process. The tariff included a one time deposit and a monthly tariff. They are given in Table 2. On demand from the citizens, the municipality has subsequently reduced monthly charges from Rs. 150 to Rs. 110.

Tariff Structure

HSC Tariff Domestic Category		HSC Tariff Non Domestic - Commercial and Industrial Category	
Square Feet	Monthly Tariff (Rs.)	Square Feet	Monthly Tariff (Rs.)
<500	60	<500	200
500-1500	80	500-1500	400
1500-3000	100	1500-5000	600
>3000	120	>5000	1000

Impact

Of the 23,000 households who paid for the services, 8,350 households were connected in the first phase i.e. by 2005. Nearly 500 slum households out of 7,000 had sewerage connections, and 43% of slum dwellers have opted and paid for individual sewerage connections. In 2005, 14 community toilets were constructed to serve poor clusters. By the end of March 2008, all households had received sewerage connections.

Sustainability

The project is sustainable as the cost towards maintaining the system is recovered from the users by means of monthly charges. There has been a regular flow of funds and timely repayment to the financial institutions. Alandur sewerage project is an innovative initiative for sustainable delivery of urban services in the country. Inspired by the Alandur example, many urban local bodies including Trichy, Tanjavur, Tirunelveli, and Ambattur have initiated similar efforts for underground sewerage system. The Alandur experience demonstrates that mobilising people's participation for infrastructure projects is possible through effective leadership, collective efforts and transparent procedures. *Political will, effective communications, transparency and partnership with community-based organisations* represent the key factors for the success of the project. Inter-departmental coordination and active involvement of all stakeholders ensured successful completion and sustenance of the project.

For further details contact:

Mr. R. S. Bharati

Municipal Chairman

Alandur Municipality, Chennai -16.

Implementing Continuous (24X7) Water Supply System

Navi Mumbai realizes its vision of working towards 24/7 water supply by acquiring and operating its own source of water. The key features of this initiative are the pro poor bias in the provision of water supply along with technical and financial reforms.

City Profile

Lying on the eastern seaboard of Thane Creek, Navi Mumbai, is one of the largest planned cities of the world. Navi Mumbai is spread over parts of two districts of Maharashtra – Thane and Raigad. The total area of the city is 344 sq. km., of which 108.6 sq. km. is under the jurisdiction of the Navi Mumbai Municipal Corporation (NMMC). The population of Navi Mumbai is around 12 million with a growth rate of 82% during 1991–2001. The main economic activities in the area are: industry, commerce, IT services, and fishing & farming in some areas. It is also emerging as the knowledge hub of the region.

Context

Till the year 1999, water supply for the NMMC area was operated and maintained by the City and Industrial Development Corporation (CIDCO) and later (1 November 1999) it was handed over to NMMC. The Navi Mumbai Municipal Corporation purchased potable water from Maharashtra Jeevan Pradhikaran (80 MLD), Maharashtra Industrial Corporation (100 MLD) and City & Industrial Development Corporation (20 MLD), and supplied to 70% of its area for three hours in the mornings and an hour in the evening.

Water was supplied to many villages and slums only on alternate days due to water scarcity. In many villages, water was directly supplied by online boosting and this caused acute shortage and low pressure. Water storage facilities were absent and the distribution network in the villages and slums was inadequate. Even in the city area, the distribution network was far from adequate and needed upgradation. Many residents had to bring water from far away places to meet their daily requirements.



Service Reservoir

Given the increasing demand and growth trends experienced by the city, it was apparent that NMMC would face a severe water crisis by 2005. In 2002, therefore, NMMC decided to acquire its own independent and operational source of potable water and a water treatment plant. The corporation declared its vision as provision of 24X7 water supply by 2010 in the entire NMMC area including *gaothans* and slums in addition to the developed nodal sector.

The NMMC had been purchasing water at the rate of Rs. 7.50 per cum to MJP and MIDC and charged the citizens Rs. 4.75 per cum. The subsidy was a heavy burden on the finances of NMMC. Besides the financial burden, low water pressure and inadequate water supply was a cause of concern in certain areas of NMMC. Further, the water storage capacity was inadequate. The distribution network and feeder mains were old, rusty and leaking at various points. There was no water metering and water quality monitoring system. Mechanisms for water, energy, and cost recovery audits were absent.

Implementation

The NMMC appointed a committee to estimate water demand, assess its financial strength and decide on the feasibility of developing its own source by constructing a dam. Taking into account all factors, the capacity of the dam was established at 450 MLD. Based on the recommendations of the committee, NMMC constructed the Morbe dam and a water treatment plant.

The NMMC provides 305 MLD water from the following sources: Morbe dam (own source) - 160 MLD; CIDCO's Hetwane dam - 45 MLD; and MIDC's Barve dam - 100 MLD. 97 ground storage reservoirs (GSRs)/ elevated service reservoirs (ESRs) were constructed to enhance the storage capacity to 200 MLD. A distribution network of 750 km was laid down with pipe diameters ranging from 100 to 1200 mm.

The corporation carried out extensive leak detection programmes through physical testing at critical points and also by using the conventional method, thereby reducing unaccounted for water significantly.

Of the 32 distribution zones, 12 zones are being supplied with 24 hours of water per day while the remaining are supplied water for 8 hours a day.

Compulsory metered connections were approved for urban area, slums and *gaothan* areas in 1999 itself. Subsequently, meters were installed at all residential connections thus enabling the corporation to provide 24X7 water supply for the entire city. Ultrasonic electromagnetic insertion-type and mechanical-type flow meters were installed at 62 control points for continuous monitoring. A system of daily water audit was adopted and this system minimised the water losses of the corporation and allowed accountability of water received as well as distributed every day.

Finally, NMMC introduced water quality testing programmes on a daily basis and established an environmental laboratory for the purpose.



Flow Meters

Impact

The distribution network has covered the entire NMMC area including slums. Consequently, the basic needs of the urban poor in the area have been met. All slums and the original *gaothan* have been provided ESRs/GSRs and 24X7 water supply, and a metering system was also introduced in these areas.

The corporation provides uninterrupted water supply by relying on dedicated power supply and installing diesel generating sets. Innovative energy saving measures like maintaining a power factor of 0.95 were adopted. Inefficient pumps were replaced and gravity water supply has been replaced wherever necessary.

Supervisory Control and Data Acquisition (SCADA) system was introduced for main transmission line, which facilitates full control on water distribution by NMMC.

The total construction cost of Morbe dam was Rs. 650 crores and that of the treatment plant and allied works was Rs. 170 crores. The cost of transmission lines and distribution network was about Rs. 200 crores.

The NMMC is able to provide 24X7 water supply to around 50% corporation area including slums and *gaothans*. The water supply is 100% by gravity in the NMMC area. This has resulted in electricity cost savings of around Rs. 9 crore.

The Corporation introduced metering system whereby 100% commercial/ institutional connections and 50% of residential connections are metered. Its other achievements include: reduction in non-revenue water from 51% to 21%; reduction in maintenance costs of motor and pumps by 65%; and reduction in consumer complaints on water pressure by 80%.

The corporation introduced water quality monitoring system at every stage on daily basis. This reduced non-potable water complaints to almost zero. Good quality and regular water is provided to the citizens. The billing system in the NMMC area is fully computerized to enable full accounting and 100% bill recovery.



Transmission Lines

The NMMC intends to sell the extra water of Morbe dam to various organizations, which will bring additional revenue of Rs. 40 crore per year. It will earn around Rs. 6 crore per year from the sale of electricity generated from the 4 MW hydro-electric project being proposed on Morbe dam.

Sustainability

Rational tariff fixation and effective non-revenue water management made this initiative sustainable

For further details contact:

Mr. Vijay Nahata, IAS

Municipal Commissioner,
Navi Mumbai Municipal Corporation
Belapur Bhavan, 1st Floor
CBD, Belapur, Navi Mumbai,
Thane – 400 614, Maharashtra

An Innovative Device (Uttaranchal Koop) for Tapping Potable Drinking Water

The 'Koop' a simple mechanical device was introduced in the hilly terrains of Uttaranchal to tap potable drinking water from natural streams and rivers. It is good example of adapting cost effective and appropriate technology for specific local needs. The use of the Koop has improved availability and quality of drinking water apart from being easy to install, operate and maintain.

State Profile

Uttaranchal is a state of natural beauty, with a total area of 51,125 sq km and a population of 8.48 million (Census 2001). The largest cities of the state are Dehradun (530,263), Harwar (91,58,896) and Roorkee (115,278).

Context

Traditionally natural springs and gadheras (streams and rivers) served as major sources of water in hilly areas. Water from springs can be used for direct supply. Due to low discharge from springs, surface water from small streams was used for drinking purposes by diverting the supply main. This was done by constructing a cross wall across the stream against the flow, called Boulder-filled Gallery (BFG). Construction of BFGs required expert supervision, huge quantities of raw materials—which are not easily available at the source—and also required enormous operation and maintenance costs. To overcome these problems, Uttaranchal Koop was designed to replace BFGs, which are appropriate, reliable and cost effective.



A Boulder-filled gallery

Status of Water Supply in Uttaranchal

	Rural area	Urban area
Gravity schemes	9,977	47
Pumping schemes	280	16
Total schemes	10,257	63

There were several problems experienced by the Uttaranchal Jal Sansthan with respect to the operation and maintenance of BFGs and the quality of water tapped from them. There were no arrangements for turbidity removal in BFGs. Thus, water supplied during monsoon was muddy and turbid. At times during heavy floods, the cross walls of BFGs got damaged and washed away completely, and pipelines got choked resulting in silting inside the clear water reservoir (CWR). More resources (finance and manpower) were required for the restoration, repairs, de-silting of BFGs and removal of chokes after every monsoon. Due to these reasons, the water supply schemes remained non-functional for several months. Intermittent water supply caused serious inconvenience to the public.

Implementation

The Uttaranchal Koop, also known as 'French Well', is an innovation based on riverbank filtration technique, which obtains water from aquifers (layers of sand and gravel) near the riverbanks. An Uttaranchal Koop is a hollow cylindrical steel pipe with radial perforated pipes, connected with welded outlet socket in the middle of a vertical cylinder. A 1–1.5 m long pipe is placed vertically 3 to 4 m below the bed of stream with the open end at the bottom and close end at the top.

The device is placed over the impermeable strata of streams tapping the entire alluvial field. After placing the Koop, the space-graded filter media envelops the Koop up to the natural bed level of the stream. The base flow of the stream rises inside the cylindrical pipe through its open end and perforated radial pipes due to hydrostatic pressure of the submerged surface and maintains a static level in the cylindrical pipe. The outlet socket, placed almost at the middle of the Koop, is connected to the 'gravity-main' of the water supply scheme. The gravity main starts drawing water from the Koop. The static level of the well is maintained through hydrostatic pressure, thus a continuous flow is ensured.

The Koop is designed in such a way that it works even during minimum discharge i.e. during summers and winters. Uttaranchal Koops are being used successfully in 1,019 rural water supply schemes and 58 urban water supply schemes in Uttaranchal. Combination of each Uttaranchal Koop costs little more than Rs. 30,000. Detailed work-wise cost estimations are given in the Table below:

Turbidity, suspended particles and coliform are removed to a great extent by the natural streambed filtration process involved in the use of the Uttaranchal Koop. The total coliform and faecal coliform levels in the water drawn from gadhera (total coliform: 315mpn/100ml, faecal coliform: 180 mpn/100ml) are on higher side when compared to the water from Uttaranchal Koop (total coliform: 41mpn/100ml, faecal coliform: 25mpn/100ml). Apart from lower levels of coliform, the Koop structure is less likely to be damaged during the monsoon, and less open to tampering by miscreants.



Uttaranchal Koop

Cost Estimation of Uttaranchal Koop

(in Rs.)

Work Description	Amount
(i) In soil mixed boulder 12.95 m ³ @ 54.05 m ³	699.95
(ii) In medium rock 5.55 m ³ @ 130.25/m ³	722.89
(iii) Extra for lifting excavation earth below 1.5 m depth	100.00
(iv) Dewatering including cartage of pumps, oil lubricants, labor etc. complete or stream (gadhera) diversion work	5,000.00
(v) Fixing of shuttering including its cartage, rent and wastage	2,500.00
(vi) Supply and filling filter media 18.5 cum @ 350/cum	6,475.00
(vii) Cartage of filter media (Coarse sand)	12,210.00
(viii) Cost of Uttaranchal Koop as per type design (250 mm dia)	3,360.00
(ix) Carting and fixing of Uttaranchal Koop	2,000.00
Total	33,067.84

Cost Analysis

The estimated cost of construction of BFG (approx. 4 m wide) and roughening filter is around Rs. 1,75,395 per unit whereas the total cost of fixing the Uttaranchal Koop below the river bed (2 to 3 m depth) including all the excavations charges, supply and filling of filter media etc., is only Rs. 33,000. The capital cost of fixing Uttaranchal Koop is only around 15% of the cost of BFG and the maintenance cost is around 1% of BFG. There is a cost saving of Rs. 1.34 lakhs by using Uttaranchal Koop in place of BFG and roughening filter.

Impact

The Uttaranchal Koop provides a significant improvement in the quality and quantity of water available in rural areas while costing far less than traditional approaches. Uttaranchal Koops are simple to install and operate, almost maintenance free, economical and sustainable. They are easily replicable in hilly areas of the country.

For further details contact:

Mr. H. P. Uniyal

General Manager

Uttaranchal Jal Sansthan

Jalbhawan, B-block

Nehru Colony, Dehradun 248 001.

Utilisation of Biogas for Power Generation and Re-use of Treated Sewage

The Chennai Metropolitan Water Supply and Sewerage Board commissioned the construction of Sewage Treatment Plants which generated biogas and power from wastewater resulting in energy savings, earning of carbon credits and use of recycled water by industry. This was achieved through providing contract related conditions which encouraged optimal use of land and the use of methane based power.

City Profile

Chennai, capital of Tamil Nadu, located on the Coromandel Coast of the Bay of Bengal, has an estimated population of 7.5 million (2007) with an area of around 181sq km. The Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) was constituted under the Chennai Metropolitan Water Supply and Sewerage Act, in 1978 to provide water supply and sewerage services in the city.



Sewage Treatment Plant

Context

The CMWSSB used secondary treated effluent from sewage treatment plants (STPs) for cultivation of Para grass which would then be auctioned. The treated sewage was discharged into the nearby watercourses. In order to prevent untreated sewage flow reaching waterways, CMWSSB undertook the construction of additional sewage treatment plants with a capacity of 264 MLD at four locations, and outsourced the activity to a contractor.

Implementation

Tenders were called for the design, construction, and 10-year operation and maintenance of STPs. It was decided to load 5% of guideline value of the land cost in the total tender cost¹, in order to ensure that the bidders would propose minimum land for the STP construction. Bonus and penal clauses on the consumption of power from grid were also included in the bid document to promote the reduction of power consumption. The contractor constructed STPs that operate under an activated sludge process with sludge digesters, from which biogas is generated. With methane content of 60 to 70%, the biogas is used as fuel for running a gas engine after removal of moisture and hydrogen sulphide in a scrubber. The production of electricity is based on the methane content of biogas.

Impact

Four sewage treatment plants were constructed, which generated biogas and power from wastewater. The power generated is sufficient to cover the power requirements of the STPs. The use of recycled water by industry has reduced the demand for potable water, thereby reducing the cost of supplying water.



Minimal land was used for construction of STPs since priority was given in the tendering process to bids that would use less land. Due to penalty and bonus clauses for power consumption from the grid, the use of biogas power was maximised and the use of grid power was minimised. Methane-produced power has reduced power bills and four STPs resulted in energy savings of Rs. 387.45 lakh per year. Capturing of harmful methane gas (21 times the global-warming potential of CO₂) would contribute to reduction of global warming and its use as a fuel ,

help in the conservation of natural gas. This has enabled CMWSSB to earn additional revenue through sale of carbon credits under the clean development mechanism (CMD).

The water treated by the STPs was recycled and used by industry, which in turn reduced demand for potable water and reduced water-supply cost. With untreated sewerage no longer being discharged into streams, the quality of the environment improved considerably. This also meant improved living conditions for those living in areas surrounding the STPs.

After the implementation of the initiative, the Board is earning revenue of approximately Rs. 10 crore annually through sale of treated sewage to industry. Additional benefit of Rs. 43 lakh per month accrues to it through power generation.

Savings in Electricity Consumptions

(Rs. in lakh)

#	Location of STP	Plant Capacity (mld)	Average power production through gas engine per month (KWH)	Equivalent of Tamil Nadu Electricity Board @ Rs. 3.50 / KWH (unit) per month
1.	Kodungaiyer (Zone I & II)	110	450,000	15.75
2.	Koyambedu (Zone III)	60	210,000	7.35
3.	Nesapakkam (Zone IV)	40	120,000	4.20
4.	Perungudi (Zone V)	54	450,000	15.75
	Total	264	12,30,000	43.05
	TN Electricity Board (TNEB) Power Saving per month			43.05
	TNEB power saving per Year* (9 months)			387.45

* = Three months allowance has been given for less gas production during winter season also taking into account for repairs and maintenance work.

Sustainability

Optimal land use ,energy savings through the production of biogas and earning of carbon credits was stimulated through building in appropriate contract conditions and technical specifications. As most parts of India have a tropical climate, the production of biogas is a viable proposition .

For further details contact:

Mr. Shiv Das Meena, IAS

Managing Director

Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB)

No. 1, Pumping Station Road

Chintadripet, Chennai – 600 002.

Reforms in Revenue Enhancement by Kerala Water Authority

The Kerala Water Authority has instituted reforms to enhance revenue, not through a tariff increase but through a range of interventions encompassing legislation, internal and external communication strategies, redefinition of roles and responsibilities and customer focused services. These interventions resulted in perceptible increase in revenues and reduction of arrears .

State Profile

Kerala, with an area of 38,863 sq km, constituting 1.18% of the country’s land area, is wedged between the Arabian Sea to the west and the Western Ghats to its east and has a population of 31.8 million with a decadal growth rate of 9.42%. The Kerala Water Authority (KWA) was created on 1 March 1984 with the primary objective of water supply and wastewater collection and disposal statewide. The KWA has three sources of income: revenue collection, non-plan grants from government as subsidy and share debit from capital works.

Context

During the early 1990s, KWA began experiencing a severe resource crunch for several reasons. Tariffs had not been revised periodically to match the increasing cost of production and operation & maintenance (O&M). The Government of Kerala (GoK) had passed on budget grants as loans to KWA for the execution of water supply schemes. The revenue due from the local bodies had not been paid due to many reasons. KWA had started diverting capital funds towards operating expenses due to the additional responsibility of repayment of institutional loans with interest. This resulted in defaulting on the payment of power charges to the Electricity Board.

The KWA had not utilised the central government grants for Accelerated Rural Water Supply Programme (ARWSP). Its arrears on account of non-payment of power charges totalled Rs. 774 crores and it was defaulting on repayment of loan/ interest. As a result of these developments the drinking water sector was in jeopardy. There was an absence of integrated development resulting in duplication of investments and efforts, and KWA was unable to maintain the water supply schemes.

Implementation

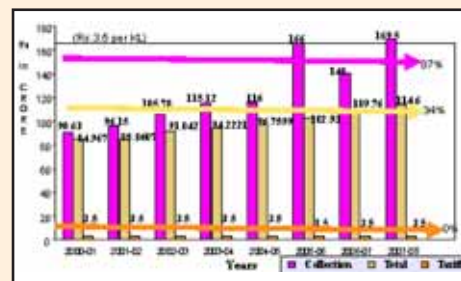
To address the situation, the KWA took a number of measures to improve revenue collection. The KWA decided to fix revenue targets based on the quantity of water supplied to each division, which is computed based on physical and non-physical losses. This step was followed by an extensive communication strategy throughout the state, at all levels of the organisation. A detailed order was issued outlining the responsibilities of each officer for revenue collection, and an internal audit team was entrusted to report the failures, if any. Norms were laid for meter readers and surcharges were levied on non-functioning meters. This led to considerable reduction in the number of non-functioning meters. A monthly progress review was put in place. The KWA issued appreciation letters for well-performing divisions, and issued strictures to divisions that have not achieved the targets. The Minister for Water Resources took up the responsibility of reviewing revenue collection personally. To recover arrears from non-domestic consumers, a one-time settlement was offered in 2005–06 and 2006–07. Pending arrear cases were settled, allowing considerable reduction in the penal interest. In addition, 14 district-level *adalats* (courts/forums) were made available for all consumers to settle pending cases related to arrears.



KWA’s Revenue Collection

Impact

The state government agreed to the financial reconstruction of the KWA. Loans were converted into an interest-free fund, and diversion of capital funds for revenue purposes was averted after 2004–05. Central government funds were fully drawn and utilised. Arrears in power charges were settled on one-time basis and payment of current dues began from 1 April 2008. The state government also offered reduction in power charges. The KWA adhered to timely payment of contractors' bills, which resulted in capital works becoming economical. Water tariffs were rationalised and the state government approved a major package of Rs. 750 crore for completion of the ongoing water supply schemes. The KWA paid pay-revision arrears without any support from the state government. Having undertaken these measures, the KWA reduced its accumulated losses by Rs. 1,006 crores.



The KWA introduced a one-time settlement system for non-domestic consumers including a partial waiving of penal interest, which greatly helped generate resources. It also introduced an employees' initiative—Consumer-Employee Friendship (CEF), to promote better interface between consumers and employees. The KWA became the first water authority in India to introduce a Management Information System (MIS) to improve its functioning and efficiency.

The entire set of initiatives were implemented in-house by utilising existing staff and without incurring any additional cost except for publicity through media. The KWA management is confident that the costs incurred towards computerisation initiatives are worthwhile as these investments resulted in securing long-term benefits relating to project monitoring, employee information, financial accounting, etc.

Revenue collection has gone up from Rs. 88.55 crore (2003–04) to Rs. 122.46 crore (2007–08) and collection efficiency has improved from 82.4% to 98.7%. Revenue increased by 37% even though the number of connections increased only by 16%. The growth in revenue was achieved without revision of tariffs. The KWA's arrears decreased by 8.9% in 2006–07. Through the adalats, KWA has settled around 4,300 pending revenue cases. A key non-financial outcome has been the change in mindset of the KWA employees. The employees started experiencing a sense of belonging to the organisation and are prepared for major changes like change management, restructuring of the organisation and e-governance.

Revenue Collection

(Rs. in Crore)

Pre-reforms		Post-reforms	
Year	Collection	Year	Collection
2003 – 04	88.55	2004 – 05	112.06 (85.68% increase)
2002 – 03	77.89	2005 – 06	106.04
2001 – 02	71.29	2006 – 07	121.29
2000 – 01	60.35	2007 – 08	122.46 (102% increase)

Sustainability

Though the reforms were initiated as a crisis response, the situation was also used as an opportunity to institutionalize reforms across the organization through a series of interventions. The sense of belonging among the employees of KWA has been a key factor behind the success of the reform initiative. The involvement of political representatives in periodic reviews and appreciation at the district level has given impetus to the process and worked as an incentive for employees to improve their performance. Interaction with consumers during the one-time settlement enabled feedback and helped KWA understand the perspective of consumers.

Due to its relatively low cost and high benefits (both in terms of revenues and finances) this improvement program is highly sustainable. The reforms were implemented across the state and there has been active involvement of all

stakeholders from minister downward to meter readers. The institutionalised activities include effective legislation, effective internal and external communication for buy-in, redefinition of roles and responsibilities, simplification of procedures, use of ICT and IT for efficiency, piloting efforts in customer-centred services, better collaboration with other departments like Local Self Government, and initiatives in water conservation. A unique aspect of these reforms is that they were achieved without any increase in tariffs.

For further details contact:

Mr. V.K. Girjavallabhan

Accounts Member

Kerala Water Authority

Vellayembalam, Thiruvananthapuram.

Combined Water Supply Scheme for Daryapur and Anjangaon Towns & 156 Villages

The Maharashtra Jeevan Pradhikaran, implements a combined water supply scheme for Daryapur, Anjangaon towns along with 156 villages which has resulted in the provision of reliable water supply on a regular basis at the household level and reduced dependence on public stand posts ; with a successful combination of technology, consultations with people and maintenance practices

City Profile

Daryapur (Banosa), a 'C' class municipal council in Amravati district of Maharashtra, comprises of three separate towns, i.e., Daryapur, Banosa and Babhali. As per the 2001 census, the population in Daryapur was 34,398 with an average literacy rate of 78%. The town is also famous for its schooling and excellence in education.

Context

Daryapur town water supply scheme was operated and maintained by the Municipal Council. Earlier, water was provided to the town from supply wells located on the banks of river Shahanoor, which resulted in poor water yield due to scanty rainfall. Moreover, with a high rate of leaks and power failures, the system provided erratic and unreliable water supply, often only once in 7–15 days. To avoid these problems, a combined water supply scheme for Daryapur and Anjangaon towns and 156 villages located in a saline area of Amravati district was proposed by the Government of Maharashtra with Shahanoor dam as a source through metallic lines.



Map of Project Area

Implementation

Before launching this initiative, Maharashtra Jeevan Pradhikaran (MJP), a stakeholder meeting with key beneficiaries and stakeholders—MLA, sarpanches, panchayat members, municipal council members, council presidents, and tehsildars—was organised to create an awareness about the expected cost savings and to seek their support in the execution of the works to avoid delays.

To make the project self-sustainable, it was decided to recover operating costs through user charges. A decision was also made to phase out the public stand posts to avoid water wastage. The scheme was approved and the tender was released to Nagarjuna Construction Company Ltd. Construction works included a 10 lakh litre raw-water sump, a 50 MLD treatment plant, a 50 lakh litre pure water sump and 714 meters of 800 mm diameter DI gravity main. Additionally, necessary sand filters, controlling valves, kinetic air valves, scour valves, etc., were installed. MBRs and ESRs were constructed with minimum two outlets for proper zoning, effective maintenance and better services, and were connected to DI and CI mains and distribution lines. Community participation also played an important role right from the inception of the project in pipe laying and land acquisition.

Works related to the construction of staff quarters, rest houses, development of MIS systems, installation of wireless base stations, generators, other machinery, etc., were outsourced. Daryapur Municipal Council handed over the Daryapur Town Water Supply scheme to MJP for day-to-day maintenance along with revenue collection.

All networks were controlled with the help of wireless stations. Day-to-day maintenance works such as water bill collection, plumbing and pipe work were executed by MJP. Cost of materials for household connections was borne by the consumers except for the saddle, which was provided by MJP to avoid leakages and to maintain uniformity.

Necessary steps such as frequent visits to the customer households have been taken to improve the cost recovery. All connections are metered and the water charges were fixed at Rs. 10.20/KL. Public stand posts were phased out and the poor households were encouraged to take group connections to avoid wastage of water and related revenues. Steps towards 24X7 water supply in Daryapur are also in progress.

Impact

The combined water supply scheme helped two towns and 156 villages to receive regular piped water in all houses, resulting in enormous time saving for the women and other family members. The scheme has cut down the use of pumping machinery leading to a reduction in CO₂ emissions; thus the scheme is also eco-friendly. The project is self-sufficient with low maintenance cost and high reliability due to metallic lining of the pipes.

As each household has been provided with an individual connection, the wastage of water associated with public stand posts has been reduced. Pumping operations have significantly reduced and related personnel were redeployed to carry out billing and collection work.

Other benefits of the project include— a rise in the groundwater level (with stoppage of groundwater extraction) and improved lifestyle of beneficiaries due to safe and assured water supply including reduction of medical expenses and time saving.

Individual schemes were submitted for Anjanagaon, Daryapur and 156 villages with the water source as Shahanoor dam. To avoid duplication of pipelines, treatment plant, etc. a combined scheme was approved, which resulted in a saving of Rs. 82 crore as shown below:

Cost of Anjanagaon town W.S.S.	Rs. 31.58 crore
Cost of Daryapur town W.S.S.	Rs. 44.21 crore
Cost of regional W.S.S. for 156 villages	Rs. 169.1 crore
Total cost of individual schemes	Rs. 244.9 crore
Total cost of combined scheme	Rs. 162.3 crore
Net saving due combined scheme	Rs. 82.6 crore

Abandoning the old water supply and pumping system resulted in savings of Rs 8.00 lakhs per month. Door-to-door bill collection improved the recovery of dues to more than 90%. Consequently, the state Government has given the MJP a grant of Rs. 222 lakh for the year 2008. The break-even point for the project was reached within four years of operation and now MJP is working towards repayment of the HUDCO loan.

Sustainability

The combined water supply scheme has resulted in reliable and sustainable water supply to all the 156 villages and two towns. Water is supplied through gravity, which resulted in huge saving in terms of electricity consumption for pumping. Most of the pumping machinery (83 pumps) was removed, resulted in saving of 8,978 units per day i.e. Rs. 96 lakh per annum. Individual water meters resulted in payment, based on consumption and also increased the satisfaction levels of residents.

For further details contact:

Mr. D. L. Borkar

Executive Engineer

Maharashtra Jeevan Pradhikaran

Works Division, Daryapur District

Amaravati (M.S.).



One of the beneficiary villages

Rainwater Harvesting Initiative (Pramod Mahajan Water Supply Scheme)

The Kulgaon Badlapur Municipal Council has been promoting rain water harvesting through successful pilots. The initiative has witnessed an increase in the ground water levels of wells in the project as well as surrounding area, as well as reduction in pumping use , reduction of water supply charges and encouraged the reuse of water.

City Profile

Badlapur, also known as Kulgaon-Badlapur, is one of the fastest growing cities in Mumbai conurbation. Due to the population pressure in the nearby cities like Mumbai and Thane, many people working in Mumbai and other cities have moved to Badlapur. Badlapur, a 'B' class municipal council, has a current population of 0.14 million, with a total area of 36 sq km. the city is divided into 34 municipal wards. Maharashtra Industrial Development Corporation (MIDC) has developed an industrial area within the limits of Kulgaon-Badlapur Municipal Council .

Context

Kulgaon-Badlapur city is connected to Mumbai metropolis and has a large number of middle-class families and a high population growth. Kulgaon-Badlapur Municipal Council (KBMC) has initiated the Pramod Mahajan Water Supply Scheme. The key objectives of this scheme are providing potable and irrigation water, increasing groundwater recharge, reducing storm water discharges and reducing seawater ingress.

Implementation

A project was initiated in the laboratory with artificial soil to find out water velocities in various combinations of soils, the absorption rate in various strata, suction capacity, etc. Topography and other natural conditions were also taken into consideration.

Based on the success of project, the Kulgaon-Badlapur municipal council implemented a pilot project, which included first-stage rooftop rainwater harvesting with groundwater recharge through percolation pits or bore wells in six housing societies. After the successful implementation of the pilot project, rooftop rainwater harvesting with bore well recharge through percolation pit systems was implemented in 40 housing societies.

Water injections were done at depths ranging from 15 to 150' based on the soil structure. The calculated area for rainwater storage was about 2.0 km with the harvesting locations being mix basalt, loose yellowish-brown basalt and at moderately weathered rock. The rainwater harvesting system was designed with the following components:

- Collection pipes for harvested natural water;
- Filtration of water through high-pressure sand filter;
- UV system to make water completely bacteria-free;
- High-pressure tank for distribution of filtered water; and
- Chain of supply pipes to deliver water.

By using technical methods, terrace water from all the buildings was collected and allowed to percolate in rainwater harvesting units and absorption pits through different graded media. Then the water from these bore wells was drawn, treated and supplied to 40 societies to use for non- potable purposes. This technology helped to raise the water table and efficiency of bore wells. The expected water harvest was about 200 cum a day. The water can be used for secondary purposes and even for bathing as it is treated with alum and sodium hypo-chlorite. The water after treatment is tested every 15 days.

Impact

With nearly 200 cum of rainwater being harvested per day under the scheme, the groundwater level in the wells in the project area and surrounding areas has increased significantly. The rise in the water table has reduced pumping costs, which in turn has led to a reduction of water supply charges from Rs. 8.6/KL to Rs. 3/KL. Further, during the rainy season (approximately for 90 days), there has been an additional reduction of pumping charges as rainwater is directly taken into the collection tank, treated and reused for secondary purposes including bathing.

Sustainability

Prior to implementation of this scheme, each member of the housing society was paying Rs. 200 /month/flat towards electricity and other maintenance charges. With the initiative, per member contribution came down to Rs. 70/ month/ flat. The technology is also easily replicable.

For further details contact:

Mr. Ram Patkar

President, Badlapur Municipal Council
Kulgaon-Badlapur (East), Thane District
Maharashtra 421 503.

Water Quality Monitoring in City

Surat Municipal Corporation provides good quality water to its citizens and attains a standard of excellence in water quality surveillance through the use of state of the art technology and quality control mechanisms.

City Profile

Surat, located in the western part of India in Gujarat, is one of the most dynamic cities, with a fast growth rate due to immigration from various parts of India. As per the Census 2001, the present population of Surat urban agglomeration is 28,11,614. The city has seen an unprecedented growth in last four decades recording one of the highest growth rates in the country and a 10-fold population rise. The city is known for its textile trade, diamond-cutting and polishing industries. The outbreak of plague in 1994 highlighted highly inadequate urban infrastructure of the city. Surat is known for its strengths to convert adversity into advantage.

Context

Surat Municipal Corporation (SMC) has developed a well-established, networked water supply system to provide drinking water to a consumer base of 3.25 lakh connections in city limits comprising of 334 sq km. There are ten major water distribution stations and four pumping stations responsible for the effective water distribution to various parts of the city.

With increase in water demand, the SMC constructed an additional water reservoir and associated infrastructure such as water treatment plants (WTPs), storage tanks, and distribution stations. However, it was observed that the raw water quality was deteriorating due to absence of fresh water in the river during non-monsoon seasons and pollution-causing activities in the upper stream. Consequently, the WTPs were unsuccessful in maintaining the desired quality of treated water.

The SMC faced constraints in monitoring the quality of treated and supplied water. The water quality-monitoring parameters like turbidity in raw water were checked once a day and parameters for supplied water like turbidity, residual chlorine, pH, hardness, alkalinity, chloride, etc., were checked only once a week. The instruments and equipment used for water-quality monitoring were outdated and the quality of reports/data generated by these instruments was neither reliable nor consistent, and involved manual operations. There was no dedicated staff for quality monitoring. There was only one centralised laboratory at the headwater works where the parameters were not regularly checked and the schedule for sample collection did not exist.

Implementation

With the objective of improving water quality, the Hydraulic Department of the SMC established various water-testing laboratories with modern instruments and equipment. A decentralised water-quality monitoring system was established with one main laboratory at a key water distribution station and water-quality testing facilities at other waterworks stations. Appropriate technologies, instruments, equipment, etc., were installed in accordance with IS 10500 standards for effective sampling and monitoring of water quality. In addition, the Water Quality Surveillance Programme was implemented to ensure the quality of water supplied. To check and measure parameters like pH, turbidity, total dissolved solids, dissolved oxygen, chlorine, ammonical nitrogen, and achieve desired results, online meters like multi-parameter deployable river-monitoring instrument, digital turbidity meter, digital residual chlorine analyzer, were installed. Arrangements were made for conducting in-house chemical as well as bacteriological tests on a regular basis. Uniform procedures were followed for record keeping at all the workstations. Fogging activities were taken up in surrounding areas of WTPs. Continuous education and capacity-enhancing programmes were organised for lab technicians, operators, etc., for the effective performance of duties. A number of experience-sharing sessions



State-of-the-art laboratories for water quality testing

were organised to exchange good practices in the sector. In addition to the above, SMC approached the Central Industrial Security Force (CISF) to conduct a comprehensive survey to assess the vulnerable points in water supply system against any terrorist attack. As per recommendations, the SMC installed an Online Total Organic Carbon Analyser as a water-contamination information tool.

Impact

Four state-of-the-art laboratories at the waterworks and one at the main distribution station were installed with state-of-art technologies and modern instruments and equipment. Staff were specially trained on water-quality monitoring and positioned as microbiologists, technicians, operating chemists, etc.

Consequently, there was regular and accurate monitoring of raw and treated water. Parameters such as turbidity, chlorine, total dissolved solids, pH, colour, dissolved oxygen, etc., were measured and monitored. Microbiological parameters were also monitored at the dedicated microbiological lab. River water quality was measured and monitored through the use of imported deployable instrument. Various test formats and logbooks were maintained for water quality. An agency was authorised to perform external maintenance and calibration, and standardised reporting procedures were defined. ISO 10500 standards have been strictly followed.

A weeding machine was procured to avoid impurities at the source itself and the operation has been outsourced to a third party. Further the installation of Online Total Organic Carbon (TOC) analyser is planned. During 2006–07, 99% samples collected on a daily basis were found to be of good quality.

Sustainability

In house capacity building ,installation of state of the art technology and systematic quality control mechanisms have resulted in consumer confidence .

For further details contact:

Ms. S. Aparna, IAS

Municipal Commissioner,

Surat Municipal Corporation

Muglisara, Surat – 395 003.

Utilisation of Groundwater to Augment Surface Water through Revival of Open Wells

Belgaum City Corporation has tried out an innovative method to augment availability of water and succeeded in successfully reviving of open wells to supplement formal water supply . The revival of wells has led to better supply of drinking water, recharging of groundwater,

City Profile

Belgaum, one of the oldest, most prominent and historic towns in northwest Karnataka, is the headquarters of Belgaum district. Belgaum had a population of 399,600 (Census 2001). The City is well connected by road via National Highway 4, now part of the Golden Quadrilateral. It is on the main Indian railways grid and is part of Hubli Division

Context

Before the commencement of Rakaskop Water Supply Scheme in 1964, Belgaum city was dependent on open wells. The wells have an average diameter of 30–35' with an average water column of 60–70', even in summer months. These wells were abandoned after introduction of tap water. but in 1995, the reservoir that supplied water to the city dried up due to variations in the monsoon.

Until 1995, the Rakaskop reservoir was the only source of potable water for Belgaum city. Wells and open wells were misused as garbage dumping sites or for religious rituals like Ganesh immersion. Because of their misuse, many of the wells were covered with concrete slabs and the people have forgotten about their existence. In 1995 with delayed monsoon the reservoir dried up, creating a water crisis in Belgaum city.

At this juncture, the Belgaum City Corporation (BCC), after studying the viability of revival of the open wells, initiated the process of utilisation of groundwater from open wells to augment surface water supply. In the process, it also protected the water table and environment.

Implementation

As there was an acute shortage of water, alternate sources of water were explored to deal with the water crisis. Consultations with senior citizens on the alternative sources of water were initiated and old high-yielding wells were identified. A survey by the Geological Department was conducted. Based on the survey, it was realised that Belgaum has an aquifer beneath the laterite stones and most of the old wells are situated there.

An expert committee from the Department of Geology, Goa University, studied the viability of revival of open wells by observing the yield, recuperation rate, groundwater level, quality of water etc., and gave an encouraging report. Subsequently, 15 high-yield open wells were identified within the Corporation limits. Identified wells were cleaned up, de-silted and dewatered with the involvement of local people, NGOs, social workers and citizen clubs.



A Open Wells in Belgaum



Mini filter plants

Mini filters with an average design capacity of 50,000 l/hr along with an alum dozer, chlorinator, and pumps were fixed to the wells. The quality of water was tested and supplied to the citizens through the existing distribution network. Each open well has an average yield of 4 lakh liters of water per day.

The cost of the project worked out to Rs. 5,00,000 per well. The operating cost of each plant with 50,000 LPH filtration capacity and 8 hours pumping was around Rs. 307 per day and the details are given in the Table:



Congress Park developed near well

Expenditure per Well

(in Rs.)

Expenditure Area	Cost per Day
Electricity	152
Chemicals	55
Labor	100
Total	307

Cost of production of water under the open-well filtration scheme is Rs. 0.76 per kilo liter which is much less than the production cost of surface water at Rs. 8.30 per kilo liter and cost of tanker supply at Rs. 100/KL.

Impact

The BCC revived 15 open wells and is able to cater to the needs of 1,50,000 residents in the city. The revival of open wells has avoided the need for drilling bore wells and engaging private tankers to meet the demand for water, thereby achieving significant savings for the Corporation. Regular usage of wells helped in recharging water levels. Further, sites of the open wells were transformed to public parks, which has also contributed to high customer satisfaction.

Sustainability

The treated open-well water is being supplied through the existing distribution system. Cost recovery is done through regular water charges, making the programme sustainable. This scheme can be implemented in places where there are aquifers and the water-table level is adequate. As the execution and operation & maintenance cost of the well-revival scheme is much less compared to other options, this project is viable.

For further details contact:

Commissioner
 City Corporation of Belgaum
 Risaldar Galli
 Belgaum Karnataka

Re-Engineering Water Supply Routes for Effective Energy Savings

City Profile

Surat, located in the western part of India in Gujarat, is one of the most dynamic cities, with a fast growth rate due to immigration from various parts of India. As per the Census 2001, the present population of Surat urban agglomeration is 28,11,614. The city has seen an unprecedented growth in last four decades recording one of the highest growth rates in the country and a 10-fold population rise. The city is known for its textile trade, diamond-cutting and polishing industries. The outbreak of plague in 1994 highlighted highly inadequate urban infrastructure of the city. Surat is known for its strengths to convert adversity into advantage.

Context

Surat Municipal Corporation (SMC) has developed a well-established, networked water supply system to provide drinking water to a consumer base of 3.25 lakh connections within the city area comprising of 334 sq km. For the effective distribution of treated water to various parts of the city, there are four waterworks, ten major water distribution stations and four pumping stations. All water-works, water distribution stations and pumping stations are connected to the grid network, which interconnects them in such a way that in case of non-functioning or shutdown of any individual waterworks, water can be supplied by the other waterworks or distribution stations. Presently, SMC is supplying more than 680 million liters of water per day (MLD) against the installed capacity of 828 MLD.

The demand for water in Surat city rose with rapid urbanisation between 1996–97 and 2003–04. Energy cost in Surat Corporation, as in any other corporation, was one of the major components of operational expenses in water supply and contributed more than 61% of the total energy bill of SMC. With an ever-increasing population resulting in increase in volume of services, optimising energy consumption for water supply became a priority for SMC. As part of its reform efforts, SMC created the Energy Efficiency Cell in October 2001.

Demand for water increased gradually in Surat city from 199 MLD in 1996–97 to 828 MLD in 2007, which in turn increased the energy cost of water supply from Rs. 12.66 crore in 1996–97 to Rs. 43.12 crore in 2003–04. There was an urgent need for the SMC to reduce energy consumption and thereby overall operating cost.

Implementation

In the water supply system, SMC identified the following major energy consumption areas: (a) raw/filtered water collection, (b) filtration of raw water including chlorination, (c) filtered water transmission and (d) filtered water distribution. After examining these areas, it was found that savings lie in the filtered water transmission and thus dedicated efforts were made in re-engineering the filtered water transmission routes and by focusing on other energy saving measures. Re-engineering of filtered water transmission routes included calculation of specific energy consumption in transmission of water in the existing situation and determining the economical channels for transmission for all water distribution stations. Actions taken for making transmission more economical include : making connections between existing transmission lines more effective, laying new transmission lines and connecting to existing ones, and replacement of existing pumps as per energy auditor's suggestion.

Other energy saving measures taken up included installation of thyristor-based APFC panels in the water distribution system, coating the pumps at the booster house of head waterworks, installation of pump sets at old and new booster pump houses, replacement of impeller at booster house and raw water wells, replacement of energy-inefficient pumping machineries, etc.

Impact

The Surat Municipal Corporation used robust technology to save energy at the municipality level with effective database maintenance for the performance of pumping machineries, water supply, electricity bills, etc. The grid network with re-engineered routes resulted in huge energy savings.

The SMC reduced its overall energy consumption from 343.29 KWH/ML (2003–2004) to 316.95 KWH/ML (2006–2007). It saved 79.40 lakh KWH/annum (Rs 350.23 lakh /annum) by reducing power costs. Savings achieved by re-engineering the pipelines in four major locations was Rs. 326.67 lakh. Other than re-engineering projects, nine energy saving projects were implemented, which resulted in an annual savings of Rs. 23.60 lakh. The specific energy consumption of SMC water supply system is monitored on a daily basis and was found to have reduced from 356.87 KWH/ML in 2000–01 to 316.95 KWH/ML in 2007. The total savings achieved by SMC through re-engineering and energy conservation were Rs. 350.23 lakh per year.

Sustainability

As no additional capital cost will be required and O&M costs are reduced, this project is highly sustainable.

For further details contact:

Ms. S. Aparna, IAS

Municipal Commissioner

Surat Municipal Corporation

Muglisara, Surat 395003.

Effective Customer Grievance Redressal Mechanism

The Chennai Metropolitan Water Supply and Sewerage Board has instituted a round the clock and effective Customer Grievance Redressal system employing technology and face to face meetings to cover requests for service, complaints and payments to be more transparent , accountable and responsive to its customers.

City Profile

Chennai, capital of Tamil Nadu, located on the Coromandel coast of the Bay of Bengal, has an estimated population of 7.5 million (2007) with an area of around 181 sq km. The Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) was constituted under the Chennai Metropolitan Water Supply and Sewerage Act in 1978 to address the growing needs and for the planned development and appropriate regulation of water supply and sewerage services in the city.

Context

The CMWSSB provides high-quality water and the safe disposal of sewage and wastewater, catering to more than 7.5 million citizens of Chennai city. However, the systems and procedures in the organisation were not streamlined and transparency and accountability were very low. The redressal system also had many weaknesses, such as manual complaint registration, which is time consuming, improper communication and allocation of work to field staff and ineffective management information system (MIS). Moreover, there was no proper mechanism for updating and verifying the status of complaints at the head, area and depot offices, and automated escalation of complaints did not exist. There was manual allocation of work to field staff by preparation of work allocation slips and manual process of generation of MIS report, resulting in duplication of work. To streamline processes and to establish user-friendly systems, the Board established an effective grievance redressal mechanism, which included reorganisation of a 24-hour Complaint Cell, constitution of a Grievance Cell, introduction of a Complaint Monitoring System (CMS), and provision of computer terminals.

Implementation

To obtain feedback from consumers and identify areas of improvement, CMWSSB conducted a survey of 4,500 consumers on service levels provided by the Board. The Complaint Cell was equipped with facilities such as computer terminals for registration of complaints, three telephone lines with hunting facility, mechanisms for immediate processing of complaints and cell phone connections to inform the officer concerned. A Grievance Cell was made functional to register complaints/grievances on activities related to water and sewerage services. Complaints were immediately forwarded to the department concerned and were closely monitored and reviewed by senior officials. Information and Facilitation Counters (IFCs) were made functional at the head office and all 10 Area Offices to assist and guide the consumers in lodging complaints relating to services like application forms, new assessment, name/address change, water tax and charges, etc. Brochures, pamphlets, citizen charters, etc., were made available at IFCs free of cost.

An adept Complaint Monitoring System (CMS) based on Oracle 11i Enterprise Resource Planning (ERP) was introduced for the speedy redressal of complaints. This facility allows the consumer to lodge the complaint at any Board office, communicate the complaint in less than three minutes to persons/departments concerned, establish the maximum time limit for redressal given in citizen charters, escalate complaints if not redressed in the stipulated time to senior officers, and allows officials to review the status of complaints at any location at any point of time. Along with CMS, the Board also introduced Complaint Monitoring Software to keep track of complaints and their recurrence.

Public grievance redressal/open house meetings were conducted at all Area Offices on a fixed date and time. Participants include voluntary organisations, consumer action groups, resident association representatives and others. A Superintending Engineer is posted as presiding officer and the date and time of open house meetings are widely disclosed through local newspapers. In order to become more transparent, accountable and citizen-friendly in its functions and policy decisions, the Board published the Citizen Charter and Citizen Guide clearly stating the standards of services. The Board has launched a website with a facility of payment of water charges and lodging of complaints online.

Impact

This new system includes a 24-hour complaint cell with facility for online complaints/ email complaints, which enables speedy redressal as well as tracking the status of complaints. Open house meetings enabled the Board to tackle pending cases, which in turn led to revenue improvements. Launching of the website enabled payment of water charges and lodging of customer complaints online.

The automated escalation of complaints to senior officials has enhanced accountability to consumers, enabled senior officials to monitor the redressal system effectively and resulted in better tracking of customers' complaints. The 20% increase in revenue collection in the year 2007–08 may be attributed to the introduction of customer centres. The institutionalised grievance redressal system has improved transparency and accountability and resulted in greater consumer satisfaction. It has also reduced duplication of work.

Sustainability

With relatively low investment, the initiative has achieved increased customer satisfaction and increased revenue. A variety of interventions , ranging from applications to citizens charters, Information and Facilitation centres etc contribute to the efficacy and sustainability of the grievance redressal system.

For further details contact:

Mr. Shiv Das Meena, IAS

Managing Director

Chennai Metropolitan Water Supply & Sewerage Board (CMWSSB)

No.1, Pumping Station Road, Chintadripet

Chennai 600 002.



24 hour complaint cell



Website for complaint registration

Community Managed Sanitation Scheme, Laxmanpura

Gwalior Municipal Corporation took the lead in providing sanitation facilities to the most vulnerable populations by piloting an initiative for 'open defecation-free' slums. Laxmanpura Slum has now achieved open defecation free status through a community based and managed sanitation facility under the Slum Environmental Sanitation Initiative.

City Profile

Gwalior, a historical Indian city located on the periphery of Madhya Pradesh, is ranked 46th among the most populated cities in the country. The population of Gwalior was 826,919 (Census 2001), with 32.87% population living in slums. Gwalior is fairly well connected to other parts of Madhya Pradesh and India via national and state highways.

Context

Open defecation in the slums is a major concern as it directly affects the health, sanitation, and environment of slum inhabitants and the surrounding communities as well. In the existing 226 poverty pockets in Gwalior, there were around 135 community toilets of which 80 were unusable due to lack of maintenance. Given the worsening situation, a conscious attempt was made by the Municipal Corporation of Gwalior to set up community toilets. A tripartite partnership was formed between UN-HABITAT, Water-Aid and Gwalior Municipal Corporation to implement the Slum Environment Sanitation Initiative (SESI) project for achieving open defecation-free slums in the city.

Sixteen slums were identified as worst effected on the basis of poverty pocket situational analysis (PPSA) for the implementation of the SESI programme. Of them, Laxmanpura, a slum with a large percentage of families where open defecation is a major concern was selected as a model for construction of community toilet. Laxmanpura is a 150-year-old slum located in the heart of the city near Padav crossing, falling under ward no. 30 of the municipal corporation. Prior to the initiative, the status of the slum in the context of sanitation and hygiene remained very poor with most people using nearby railway tracks for defecation, which at times resulted in serious accidents. In addition, water contamination and water logging at several locations further contributed to the vulnerable health status of the slum inhabitants.

Implementation

A number of steps were initiated for the effective implementation of the project. Women self-help groups (SHGs) were formed consisting 15 members. A Sanitation Fund was constituted to provide loans for construction and maintenance of toilets and water facilities . Capacity-building programmes and education campaigns were organised and exposure visits were arranged to create and enhance awareness about sanitation and hygiene and its positive impact on health.

Nirmal Samiti, a community-based organisation (CBO), was formed to create awareness among the community members about the benefits of the household toilets. For households that do not have sufficient space for individual toilets, community toilets were proposed. It was decided that the existing defunct community toilet should be demolished and a new community toilet should be constructed at the same place. Nirmal Samiti took the responsibility to supervise the construction of toilets and their maintenance.



Community Toilet at Laxmanpura

The average construction cost of an individual toilet was estimated to be between Rs. 4000 and Rs. 6000/. An incentive amount of Rs. 800–1200 per toilet was given by Water Aid, and the remaining amount was borne by the beneficiaries.

Current Status

Houses	229
House holds	327
Population	1635
Below poverty Line (BPL)	More than 30% families were BPL & 179 households have kutcha houses
Household Toilets	110 (44% of the households did not have toilet facilities and the nearby railway tracks were used for defecation)
School	1 (did not have the drinking water and toilet facilities)
Community Toilet	1, which was defunct due to poor maintenance

Income & Expenditure Statement of Community Toilet per Month

Income (in Rupees)		Expenditure (in Rupees)	
Monthly membership fees @Rs.10 x 139	1,390.00	Sweeper charge	600.00
Occasional users: average of Rs.15 per month	15.00	Maintenance cost @Rs.10/- day	300.00
		Repair & replacement	50.00
		Water & electricity charge	GMC *
Total	1,405.00		950.00

*Presently borne by GMC

To meet the initial O&M expenditure on water and electricity of the community toilet, the Gwalior Municipal Corporation decided to provide free electricity and water for a period of one year. A five-member team of Nirmal Samiti was formed to act as caretaker on a rotational basis.

Impact

Laxmanpura slum has been declared as 'Open Defecation-Free Slum' with construction of 203 individual toilets and one community toilet which has an incinerator facility and is disabled-friendly as well as child friendly. A strong sense of ownership has developed among the community members in maintaining the infrastructure.

The initiative provided a comfortable and easily accessible sanitation facility to women and children as well as to the disabled and aged members of the community. The city administration gained confidence in community-managed asset creation.



Laxmanpura community-based toilet

Sustainability

Expenditure required for operation & maintenance are minimal and the project is sustainable. This model is being replicated in 28 other slums of Gwalior city as there is demand for individual and community toilets. In Laxmanpura a CBO has been made responsible for the smooth functioning and proper operation and maintenance (O&M) of the community toilet along with the responsibility of collection of user charges. At present the community toilet has a membership of 139 households and is partly maintained through user charges of Rs. 10 per head per month. Effective monitoring and user fees will contribute to project sustainability .



Replication of Laxmanapura model

For further details contact:

Dr. Pavan Sharma, IAS

Commissioner

Gwalior Municipal Corporation

Maharajawada, Gwalior.

Improved Access to Water Supply for the Poor

The Vijayawada Municipal Corporation embarked on a unique initiative to increase the access of the urban poor residents to water supply through subsidizing connections and simplifying procedures. The Municipal Corporation also employed a unique communication and campaign strategy and witnessed a fifty percent increase in the number of consumers belonging to the 'Below Poverty Line' category as a result.

City Profile

Vijayawada, is the third largest city and “commercial hub” of Andhra Pradesh, located on the banks of the Krishna River. It has the largest railway junction in South India with a well-connected road network. The population of the city as per the 2001 Census is around 10 lakh spread over 58 sq. km, with approximately 2,63,973 people living in slums.

Context

Prior to the initiative (April 2006), only about 25% of the households, i.e., 56,204 out of 1,95,000 households in Vijayawada had access to the piped water supply network. The majority were dependent on public stand posts, irrigation canals, bore wells, and open wells. The situation was worse in slums. Women were spending two to four hours a day to fetch water from public stand posts.



Position at public taps before the initiative

With a vision of providing universal access to potable water supply to all the citizens, the Vijayawada Municipal Corporation (VMC) decided to offer water connections in a mission mode at subsidised rates by streamlining the procedures.

Implementation

A consultant was appointed to prepare a list of all areas without network connections and to initiate steps to cover those areas with transmission and distribution mains along with storage reservoirs. A database of the areas with proper network and potential for new connections, and areas without network but with sufficient water availability permitting expansion of coverage, was developed.

The studies indicated that the existing network covered 60% of the streets and with limited additional investments, interconnection, reorganisation of existing supply zones and laying networks in a few areas, it was possible to cover an additional 15–20% of the streets in the city.

Specific areas were targeted with promotional materials such as newspaper advertisements, local cable network and corporate advertisements to inform residents about the initiative. Tap *melas* (fairs) were conducted to encourage the residents to take connections.

To encourage connection coverage among the poor, VMC decided to offer connections at Rs. 2,500 to households with a property tax limit of Rs. 175–300 and also gave them an additional discount of 25%.

Connections were sanctioned across the counter after verification of documents, and on-spot payments for new connections were accepted. Additional labour was hired to eliminate delays in providing connections. Software was designed to monitor both the sanctioning and the physical commissioning of connections online on a daily basis by a dedicated cell.

Even though the discount on connections was withdrawn after an initial encouraging response, the demand for new connections continued and even increased.



Tap mela in Vijayawada

Impact

Increased standard of living for BPL families and additional revenue to the corporation are the two most tangible benefits of the initiative. With minimum investment, VMC was able to make optimal use of its existing distribution network, extend the network to new areas and reduce the dependence of households on ground water and public taps. Within nine months, the number of public stand posts was reduced from 4,770 to 3,350.

The VMC collected revenue of about Rs. 1.14 crore towards connection charges, and it is expected that revenue through monthly tariff would reach around Rs. 61 lakh per year. Connections were given on demand at the doorstep of customers within 48 hours of payment of connection charges. Within seven months time, the number of connections increased by 14% in above-poverty-line (APL) households and increased by 50% in BPL households (7,460 new BPL connections in four months against 4,127 in five years until March 2006).

The project implementation cost primarily consisted of promotional cost, which was very limited.

Apart from the revenues generated from APL connections, VMC is collecting monthly charges of Rs. 50 to 80 per connection and initial connection fees of Rs. 1,200 from BPL households.

Poor families with household connections have also benefited significantly in terms of time saving. Accounting for a woman's time spent in collecting water, the average cost per kiloliter of water declined from Rs. 52 to Rs. 6, once the household enjoyed an in-house water connection.

With families depending far less on public stand posts, there has been a significant reduction in non-revenue water, which has boosted the revenue of the municipal corporation.

Sustainability

Providing additional water connections to the households on the existing network is not a complex task and does not require major investments. The VMC is getting additional revenue through connection charges from new connections and monthly tariff payment. With effective monitoring and teamwork, such an initiative is sustainable as the marginal costs are very low while the returns are high. In addition, returns on health and hygiene, saving of time to the poor, etc., are very high.

For further details contact:

Commissioner

Vijayawada Municipal Corporation
Vijayawada – 522 003

Operation and Maintenance of Water Supply System through Public- Private Partnership

Outsourcing the operation and maintenance of the water supply system via a performance based contract in Navi Mumbai has resulted in an 80% reduction in complaints on water pressure and quality and a perceptible increase in revenues of the Navi Mumbai Municipal Corporation

City Profile

Lying on the eastern seaboard of Thane Creek, Navi Mumbai, a twin city of Mumbai, is one of the largest planned cities in the world. Navi Mumbai is spread over parts of two districts of Maharashtra – Thane and Raigad. The total area of the city is 344 sq km of which 108.6 sq km is under the jurisdiction of the Navi Mumbai Municipal Corporation (NMMC). It has a population of around 12 million (*Source: Nomination submitted by NMMC*) with a growth rate of 82% during 1991–2001. The main economic activities include are industry, commerce, IT, services, and fishing & farming in some areas. The city is emerging as the knowledge hub of the region.

Context

The NMMC took over the water supply system from the City and Industrial Development Corporation (CIDCO) on November 1st, 1999. NMMC had limited manpower for carrying out Operation and Maintenance (O&M) work of water supply. Managing the Operation and Maintenance posed an administrative and technical challenge for NMMC. This is because each of the various components of O&M were out sourced to assigned to a different agency/ contractor viz. electrical, piping, pumps and valves, tanks and chambers, water supply operations, water supply connections, billing and recovery, processing and bill preparation . This made coordination and quality supervision difficult; as a consequence there was frequent breakdown of systems. Further, there was inadequate interface with customers and There was no system for communication and poor mechanism for registering and redressal of complaints.

Implementation Process

In order to find a solution to these challenges and improve efficiency of operation and maintenance , the NMMC decided to outsource the O&M of the entire water supply system to a single contractor through a comprehensive performance based contract. An expert committee was appointed to study all aspects of the O&M works. Water supply districts were defined and an inventory of each district was prepared. The expert committee set benchmarks for the O&M. ‘Scope of work’ and ‘Bonus and Penalty Clauses’ were defined for a performance-based O&M contract. A provision of penalty was made for improper, inadequate and negligent performance and there were incentives for excellent performance. General and special conditions of the contract were also defined.

The contractor was made responsible for the management of various tasks like water and energy audits; regular and preventive maintenance of civil, mechanical, electrical and distribution works; coordination with all authorities viz., MJP, CIDCO, MIDC, MSEDCL, registering of consumer complaints; meter reading and distribution of bills and notices; leak management; detection of illegal connections; operation of the system; maintenance of residual chlorine content; distribution of water to the citizens and maintenance of pumping machinery and electrical equipment.

Innovations

NMMC integrated all functions related to O&M in a single contract . Having a single contractor responsible for all O&M Functions has reduced administrative transactions significantly as well as improved monitoring of O&M activities. NMMC officers now have adequate time to focus on strategic and long term activities like contingency planning, introduction of 24X7 water supply planning, and MIS.

Impact

The performance based single O&M contract has proven to be economical and more effective. The visible benefits are :

- The annual revenue has increased from Rs.44 to Rs.55 crores on attaining 88% bill collection efficiency and additionally through savings through reduction in water wastage, illegal connections, water theft, power bills, break down of electrical components and mechanical machinery etc.
- The maintenance costs of motors and pumps have been reduced by 35%.
- There has been an 80% reduction in complaints relating to water pressure with efficient and sustainable service being provided to the consumer
- Complaints relating to water-quality complaints have been reduced to almost nil attributable to the introduction of daily water-quality monitoring system
- The billing system is fully computerised for full accounting and bill recovery, which has also reduced paperwork.
- The NMMC also observes that improved quality of water has reduced incidences of water borne diseases

Sustainability

Effective monitoring of the performance of the contractor who is responsible for O&M of the entire water supply system has resulted in better revenues and efficiency. The NMMC is now able to focus on strategic improvements for the sustainability of the project.

For further details contact:

Mr. Vijay Nahata, IAS

Municipal Commissioner

Navi Mumbai Municipal Corporation

Belapur Bhavan, 1st Floor, CBD

Belapur, Navi Mumbai, Thane – 400 614