



सत्यमेव जयते

Ministry of Urban Development  
Government of India

# Compendium of Good Initiatives

## National Urban Water Awards 2011-12



Knowledge Partner



**Administrative Staff College of India**

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# INTRODUCTION

## 1. BACKGROUND

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 Millennium Development Goals (MDGs). Urban areas throughout the country are striving 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, exploring new financing options and forging new partnerships. The Government of India's Jawaharlal Nehru National Urban Renewal Mission (JNNURM) and other initiatives of capacity building are helping cities to accelerate ambitious initiatives for change.

## 2. THE NATIONAL URBAN WATER AWARDS (NUWA)

The National Urban Water Awards (NUWA) was instituted in 2008 with the explicit purpose of honouring urban local governments, water boards and organisations that assist them in taking innovative and significant steps towards effective water management and effecting improvements in service delivery. The Ministry of Urban Development in association with the Administrative Staff College of India (ASCI), Hyderabad has conceptualised and successfully established an annual National Urban Water Awards (NUWA). The NUWA was conceptualised based on the appreciation of the potential of learning from peers and knowledge exchange of context specific practice.

The NUWA aims to encourage and promote provision of continuous and equitable water supply and universal sanitation in urban India. The Awards cover a wide spectrum of good practices across various categories that have resulted in enhanced quality of service delivery levels to the citizens at large and the poor and marginalised in particular. The Awards are a veritable showcase of innovative, inspiring and sustainable models in water management practices in urban India. The Awards are meant to recognise urban local governments for good performance in water and sanitation in seven categories, described below. The NUWA is unprecedented in scale and scope, being open to all urban local governments/service delivery agencies across the country. The Awards Programme is now in its fourth year.

## 3. ELIGIBILITY CRITERIA FOR NUWA

The awards are open to:

- ◆ Urban Local Bodies (ULBs)
- ◆ Water Utilities/ Boards
- ◆ Non-governmental organisations, community based organisations, private sector, bilateral and multilateral agencies working jointly or in association with ULBs/Water Utilities/Boards

## 4. CATEGORIES OF AWARDS

The awards acknowledge organisations that have made noteworthy contribution to urban water management in one or more of the following seven categories:

- **Technical excellence**
  - reduction in non-revenue water (NRW), energy audit, metering, 24X7 water supply initiatives, etc.
- **Financial reform**
  - accounting reforms, tariff and/or subsidy rationalisation, cost recovery and bill-collection improvements, etc.

- **Services to the poor**
  - improved access, targeted subsidies and incentives, participatory planning mechanisms, etc.
- **Citizen services and governance**
  - improved communication strategy, enhanced customer satisfaction, e-governance, public disclosure and transparency initiatives, etc.
- **Public-private partnerships**
  - provision of services, contracting out O&M services, etc.
- **Urban sanitation**
  - awareness generation and behavior changes, eliminating open defecation, hygiene improvement, sanitary improvement and safe disposal practices, reuse and recycle of wastewater, strategies and plans for city wide integrated sanitation, good O&M practices, capacity building, new financing options, etc.
- **Communication strategy and awareness generation**
  - advocacy, outreach, dissemination, innovative knowledge sharing in various aspects of water and sanitation, video and audio films, campaigns organised for awareness generation and behavioral change.

## 5. PARAMETERS FOR SELECTION

Nominations were evaluated on the following parameters:

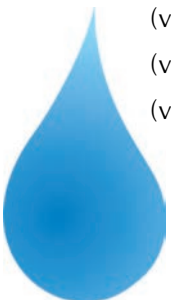
- **Sustainability**  
Demonstrated success towards availability of water resources and environmental benefits
- **Replicability**  
Potential for replication of practices and models resulting in better service delivery
- **Innovation**  
Demonstrated uniqueness and originality in use of ideas, technology & resources
- **Pro-poor and Community-based Approaches**  
Practices and programmes that have resulted in improving service delivery levels to citizens at large, and poor and marginalised communities in particular
- **Impact**  
Tangible improvements in service delivery in water and sanitation sectors.

## 6. SELECTION PROCESS

Eligible and interested organizations were invited to submit their entries. Information on the Awards programme was disseminated by advertisement in the media and websites. Communications and promotional material on NUWA 2011-12 were also sent to state governments, ULBs, water utilities, NGOs, CBOs, private sector, multilateral and bilateral agencies. A dedicated website (<http://www.waterawards.in>) was set up to disseminate updated information on NUWA.

Over 60 entries were received for NUWA 2011-12 under various categories, namely:

- (i) Technical Excellence
- (ii) Financial Reforms
- (iii) Services to the Poor
- (iv) Citizen Services and Governance
- (v) Public Private Partnerships
- (vi) Urban Sanitation
- (vii) Communication Strategy and Awareness Generation



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An independent panel of experts (Advisory Group), chaired by the Joint Secretary, MoUD, GoI, was constituted for overall guidance, evaluation of entries and final selection. The Advisory Group has eminent experts in the water sector including policy makers, academicians, representatives from civil society organizations and private sector. ASCI provided technical support for the programme.

The Advisory Group reviewed each entry based on well-defined criteria and recommended 24 promising entries for field validation. Technical teams were then deployed to undertake systematic field validations. The Advisory Group reconvened to propose entries for final selection, following the validation exercise. Detailed presentations on shortlisted entries were made by the finalists to the Advisory Group and winners were selected.

The winners are felicitated in an award ceremony organised by the Ministry of Urban Development, Government of India on 07 March 2014 at Vigyan Bhavan, New Delhi. This compendium covers the outstanding initiatives showcased in the National Urban Water Awards Programme. The compendium and details for submission of entries for NUWA are available at "[www.waterawards.in](http://www.waterawards.in)".

# Technical Excellence



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# 1 USE OF COST EFFECTIVE TECHNOLOGY IN KANHAN WATER TREATMENT PLANT

*Nagpur Municipal Corporation*

## SUMMARY

*The Nagpur Municipal Corporation (NMC) has achieved remarkable efficiency gains through deployment of cost effective technology through an innovative model. NMC has introduced a world class technology in building a new 240 Million Liters per Day (MLD) water treatment plant that led to saving in space and cost and ensuring potable water supply to unserved slum areas. The project was implemented through Public-Private Partnership format.*

## CONTEXT

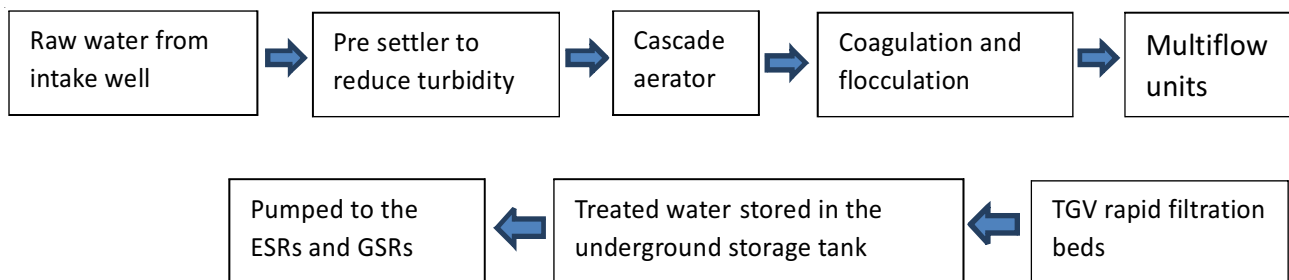
Nagpur, with a population of 2.4million (Census of India 2011), is spread over an area of 217.56 Sq. Km. The city experienced severe water supply problems over the years due to continuous expansion of the city and mismatch of demand and supply. The Nagpur Municipal Corporation (NMC) made efforts to improve the water supply by augmenting the source, treatment and distribution. Prior to the construction of 240 Million Liters per Day (MLD) Water Treatment Plant (WTP), there was a 120 MLD plant constructed in phases between 1950 and 1970. The plant has outlived its life and the assets have become dilapidated. The plant functioned much below its capacity as the conventional technology was not able to treat the raw water having high levels of turbidity particularly during the monsoon. The Operation and Maintenance (O&M) cost, particularly the energy cost, was very high. The plant occupied large area as the conventional technology was not compact and required spread of various infrastructures and assets. This resulted in poor water supply often ranging between 30 minutes to an hour on alternate days and many areas had to depend on tanker services. The NMC initially proposed to rehabilitate the existing plant and to construct a new plant of 120 MLD with the same conventional technology. This implied acquisition of additional land to accommodate the new plant and all the existing problems associated with the conventional technology were expected to continue even after rehabilitating the old plant and constructing the new plant.

## THE INITIATIVE

The NMC proposed to execute the project on Public-Private Partnership (PPP) mode and Veolia Water India was selected with due transparent bidding process. The Veolia Water India proposed to construct a new WTP with 240 MLD capacity instead of rehabilitating the existing 120 MLD plant and construction of new 120 MLD plant with its patented cost and space saving technology. The scope of the initiative was to augment the water treatment from 120 MLD to 240 MLD to meet the demand up to 2021. The initiative of constructing a new 240 MLD WTP with latest technology has not only avoided acquisition of additional land as it was compact and require a comparatively lesser area and also ensured good quality of treated water. Under the old proposal, new plant would have affected the water supply to the city since the existing plant could be rehabilitated only after the construction of new plant. Under the new proposal of construction of a new 240 MLD plant, water supply to the city was not affected. The key stakeholders in the initiative were NMC, state government, Ministry of Urban Development, Government of India and the Veolia Water India.

## PROCESS AND KEY FEATURES

The NMC received capital subsidy under the Jawaharlal Nehru National Urban Renewal Mission (JnNURM) for construction of the plant. The support of state government, proactive role of NMC and the technical experience of Veolia are the other enabling factors. The key bottlenecks were related to the delays in approval and the inclement weather conditions affecting construction. The operational process of the plant are shown in the flowdiagram:



The key features of the cost effective technology of the new 240 MLD plant:

- i. required only 3.5 acres of land instead of 12 acres under conventional technology resulting in saving in land cost;
- ii. less detention time of 22 minutes while the conventional technology required upto 3 hours which increases the size of various assets to be created which in turn increase the cost
- iii. lower construction cost compared to the conventional technology;
- iv. rapid filters which filter water at three times the efficiency of the conventional filters;
- v. require small size machinery which is more efficient and cost effective;
- vi. all plant operations and pumping machinery are energy efficient reducing significantly energy costs;
- vii. the raw water from Kanhan river has high surge load and high levels of turbidity which the conventional technology cannot handle resulting in higher turbidity levels than prescribed norms while the new technology is designed to meet the surge loads and turbidity levels which ensures compliance with the norms at much higher levels; and
- viii. adopted a multi flow unit technology which is a patented by Veolia with lamellas that can handle any type of surge load equipped with online dosing system for automated quality management.

### THE KEY IMPLEMENTATION STEPS.

- i. construction of new intake for additional surface water from river;
- ii. replacement of old raw and pure water pumping machinery with efficient pumps;
- iii. protection of river bank near old head works to prevent floods;
- iv. construction of pre-settling unit to handle abnormal turbidity during monsoon; and
- v. laying additional 1300 mm dia MS pipe of 10 km to transport 240 MLD water to grid of feeder main.

The cost of construction of new 240 MLD plant is Rs. 65 cr. which is almost similar to the cost of construction of new 120 MLD plant and rehabilitation of existing 120 MLD Plant. The project enabled lifting of additional raw water without extra cost from the existing source whereas if the same quantity of raw water is lifted through a new source it would have cost around Rs. 160 Crs. The new plant saved power costs to the extent of Rs. 3 cr. which is higher than the Equated Monthly Installment (EMI) that need to be paid to the operator at Rs. 2.86 cr per annum. Thus, there are substantial savings in capital and O&M and cost due to the new cost effective technology.

The new technology enabled the new plant to be constructed in the available land adjacent to the existing plant. The new technology of the plant enabled treatment of raw water with high turbidity without any waiting period or reduction in capacity. The new plant has also enabled uninterrupted water supply to the city during the construction period as it has not affected the functioning of the existing plant.

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## IMPACT

The Kanhan WTP resulted in augmentation of treated water supply from 90 to 240 MLD to meet the demand up to 2021. There is a significant increase in quantity and quality of water supply. Zones 5, 8 and 9 which were receiving water on alternate days now receive daily. Many slums and peri-urban colonies that depended on tanker supply now get piped water. The quality of supplied water increased as the new technology is able to reduce the turbidity level significantly and the online dosing system is equipped to adjust the dosing of chemicals as per the fluctuations in the quality of raw water. The cost and space saving technology saved the land and also reduced the capital and O&M cost. The technology adopted by the plant was able to save around Rs 3 cr. in the form of saving in energy cost which is sufficient to meet the payment to the operator making the project financially sustainable. The plant is fully automated and first of its kind and easy to operate and monitor.

## CONTACT DETAILS

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# WATER QUALITY MONITORING IN UTTARAKHAND

*Uttarakhand Jal Sansthan*

## SUMMARY

*Uttarakhand Jal Sansthan (UJS) has introduced a comprehensive water quality monitoring protocol as per IS:10500 across the state of Uttarakhand. Sampling, monitoring and reporting is being carried out as per Service Level Benchmarking Framework of Government of India. A state of the art laboratory with modern equipment was established at Dehradun and twelve more laboratories were established at different locations covering all districts in the state. Training programmes were conducted to support implementation of water quality monitoring protocol.*

## CONTEXT

Uttarakhand is a hilly state with approximate 101 lakhs population (Census of India 2011) covering an area of 53,566 Sq.Km. Uttarakhand Jal Sansthan (UJS) is responsible to provide safe drinking water to the people. Water is supplied through pumping or by gravity flow from rivers, gadheras and springs. In plains, some schemes tap water from rivers and streams while most schemes use ground water. At present UJS is maintaining 63 urban and 5,407 rural water supply schemes and another 640 schemes are being maintained by the communities under sector programme using 31000 water sources.

Bureau of Indian Standard prescribed 34 physical and chemical parameters and two bacteriological parameters for analysis. Indian Standard Specifications For Drinking Water IS:10500 also fixed desirable and permissible limits. Therefore, it is essential to test all parameters and when they are within the limits, water can be declared safe for human consumption.

Rapid population growth, industrialisation, development works like construction of roads, buildings and urbanisation polluting the water bodies. Earlier, required attention was not given to check whether the raw and supplied water was safe for consumption or not as there was a natural cleansing process and the water sources were not polluted. But at present, there is a need to check the quality of water at the sources and tackle with the quality related problems. UJS had three water quality testing laboratories at Dehradun, Srinagar and Nainital but they were not equipped with proper equipment and facilities. As a result, the quality of water was tested on a few parameters and where required. The water samples were analysed at PCRI, Haridwar, IIT, Roorkee and State Health Institute, Lucknow, Uttar Pradesh. As the process was very expensive and time consuming, it was not possible for the UJS to analyse all the water samples from different sources.

## THE INITIATIVE

UJS supplies drinking water from about 31,000 water sources. UJS took the initiative to test the water sources and established a state of the art "State Level Water Quality Analysis Laboratory" at Dehradun with the help of Uttarakhand State Council for Science and Technology (UCOST), Government of Uttarakhand and DAV (PG) College, Dehradun under Water Technology Initiative Programme of Department of Science and Technology (DST), Government of India. Tests are conducted in this laboratory on all the parameters specified by IS:10500, except the radioactivity test. Twelve labs were also set up in the twelve districts of the State. The objectives of the initiative are as follows:

- i. to test water on all parameters as per the IS:10500;
- ii. ensure the quality of water supplied by continuous monitoring and surveillance;
- iii. increase consumer confidence; and
- iv. saving in water treatment chemicals.

## PROCESS AND KEY FEATURES

After setting up the State level laboratory at Dehradun, tests of 30 water quality parameters are conducted for all 31,000 sources. It was felt that the testing of all sources in one lab may not be possible. The central government earmarked funds under National Rural Drinking Water Programme (NRDWP) for water quality surveillance and monitoring which stipulate the desirability of testing each source at least once a year for chemical contamination and two to four times for bacteriological contamination to ensure potability of drinking water. The Government of India prescribed to test water on 20 water quality parameters. So with this programme, UJS strengthened the remaining two laboratories already existed at Pauri (Srinagar) and Nainital and established 10 new laboratories at Haridwar, Tehri, Uttarkashi, Rudraprayag, Chamoli, Udham Singh Nagar, Almora, Bageshwar, Pithoragarh and Champawat covering all the districts which are fully equipped. Department also utilises the services of Shriram Institute for Industrial Research, Delhi for testing the samples on 20 water quality parameters. UJS is testing the sources on 20 parameters in its own labs and some at Shriram Institute for Industrial Research, Delhi.

The state level, laboratory in Dehradun is equipped with high quality testing equipment such as UV-Spectrophotometer and Atomic Absorption Spectrophotometer (AAS) for ppb level analysis. They are also equipped with pH, Conductivity and Turbidity Meters, Digital Titrator, Millipore Ultra Pure Water Purification System, Digital Colony Counter, Autoclave, Laminar Flow, Digital Electronic Balance, Incubator and Hot Air Oven. Stages of monitoring (raw water of the source and treated water in distribution systems) have been finalised for various parameters as described in IS: 10500. Staff has been employed for water samples collection, analysis and monitoring and standardised reporting procedures have been established. At present 28 physical and chemical tests and two bacteriological tests are being undertaken in the lab. Random samples from each district are being tested on 30 parameters. The results are being uploaded on the website of Government of India ([indiawater.gov.in](http://indiawater.gov.in)). For water sampling, preservation, transportation, testing and analysis the American Public Health Association (APHA) guidelines and IS: 3025 (different parts) protocols are being followed. Details of water quality parameters presently being analysed and analytical/ instrumental methods being used for analysis are as follows:-

TABLE 1 : WATER QUALITY PARAMETERS ANALYSED

S. N.	By Volumetric Method	By Instrumental Technique/ Manually	By UV-VIS Spectrophotometer	By Atomic Absorption Spectrophotometer
1.	Alkalinity	Odour	Anionic Detergents	Aluminium
2.	Total Hardness	Taste	Colour	Arsenic
3.	Turbidity	Chloride	Calcium	
4.	Dissolved Solids	Res. Free Chlorine	Cadmium	
5.	pH value	Sulfate	Chromium	
6.	Total Coliform Bacteria	Phenolic compounds	Copper	
7.	Fecal Coliform Bacteria	Fluoride	Iron	
8.	Nitrate	Lead		
9.	Magnesium			
10.	Manganese			
11.	Mercury			
12.	Selenium			
13.	Zinc			
	13	08	07	2

IS: 10500 has specified the testing of water on 36 parameters and state level lab is equipped to test the water samples on 30 parameters as facility to test water on remaining six parameters is yet to be created. UJS is in the process to procure Gas Chromatographer and Ion Chromatographer. After installation of these two instruments the lab will be able to test all the parameters specified by IS:10500, except radioactivity. To establish radioactivity test a major procedure and investment is required.

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UJS is also working on “Development of Remote Sensing and GIS Based Water Quality and Water Resource Maps of Uttarakhand” with the help of Uttarakhand Science, Education and Research Centre (USERC) and Uttarakhand State Council for Science and Technology (UCOST), and in collaboration with National Institute of Hydrology (NIH), Roorkee, DAV (PG) College, Dehradun and G.B. Pant University of Agriculture and Technology (GBPUAT), Pantnagar. The development of software for water quality mapping is under process. The geo-coordinates of sampling locations (using GPS) have also been taken with site information pertaining to source along with the photograph of site. All this data will help the department in preparing water quality map of the state. The key features of the initiative are:

- i. involvement of all the key stakeholders;
- ii. appropriate use of information technology to various activities;
- iii. verification from external equipped laboratories;
- iv. outsourcing staff for monitoring and water quality analysis; and
- v. several workshops and brain storming sessions on water quality & data base management were organised under the joint aegis of DST, UCOST, UJS and DAV (PG) College for capacity enhancement and experience sharing.

## IMPACT

UJS is getting the water tested and results are used to take decision. No major problem of water quality has been observed till now but bacteriological contamination in water sources have been observed in few cases. UJS has started focusing on proper disinfection of water being supplied. The result of the initiative are as follows:

- i. setting up of one state of the art laboratory at Dehradun with modern equipment and twelve laboratories in all 13 districts of the state;
- ii. testing of water on parameters as described in IS: 10500;
- iii. ensure quality of supplied water by continuous monitoring and surveillance;
- iv. consumer confidence has increased;
- v. saving in water treatment chemicals; and
- vi. preparation of water resource map

## CONTACT DETAILS

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# Financial Reforms



# 3 INSTALLATION OF WIRELESS DIGITAL WATER METERING SYSTEM ON PUBLIC-PRIVATE PARTNERSHIP

*Greater Visakhapatnam Municipal Corporation*

## SUMMARY

*Greater Visakhapatnam Municipal Corporation (GVMC) has achieved significant efficiency improvements by installing digital water meters for bulk connections by replacing mechanical meters. This led to accurate measurement of meters, identification and reduction of unaccounted for water and prompt delivery of bills leading to near 100% collection efficiency. The project was implemented through Public-Private Partnership (PPP) model. GVMC has also introduced a system of meter reading and spot billing for semi-bulk and residential connections through PPP. These efforts have resulted in effective water demand management, reduction of Non-Revenue Water (NRW), enhanced billing and collection efficiency and thus contributed to full cost recovery of operation and maintenance and financial sustainability of the organisation.*

## CONTEXT

Visakhapatnam has a population of 17.30 lakh (2011) spreading over an area of 533.00 Sq.Km. Greater Visakhapatnam Municipal Corporation (GVMC) is responsible for supplying of drinking water including planning, design, construction, implementation, maintenance, operation and management of water supply in the city. GVMC has nine sources of water supply which supply 56.60 Million Gallons per Day (MGD). As on March 2013, there are 1.21 lakh water supply connections including 74 bulk water connections to industries, 2,300 semi-bulk connections to the apartments/commercial establishments, and around 700 residential connections on 24X7 water supply. The bulk water connections consume 26 percent of water supply and contribute 78 percent revenues. The semi-bulk connections consume 3.5 percent of water supply and contribute 6.3 percent of revenues. The bulk water supply connections to industries have mechanical bulk flow water meters with manual reading often resulting in errors in reading and loss of revenues to GVMC. There were huge leakages in water supply since the water needs to travel long distances from the point of meters. There was no mechanism to identify these leakages. These mechanical bulk flow meters were installed by consumers themselves and in case of meter failure industries did not come forward to replace them. Similarly, 2,300 semi-bulk metered connections to apartments/commercial complexes were also faulty and mal-functioning, due to which there was huge wastage of water. The situation prior to the initiative was as follows:

- ◆ conventional mechanical water meters;
- ◆ manual recordings of readings once a month;
- ◆ manual preparation and disbursement of bills on a monthly basis;
- ◆ scope for tampering by consumers;
- ◆ water leakage through metal gate seating leaves leading to minimum flow to consumer;
- ◆ water leakage through gland packing arrangement causes submergence of the water meter in chamber due to which water was prone to contamination and was causing environmental hazard;
- ◆ mechanical water meter accuracy is +/- 10 %;
- ◆ since mechanical water meters function with turbine system, there is every possibility that the turbine get stuck due to any medium sized particles, which results in non-functioning of meter despite flow of water; and
- ◆ not compatibility of mechanical meters with telecommunication system.



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## THE INITIATIVE

The initiatives were an outcome of continuous effort of the administrative leadership and the concerns of the senior officials about the malfunctioning of the mechanical meters for bulk connections and inaccurate reading for both bulk and semi-bulk connections. They have explored the options to improve the existing system and learned from the cities of Hyderabad and Surat about the digital wireless metering system. The GVMC officials have tried to convince the industries to install these meters on their own but they have not come forward for the same as these meters were expensive. If the GVMC has to install on its own it has to incur huge capital investments. GVMC, therefore, decided to install digital meters through Public-Private Partnership (PPP) and engage private agency for meter reading and spot billing for semi-bulk connections which will result in reduction of Unaccounted for Water (UFW), increase revenue, conserve water and develop better communication system leading to system improvement. The two components are explained as follows:

Firstly, installation of digital wireless water meters to all 74 bulk consumers replacing the mechanical meters. This was undertaken on PPP by engaging 'Vinflow Controls' on a Built-Operate-Transfer (BOT) basis for a period of two years and another private company 'Siemens' provided the technology. The role of BOT operator is to undertake capital investment, procure and install meters and Supervisory Control and Data Acquisition (SCADA) technology, undertake Operation and Maintenance (O&M) and meter reading and issue bills. The key stakeholders in installation of digital meters are GVMC, Vinflow Controls, Siemens and the 64 industries having 74 bulk water connections. Secondly, meter reading and issue of spot bills to 2,300 semi-bulk connections involving commercial properties and apartments and 700 residential connections having 24X7 water supply through PPP by way of outsourcing. The key stakeholders in the meter reading and spot billing are GVMC, S.V. Enterprises, apartment owners' associations and residents.

## PROCESS AND KEY FEATURES

The GVMC entrusted the implementation of the digital wireless metering system for bulk connections to Vinflow Controls through tendering process in June 2010. Between June and September 2010, the agency has undertaken research and development for identification of meters and SCADA system and Siemens was selected as technology provider. Between September 2010 and January 2011 the agency procured and installed digital meters and SCADA system and the same was put on a trial basis between January and March 2011. The O&M of the system begun on March 2011 and continued for a period of two years as envisaged in the contract until March 2013. On April 2013, the private agency has handed over the assets to the GVMC which has called for another tender for O&M of the system. Meanwhile, the same private agency is engaged to provide the O&M support on a temporary basis.

The technical knowledge of the private agency and its working experience with GVMC was an enabling factor. A key constraint was the initial resistance from the industries but discussions by GVMC officials helped to overcome the same. Stakeholder consultations were carried out and information about the initiative was disseminated to the public which led to favourable public opinion. A key factor for the success of the initiative was the cost-benefit analysis which created a win-win situation for all stakeholders.

The key process innovation is the use of electro-magnetic flow meters, which is compatible with the SCADA system and provides readings on a minute to minute basis. Electro-magnetic flow meters do not require manual readings and have an accuracy of plus or minus 0.5 percent against the plus or minus 10 percent for the mechanical meters. Other advantages of electro-magnetic flow meters include.

- ◆ avoids leakage through metal gate seating and gland packing arrangement;
- ◆ avoids leak /minimum flow through metal gate;
- ◆ avoids sub emergence of valve chambers with gland leakages;
- ◆ improves environmental safety and averts water borne diseases;
- ◆ low operational torque – easy to operate;
- ◆ no gland packing - low maintenance cost;

- ◆ compatible to actuators and SCADA;
- ◆ electro magnetic flow meter of IP 68 protection flow bore can be buried and flow transmitter can be remote mounted;
- ◆ meter chamber not required;
- ◆ no meter-struck in full bore and turbine free EMFM;
- ◆ readings can be taken automatically and manually as well;
- ◆ no power failure (6 years life internal battery with external power supply); and
- ◆ compatible with communication system and SCADA.

The electro-magnetic meter helps to generate bills, online monitoring the functioning of the meter on a continuous basis and water consumption can be regulated based on the readings. The UFW can also be identified by comparing the input and output of water supply.

## IMPACT

The accountability has increased among the consumers and wastage of water is reduced. Due to metering of all commercial, institutional and apartments connections, the revenue is increased and due to spot billing system the consumers are paying bills to GVMC in time. Similar approach was followed for around 700 residential connections having 24X7 water supply on a pilot basis. The private agency has invested around Rs. 3 cr. and recovered its capital and O&M costs through annuity payment which constituted 2.75 percent of monthly revenues from 74 bulk connections. The monthly revenues stood at around Rs. 7 cr. and annuity payment was sufficient to recovery capital cost, interest and O&M cost. The GVMC benefited from the initiative as its revenues have gone up by Rs 1 crore per month and it needed to pay only a percentage of it to the private agency. The bulk consumers benefitted from the initiative as they could accurately know their consumption and restrict the usage and also bring down UFW for which they were earlier paying.

The outputs/achievements against the set objectives are as follows.

- ◆ with a single time investment, i.e., initial cost of Rs. 3.0 crore, the existing system is upgraded resulting in Rs 1.0 crore additional revenue per month;
- ◆ by March 2013, the total software and hardware provided by BOT agency is already transferred to GVMC;
- ◆ UFW in bulk supplies completely avoided and bulk consumer demand is properly managed and accounted; and
- ◆ 4.56 MLD saved water is utilised for issuing 10,000 new house connections for domestic purpose and balance water to the new bulk consumers.

The initiatives significantly contributed to financial and physical sustainability of water services. The conservation of water and reduction in UFW indirectly increased the supplies to all residents including the poor as more connections and better services are extended due to savings from this initiative.

## CONTACT DETAILS

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# Service to the Poor





# 4 ACCESS TO BHAGIRATHI TAP

## Municipal Council Kawardha

### SUMMARY

Kawardha Municipal Council (KMC), Chhattisgarh is working towards universal access to treated water supply with a focus on the poor citizens. The key features of the initiative comprise promoting free water connection as per the state sponsored scheme (Bhagirathi Nal Jal Yojana) and simplification of procedures related to individual water supply connections resulting in huge increase in access to the poor. The programme also covers those citizens who lack legal titles to land. A monthly user charge was introduced to ensure financial sustainability and demand side management. To streamline the collection of water charges, KMC issued Customer Cards and opened collection counters. This initiative has led to increased access to individual water connection by the poor, reduction in Non-Revenue Water (NRW), phasing out Public Stand Posts (PSPs) and increased revenues of the KMC.

### CONTEXT

Kawardha Municipal Council (KMC) in Chhattisgarh, has a population of 44,205 (Census of India 2011) covering an area of 14 Sq.Km. It has around 10,000 households of whom 6,580 are considered as Below Poverty Line (BPL) families. There were about 3,500 connections and about 350 Public Stand Posts (PSPs) for the poor. This was costly and insufficient to meet the city's requirement. The KMC had difficulties to issue new connections because of the non-availability of water and very low pressure. Water was supplied through 35 power bore-wells with low pressure, low water productivity and high electricity charges for pumping. Power charges used to be very high at Rs. 4 to 5 lakh every month. In 2009-10, KMC executed a 3.5 Million Liters per Day (MLD) water supply scheme from Saroda Dam – a surface water source through gravity transmission. A filtration plant of 7.75 MLD was constructed by Public Health and Engineering Department (PHED), Government of Chhattisgarh and now water is supplied through gravity to the entire town resulting in considerable saving in power charges. Even then, several problems were faced in the management of water supply in the town which include:

- ◆ Per capita availability of water was only 68 liters;
- ◆ water supply network covered only 80% of the town;
- ◆ large number of PSPs with high Non-Revenue Water (NRW) and wastage of water;
- ◆ KMC provided 50 bore wells in poor localities and a large part of the poor households depend on private bore wells;
- ◆ in several cases, PSPs used to be dominated by a few influential persons and the needy used to suffer without water;
- ◆ high electricity bills;
- ◆ many illegal connections due to weak regulation; and
- ◆ citizens not ready to pay water charges due to poor service.

The poor were the worst sufferers to procure water. The municipal council charges Rs. 1,950 as connection cost and Rs. 2,000 as deposit for every water connection it provides. The other charges vary depending on the type of road which needs to be cut to provide the water connection. For example, the municipal council charges Rs. 900 in case of cement concrete roads, Rs. 900 for BT road and Rs.150 for kutchra road. These charges and payments were acting as a barrier for the poor to access individual water supply connection.

### THE INITIATIVE

The Government of Chhattisgarh, recognising that low access to water supply in the urban local bodies (ULBs) is mainly due to high connection cost and cumbersome procedures, launched Bhagirathi Nal Jal Yojana in 2009

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which aims at providing water connection to the urban poor households 'free of cost' to improve the living conditions of women and children, easing their burden and struggle and prevent wastage of water at PSPs. The key features of the initiative include:

- ◆ the state government reimburses connection costs up to a maximum of Rs. 3,000 per connection and the additional cost, if any, to be borne by the ULB;
- ◆ ULB decides the criteria for beneficiary selection;
- ◆ beneficiary pays a subsidised monthly user charge; and
- ◆ property title is not insisted for providing water supply connection

The Yojana is being administered by the State Urban Development Agency (SUDA), Chhattisgarh. With the commissioning of water supply scheme in 2009, the KMC decided to provide water connections to households. The key stakeholders are the state government which provided funds, municipal council, and the community. The KMC undertook a door-to-door survey and identified houses without water connection and submitted a proposal to the SUDA for providing 3,000 connections to the poor. Accordingly, the government approved the proposal and released the funds. With the successful implementation of Yojana, in 2012 the government sanctioned another 1,500 connections under the Yojana to the KMC.

The scope of the Yojana is to provide domestic water connection to all eligible poor free of cost. The Yojana was launched with the two main objectives viz., benefiting the urban poor, and to generate revenue to the KMC from water supply. Other objectives of the initiative include:

- ◆ covering all the poor with water connection;
- ◆ improvement in billing and collection efficiency;
- ◆ 100% cost recovery;
- ◆ cut down the cost of water supply;
- ◆ minimise NRW;
- ◆ remove the PSPs;
- ◆ plan for 24 hours uninterrupted water supply;
- ◆ every household to get water at its doorstep;
- ◆ to provide safe drinking water to everyone;
- ◆ to control leakages in pipelines and reducing losses in water wastage;
- ◆ to detect unauthorised and illegal water connections;
- ◆ to reduce consumption of electricity for pumping; and
- ◆ to reduce cost in Operation & Maintenance (O&M) in water supply system.

## PROCESS AND KEY FEATURES

KMC prepared a detailed ward-wise project report identifying uncovered areas and conducted hydraulic test on distribution network for uniform distribution of water at proper pressure. The Council decided that all ration card holders, those identified as 'mahagarib' under Antyodaya scheme, those identified under Below Poverty Line (BPL) and all those property owners who do not pay property tax should be extended domestic water connections under the Yojana. KMC gave extensive publicity through announcement and advertisement on rickshaws about the scheme and invited applications to access domestic water connection from the poor and municipal officials during their visits informed the communities. Connections are provided within fifteen days after receiving the application. The entire work of providing connections has been tendered out and a contractor was provided the responsibility for providing 3,000 water connections. During the first phase 3,009 connections were given. The municipal council again tendered inviting applications for providing water connections for the second phase to extend 1500 connections. After implementing the project KMC not only got additional revenue but also reduced

wastages of water through removal of PSPs in a phased manner. The table 2 gives details of the number of water connection given during the last three years and income from water tariff.

**Table 2: Yearly Number of Connections and Water Tax Demand**

S. No.	Year	No. of Connections	No. Increase	Total Water Charges Demand (In lakhs)	Amount increase (In lakhs)
1	2008-09	3600		17.28	
2	2009-10	3986	386	19.23	1.95
3	2010-11	4236	250	35.31	16.08
4	2011-12	6735	2500	84.62	49.31
5	2012-13	7242	506	119.17	34.55

To streamline collection of water tariff, the municipality gave a booklet to each households with water connection in which all payments are recorded. The municipal council established a separate counter to facilitate easy access and payment in the municipal office. This resulted in better compliance and the collection efficiency increased from 32% in 2010 to 75% in 2013. The consumers interviewed expressed satisfaction at the convenience. There has been extensive participation of the poor in project execution. Several households personally supervised the water connections and also in several cases contributed through cash and kind. The municipal councilors and officials participated in the execution of the Yojana willingly as it benefited the town and the people. But absence of qualified engineering staff is the major constraint in the execution of the Yojana. Another constraint is the absence of authentic data as a result of which it has not been easy to identify the poor households despite availability of funds. Some of the problems associated with the implementation are that in some cases the households were asked to pay for the pipeline as the distance is more than 40 meters. In other, the households contributed both in kind and cash. Some houses which are occupied by tenants did not take advantage of the Yojana and the tenants are not fully aware of the Yojana and the owners are not available for discussion. But the tenants are willing to pay the monthly tariff of Rs. 60 if water connection is provided.

## IMPACT

- ◆ water supply increased to 98 liter per capita per day (lpcd) from 68 lpcd;
- ◆ increase in collection of water charges. In 2005-06 the revenue for the water supply was just Rs.15.62 lakh and it increased in 2011-12 to Rs. 91.82 lakhs;
- ◆ administrative expenditure on stationary, printing and bill delivery, etc., is reduced as the tariff is on a flat rate and card system obviates monthly distribution of bills;
- ◆ some institutional modifications were undertaken under the initiative by "Consumer Cards" to enable them to pay the tariff without waiting for bill;
- ◆ of the 350 PSPs, 300 were removed after implementation of the scheme. The remaining 50 PSPs now serving the poor, which would also be removed in a year after providing remaining connections;
- ◆ reduction in tanker supply as most households have either domestic connection or bore well nearby or PSP to meet their needs;
- ◆ single window bill collection on basis of consumer cards;
- ◆ for the citizen, it is value for money - rational tariffs coupled with improved service;
- ◆ revenues from user charges for water supply showed substantial increase over years as can be seen from table 3.

**Table 3: Revenues from Water Charges**

<b>Year</b>	<b>No. of Connection</b>	<b>Water Revenue (In Rs lakh)</b>
<b>2005-06</b>	3,150	15.12
<b>2006-07</b>	3,280	15.50
<b>2007-08</b>	3,450	16.56
<b>2008-09</b>	3,600	17.28
<b>2009-10</b>	3,986	19.23
<b>2010-11</b>	4,236	69.56
<b>2011-12</b>	6,735	84.62
<b>2012-13</b>	7,242	119.17

Source: KMC

- ◆ positive impact on citizens and KMC for overall improvement of delivery of service and revenue collection.

## CONTACT DETAILS

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# Citizen Services and Governance



# 5 E-GOVERNANCE IN UTTARAKHAND JAL SANSTHAN. "A STEP TOWARDS CITIZEN SATISFACTION"

## Uttarakhand Jal Sansthan

### SUMMARY

Uttarakhand Jal Sansthan (UJS) in partnership with National Informatics Centre (NIC) introduced a comprehensive web-based IT solution across the state of Uttarakhand covering all aspects of water management. It offers service level guarantees and initiates service level improvement based on customer feedback. IT enablement of various back-end operations have resulted in resource optimisation and improvement in service delivery processes. The online data flows and reporting mechanism has helped the decision-makers in monitoring and evaluating the system performance.

### CONTEXT

Uttarakhand Jal Sansthan (UJS) provides drinking water throughout the state for approx. 10 million population (Census of India 2011). UJS has 15 divisions across the state which are partly urban and partially rural. Its operations in urban areas can be seen from the table 4.

**Table 4: Urban Divisions of UJS, Number of Connections and Revenues (Rs. in lakhs)**

S. No.	Urban Divisions	Number of Connections	Population	Revenue (Year 2012-13)
1.	Dehradun – North	23,646	300,000	593.22
2.	Dehradun – South	44,152	512,000	1081.88
3.	Dehradun – Pithuwala	25,911	270,000	509.57
4.	Mussoorie	4,845	92,923	323.05
5.	Haridwar	48,898	811,081	713.38
6.	Udhamsingh Nagar	17,788	513,557	334.43
7.	Kotdwar	7,624	69,700	132.34
	<b>Total</b>	<b>172,864</b>	<b>25,69,261</b>	<b>3,687.87</b>

Earlier, the UJS worked in very archaic and unscientific manner with manual management of records related to personnel & payroll, court cases, pension management, schemes & resources, etc., leading to errors and malpractices. The procedures take long time and manpower. The consumer's complaints were registered manually. Even store management and contractors & suppliers information was available in registers only. Information relating to billing and collection in different divisions was not available to the head office on real time basis. It was difficult to monitor the activities because data has to be collected from division, sub-divisions, etc. Compilation and integration of data manually was a difficult task needing huge manpower affecting organisational efficiency. Whatever information was made available by the lower rung was taken as final and critical decisions were based on the available limited information. There was no method of checking the reliability of available data/information.

### THE INITIATIVE

The scope of the Management Information System (MIS) System is to provide end users with a Web-based Integrated Management Information System at six operational levels throughout the state viz. head office, zone, circle, division, sub-division and consumer.

Integrated MIS was introduced with the objective to improve transparency in working of organisation, build accountability among stakeholders, improve service delivery, effective planning, monitoring and evaluation and easy availability of reliable data.

## PROCESS AND KEY FEATURES

In a state like Uttarakhand, it is very difficult for any organisation to manually maintain departmental information, status/records of various ongoing/completed schemes across the state. In response to this challenge, UJS decided to implement a comprehensive IT solution. Department of Drinking Water Supply in the Ministry of Rural Development contributed in the efforts to achieve goals and objectives. The Rajiv Gandhi National Drinking Water Mission took up a computerisation project under the 10<sup>th</sup> Five Year Plan for effective planning, monitoring and implementation of various activities under the Water Supply and Sanitation Sector.

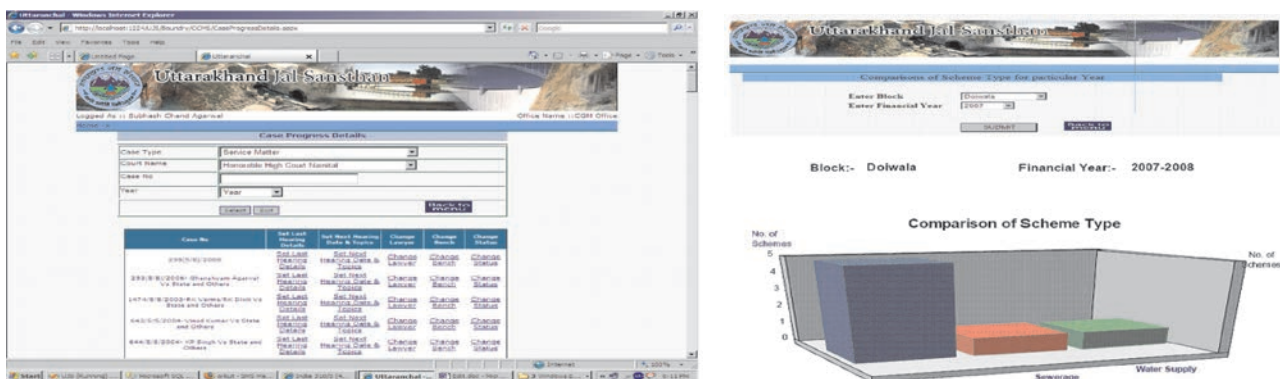
The Software Requirement Specification and modules have been prepared by department with the help of NIC & NICS in 2005-2006. Continuous modifications and customisation were carried out in-house and tested by the employees of UJS in a real time situation on a pilot basis before the state-wide implementation. UJS prepared and put in use 17 modules. These modules are citizen and organisation centric as given in table 5:

**Table 5: Modules of e-Governance**

Citizen Centric Modules	Organisation Centric Modules
<ul style="list-style-type: none"> <li>• Customer Relation Management System</li> <li>• Billing and Demand Collection System</li> <li>• Water Quality Management System</li> </ul>	<ul style="list-style-type: none"> <li>• Personnel &amp; Payroll Information System</li> <li>• Pension System</li> <li>• Scheme and Programme Management System</li> <li>• Resource Management</li> <li>• Contractor, Tender and Supplier Information System</li> <li>• Material and Store Management System</li> <li>• Billing and Demand Collection System</li> <li>• Court cases monitoring System</li> <li>• Customer Relation Management System</li> <li>• Finance and Works Accounting System</li> <li>• Equipment Information System</li> <li>• Office Automation System</li> <li>• Decision Support System</li> <li>• Mailing System</li> </ul>

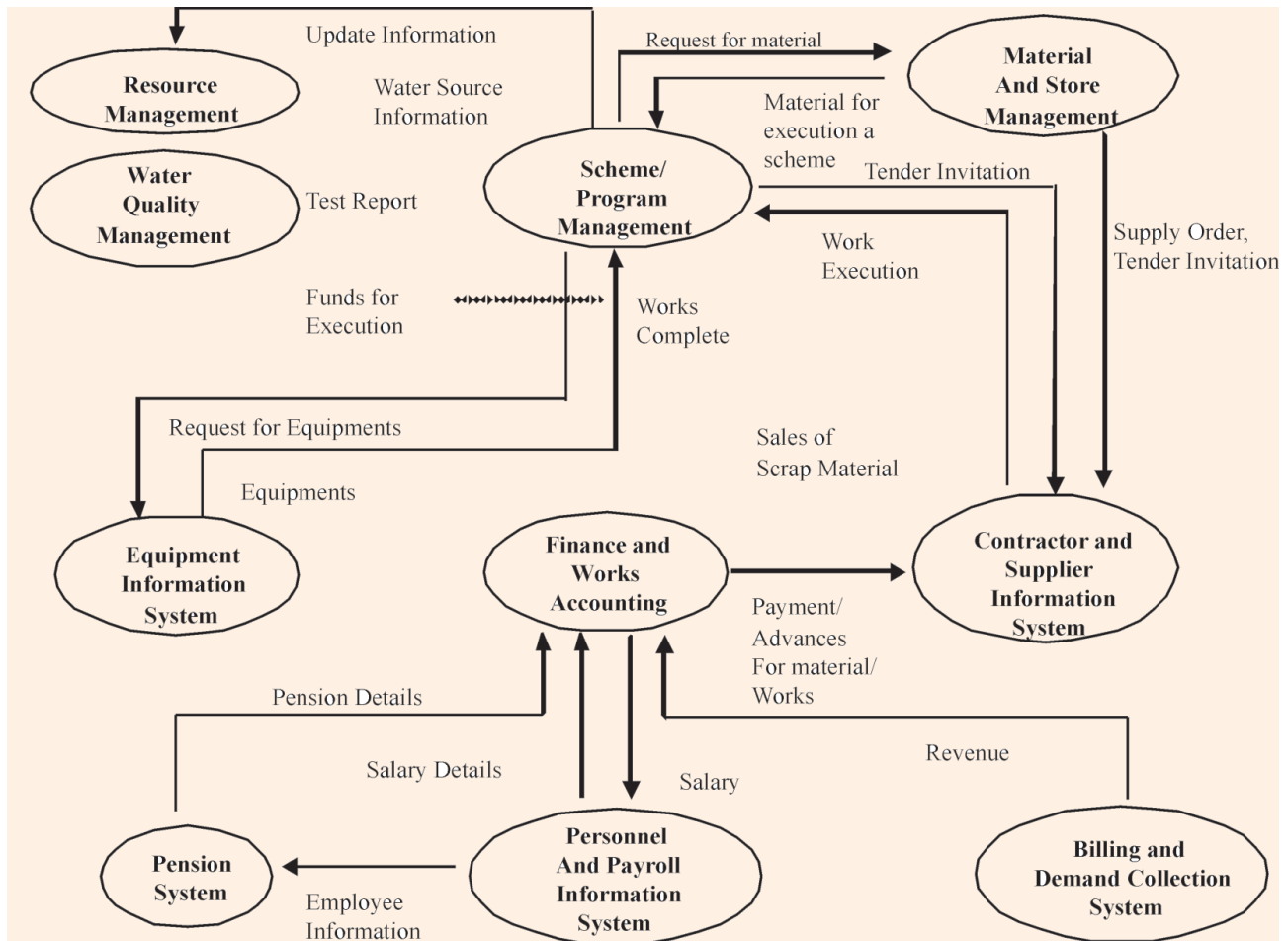
There is no requirement of updating database of each module as all modules are linked with a master database. The system has strict security guidelines in-place and right to access of various modules/sub-modules are fiercely guarded. In all the modules data can be maintained office-wise. Office hierarchy has been mapped to location hierarchy (District/Block/Urban Division). MIS Application and relevant database is hosted on State NIC Server at Dehradun. UJS with support of NIC has taken adequate measures to secure the master database and departmental website from the threat of hacking. Security audit is a permanent feature of the initiative. The department also established a backup server for emergencies. A screen-shot of the function is given in fig 1:

**Figure 1: Screen-shot of Functions under e-Governance**



ASP.NET 2005 (.NET FRAMEWORK 2.0) and SQL Server 2005 were chosen because of their robustness and scalability as a core back-end. At the user-end Internet Connection (preferably Broadband and with State Wide Area Network (SWAN)) with Internet Explorer 6.0 or higher is required. The programme is being monitored in all the 13 districts of the state through video conferencing by the Secretary, Drinking Water and Chief General Manager, UJS. All the modules are interconnected as shown in fig 2:

**Figure 2: Inter connectivity of modules**



UJS developed Citizen Charter in compliance with the state Right to Service Act. It established help desks at Dehradun for the benefit of consumers and they also accept various forms, applications and payments. Consumers are able to get accurate information faster. UJS established a state-level Call Centre at Dehradun with a toll-free number to register consumer complaints regarding water pressure, leakages, bills, etc., from across the state for all division and its operation is outsourced to a third party. Complaints can also be registered through department's website. Records of all the registered complaints are maintained online with escalation facility if unattended. A feedback call from Call Center to consumer is necessary to close the complaint.

A number of training programmes were organised to the staff and officers to equip them with the knowledge of MIS and capacity development during 2006, 2009 and 2010. Considering the need for continuous skill enhancement, UJS is organising training programmes on regular basis. Capital cost of the project is summarised in table 6:



**Table 6 : Capital Cost of the Project**

<b>Particulars</b>	<b>Amount (Rs. in Lakhs)</b>
Expenditure on Hardware Procurement	107.43
Expenditure on Networking & Site Preparation	14.98
Expenditure on e-Governance (MIS) Software & Training	48.67
Expenditure on System Software	52.93
<b>Total</b>	<b>224.01</b>

## IMPACT

- ◆ before the initiative, all records and activities were confined in the books and registers but at present information is available online on a real time basis. Decision Support System (DSS) modules give the results and reports in tabular as well as graphic forms, which helps in reviewing and monitoring the activities as well as future planning;
- ◆ online availability of information leads to transparency of the system and citizens are benefited greatly;
- ◆ billing and collection has been computerised from last eight years in Dehradun, Mussoorie, Rishikesh & Kotdwar benefiting 1.2 lakhs consumers;
- ◆ revenue collection and connection process is also made available online. Consumers can make the payments of bills and dues online. The Help Desks allow the consumers to make payment of their dues belonging to any region at Dehradun;
- ◆ tender quotations are readily available online to senior officials;
- ◆ the application has a system to monitor too. Decision makers access the accurate data on the available funds and monitor the accounts;
- ◆ the initiative helped to improve the efficiency of UJS's internal operations, benefited stakeholders and citizens by providing them access to online information, and has largely succeeded in reducing corruption; and
- ◆ with support of web-based online operations, UJS is able to comply with the provisions of Right to Services Act being implemented by Government of Uttarakhand.
- ◆ UJS has also self-disclosed the 16 points information as per provisions of the Right To Information Act. The modules upgrade many self-disclosed information such as directory of its officers and employees, their monthly salary and perks, budget allocated to each of the agencies, expenditure, etc.

## CONTACT DETAILS

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# 6 WEB BASED MONITORING AND CITIZEN SERVICES

## *Nagpur Municipal Corporation*

### SUMMARY

*The Nagpur Municipal Corporation (NMC) introduced a customer centered approach by establishing a customer care centre for generation and payment of water bills, a dedicated website and a 24X7 call centre. Further, a web-based Water Distribution Management System (WDMS) was established to measure, record and monitor water operations – flow, level, pressure, residual chlorine, etc. Information, Education and Communication (IEC) campaign helped in promoting these citizen friendly initiatives. The initiative led to better management of water supply, improved services, increased citizen satisfaction and effective implementation of 24X7 water supply project.*

### CONTEXT

Water distribution management is a key aspect in ensuring equitable and timely supply. In Nagpur Municipal Corporation (NMC), prior to the initiative of web monitoring, there was no mechanism to record, measure and monitor the water flow, level, pressure and chlorine content in Water Treatment Plants (WTPs) and Elevated Service Reservoirs (ESRs) and Ground Level Service Reservoirs (GLSRs). As a result the water supply distribution experienced many problems including:

- i. lack of monitoring of input and output;
- ii. no accountability for water losses;
- iii. lack of monitoring of operations of treatment plants, service reservoirs and pumping stations; and
- iv. no system to record, measure and monitor data on a continuous basis.

### THE INITIATIVE

NMC has entered into a management contract with Mechatronics for implementation and management for web based monitoring system for a period of five years. The later contributed 30 percent of the cost, while NMC paid the rest of capital costs and management fee for Operation and Maintenance (O&M). The private operator was responsible for installation, O&M and monitoring on 24X7 basis. The Mechatronics established a central monitoring station in NMC head office and provided input and output signals, sensors and transmitters along with suitable telemetry/monitoring system based on Radio Frequency (RF) technology. The station is web enabled and is open and accessible to all for monitoring. The objectives of the initiative are:

- i. to install real time data monitoring and data recording system;
- ii. monitoring of WTPs, service reservoirs and pumping stations on as 24X7 basis;
- iii. to provide equitable distribution of water;
- iv. to improve the efficiency of water distribution and reduce losses; and
- v. to increase accountability of functioning of the distribution system to public.

The objectives of the customer care centre are to address all complaints relating to water supply and billing, bill collection efficiency and to enhance customer satisfaction. The total project cost was Rs. 5.5 crores. A customer care centre was established and operationalised by the Veolia Water India as part of its 24X7 water supply pilot initiative in 2009. Drawing lessons from the pilot experience, the customer care centre is scaled up to ten zones with Orange City Water as operator. In addition, a 24X7 call centre was set up with a toll free number to register the complaints on a 24 hour basis.

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## PROCESS AND KEY FEATURES

The system was implemented using three levels of information system at ELSRs, GLSRs and MBR and one level of monitoring system at central location. The key implementation steps include:

- i. primary sensors such as pressure, level, flow, residual chlorine to acquire information and communicate to the next level;
- ii. analog/discreet input module which communicate with the central monitoring system based on radio telemetry system;
- iii. telemetry/monitoring software located and running at NMC head office which communicate and get status on different parameters from the above input modules;
- iv. Wyse Device Manager (WDM) software for acquiring and storing of information at the central level by using MS SQL data base; and
- v. a similar but separate system is designed for monitoring of data from WTPs.

The customer care centre in the pilot zone has all the facilities such as reception area, cash collection centres and back office. The necessary staff was deployed and software was put in place to make the centre functional. The key features of 24X7 call centre are:

- i. toll free number to register the complaints and trained executives;
- ii. a unique reference number is given to the complainant for tracking the complaint;
- iii. the complaint is immediately forwarded to the officer concerned for redressal through on line application; and
- iv. the software enables complete database management and generation of reports for monitoring.

Complaints can be registered from 24X7 call centre, NMC website, customer care centres and water houses (information kiosks for 24X7 water supply). The web based application can be accessed through General Packet Radio Service (GPRS), 3G hand held devices and can be monitored on 24X7 basis by concerned officers.

## IMPACT

The web based monitoring of water distribution has enabled equitable distribution of water supply, improved transparency and accountability in water management and reduced losses. The customer care centre initiative has helped the private operator and NMC to ensure customer involvement and support in implementation of 24X7 water supply and in achieving improved billing and collection and better citizen satisfaction. The customer care and call centres under the full city initiative have contributed to a significant improvement in citizen services.

## CONTACT DETAILS

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# 7 INTEGRATED METRO CUSTOMER CARE WITH WEBSITE AND SOCIAL NETWORKING SITE

## Hyderabad Metropolitan Water Supply and Sewerage Board

### SUMMARY

The Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) has implemented customer focus reforms aimed at improving service delivery performance. The Board has introduced customer relations touch point - Metro Customer Care (MCC) - and integrated with IVRS, website and social networking site (facebook) and provided IT enabled transparent and accountable system to address customer service requests, complaints and suggestions in a speedy and effective manner.

### CONTEXT

The Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) provides water supply and sewerage services to Greater Hyderabad Municipal Corporation and surrounding areas with a population of 69.93 lakhs (Census of India 2011). The jurisdiction of HMWSSB is spread over 688 square kilometers with eight lakh water supply connections. The daily quantity of water supplied is 340 Million Gallons per Day (MGD) and monthly revenue is Rs 52 crore. Registering and redressing customer complaints and providing integrated customer services is a key factor in efficient management of water supply.

HMWSSB pioneered Metro Customer Centre (MCC) way back in 2003. The key stakeholders of the initiative are HMSSWB, IT department and all 17 Operation and Maintenance (O&M) divisions, outsourced MCC team, tanker service providers, suppliers of software and Interactive Voice Response Service (IVRS) system and citizens. The MCC enabled the customers to register their complaints by calling a dedicated toll free number. The MCC experienced a number of problems and hence the Board has brought out changes and improvements over the years. The MCC was managed in-house initially but it was outsourced in 2007 for improving performance. It operated on two-shift basis and one more shift was added in 2011 to ensure round-the-clock operations. In spite of these measures, the complaint registering and redressal mechanisms were not effective and there were many unattended or dropped out calls. The main problem areas were availing of dial-a-tanker service and chokage on server lines/chambers. There was huge demand from customers for dial a tanker service where the customer could book for tanker service through MCC. There were several complaints from customers of non-delivery of tankers. It was felt that the tanker suppliers were diverting the service to other consumers who were willing to pay a higher price and there was no accountability of the same.

### THE INITIATIVE

The scope of the initiative is to extend and integrate the existing telephone based MCC with IVRS, website and facebook. The MCC has catered to 17 complaint categories through a dedicated phone (155313) with 18 persons working on a two shift basis and 2 persons working for additional third shift. It was realised that 50 percent of the complaints belonged to tanker service and chokage on premises and hence IVRS system was introduced. An IVRS system is automatic call registration system which has particularly simplified the booking of tankers. Remaining complaints are attended to by the MCC staff. The MCC system is integrated with departmental website and facebook. The objectives of the initiative are:

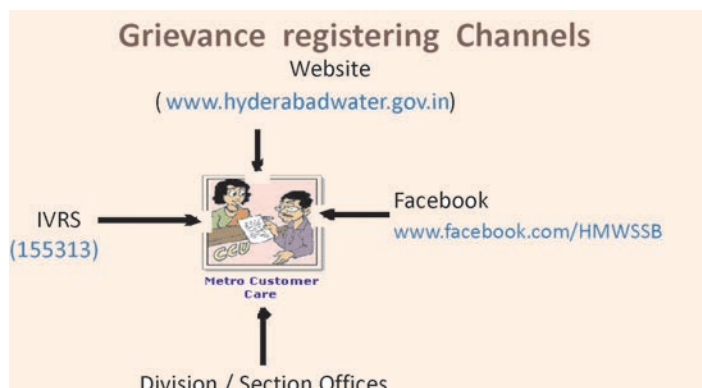
- ◆ registration of complaint through phone call, website and facebook;
- ◆ promote better interaction between consumers and Board and keep them updated about various initiatives of the Board through facebook;
- ◆ increased accountability of staff;
- ◆ quick and more responsive process;

- ◆ interactive and customer friendly process;
- ◆ reduction of paper work and correspondence; and
- ◆ integration of complaints from all channels for effective processing and monitoring through integrated MCC software module

## PROCESS AND KEY FEATURES

The HMWSSB provides an integrated approach to complaint registration and redressal through MCC and IVRS, website, facebook and divisional/section offices as given in figure 3:

**Figure 3: Channels for Complaint Registration**

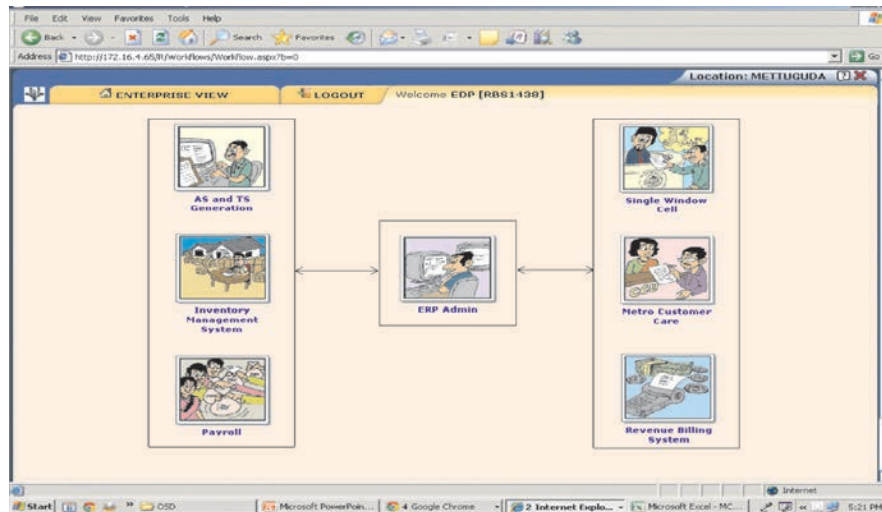


The customer could call up 155313 and register complaint through IVRS (for tanker service and chokage on customer premises only) or through MCC staff for other complaints. The customers can register the complaints by logging onto HMWSSB website [www.hyderabadwater.gov.in](http://www.hyderabadwater.gov.in) or by posting on wall of HMWSSB page at [www.facebook.com/HMWSSB](http://www.facebook.com/HMWSSB). As soon as a complaint is booked through any of these channels an SMS is sent to customers mobile with a token number for reference and number of days required for redressal. The complaint will be automatically forwarded to the section officer concerned for redressal along with the details of the customer. The section officer is required to attend to the complaint within the stipulated time and update the status on the MCC website. Following this an SMS will be sent to the customer that the complaint is attended to along with the name and mobile number of the section officer concerned to enable the customer to contact if any further action is needed. The software allows for generating a number of reports on category of complaints or by channels and by time frame for effective monitoring.

In case of tanker service complaints, the IVRS system generates computerised requests for delivery which will be attended on first cum first served basis and delivered as per the date and time requested by the customer. The customer is given a secret PIN number at the time of booking tanker which should be given to the tanker service provider only after delivering the service. The tanker service provider is required to furnish the PIN to HMWSSB after delivering the water to undertake the next service. This ensures that the tanker is delivered to the right customer at the right time. A smart card based application enables this process.

A key feature of MCC software module is that it can be integrated with the software modules related to other customer services like revenue, billing and collection and providing new water supply connections. The HMWSSB is implementing a hand-held machine system for collection of bills which are updated and monitored online. HMWSSB is also providing option for applying online for new water supply connections. Anyone who desires to take a new connection is required to submit an online application and pay the processing fee. The application is scrutinised and the customer is advised to submit the documents. A technical feasibility study is undertaken and if accepted the customer is informed to pay the charges and consumer number is allotted to the customer. Upon payment of the charges a green brigade contractor will be allotted for providing the connection. The entire process can be tracked and monitored online. Figure 4 presents the details.

Figure 4 : Metro Customer Care Process



The key factor for success of the initiative is strong in-house IT capacity. The top leadership provided the much needed support to implement the initiative though there was resistance from tanker service providers and others. The key innovations include IVRS system which enabled automatic call registration, integration with website and facebook. Facebook enabled the customers to provide photographs and other information related to service gaps which enabled the Board to take quick actions. The Board utilised facebook to reach out to the customers to disseminate information. The initiative was implemented with low cost but resulted in benefits in the form of improvement in revenue from tanker service and customer satisfaction from quick registration and redressal of complaints. Customers particularly facebook users and tanker service users supported the initiative.

## IMPACT

The initiative made significant progress in achieving the set objectives and outputs and has led to increased citizen services in terms increase in number of complaints registered and redressed. It increased the accountability of staff since the action taken information along with the mobile number and name of the section officer concerned is shared with the customer. This makes the staff more accountable in redressing the grievance since the customer can report non-compliance to the MCC or higher officials. The accountability is much more in case of facebook since it is visited by lakhs of customers.

It resulted in quick and more responsive process since the time frame for redressing the grievance is indicated to the customer as per the citizen charter and the customer is able to follow up regularly on tankers. Because of integration with IVRS, the number of unattended calls has gone down from 44 calls per day to four calls per day. The process is more streamlined in case of tanker service and providing water connections since the backend processes are IT enabled which makes it not only transparent but also fast.

The channels of IVRS, MCC, Website and Facebook together have created an interactive and customer friendly process. These channels enable continuous interaction between the customers and officials of the Board. The process has made officials more responsive and friendly as they are able to see the citizen perspective in redressing the grievances.

The process has led to reduction of paper work since customers need not give complaints in writing while the backend processes for redressing the grievances are automated. For example, the complaint is given over phone to MCC, forwarded over phone to the section officer, and action taken is posted on the website once the grievance is redressed. The facebook provides for posting the documents and videos and there is no need to submit them separately.

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The IT enabled software not only provides integrated approach to registration and redressal of complaints through MCC, but also provides for integrated approach to citizen services and governance and integrates the three services viz. customer grievances through MCC, water supply connections through single window cell and billing and collection services. These initiatives resulted in transparent, effective and citizen friendly services.

## CONTACT DETAILS

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# 8 RAIN WATER HARVESTING

## Bangalore Water Supply and Sewerage Board

### SUMMARY

Bangalore Water Supply and Sewerage Board (BWSSB) has promoted Rain Water Harvesting (RWH) in Bangalore through a well-planned outreach programme and by forging partnerships with resident welfare associations. The board has mobilised citizen support through a combination of Information, Education and Communication (IEC) programme, establishing a help-desk and offering technical expertise in construction and management of RWH structure. A Rain Water Theme Park was established for mass awareness generation. A legislation was introduced in support of RWH programme. These interventions have helped institutionalisation of RWH in buildings and resulting in adoption of RWH in about 46,000 properties.

### CONTEXT

The Bangalore Water Supply and Sewerage Board (BWSSB) services an area comprising 800 sqkms with a core area constituting 245 sq.kms. and eight ULBs and 110 villages covering an area 330 and 225 sq.kms. respectively. The table 7 shows the population of the Bruhat Bangalore Mahanagar Palike (BBMP) and projected and current shortfall in water supply.

**Table 7: Population and Shortfall of Water Supply in Bruhat Bangalore Mahanagar Palike**

Year	Population in Lakhs	Water Demand (MLD)	Water supply (MLD)	Short fall (MLD)
2001	53.79	870	540	330
2007	75.00	1,219	870	349
2015	88.00	1,720	1,470	250
2021	100.00	2,125	1,470	655
2036	125.00	2,550	1,470	1,080

The BWSSB has been depending on the water from River Kaveri for the supply to the city. Kaveri Tribunal award put an end to use its waters. In addition, considerable amount of ground water is also extracted to meet demand through private and public tube wells with little scope for recharge / infiltration of rain water, given the massive concreting and asphaltting. In order to meet the future demand of the rapidly growing population there is a need to augment both surface and ground water. Use of ground water in an unregulated manner resulted in depletion of ground water sources and, therefore, it is imperative that a conservation and recharge mechanisms are put in place.

### THE INITIATIVE

Given that Bangalore is blessed with good rainfall, it was felt that RWH presents a good solution to supplement water requirements as well as contribute to recharge of ground water. Rain Water Harvesting (RWH) has been made mandatory for all newly constructed residential, commercial and industrial establishments through an amendment to the BWSSB Act. As per the amended Act, all existing buildings constructed with a dimension of 40'x60' and above and all new buildings being constructed on site dimension 30'x40' or above are to compulsorily adopt rain water harvesting effective from 2009. Simultaneously, interventions were on to augment water supply sources and to make efforts to reduce unaccounted for water, initiatives in the recycling and reuse of water / wastewater and a dual pipe supply of potable and non-potable water in new layouts. A large scale outreach programme for RWH was initiated following the policy decision to make rain water harvesting mandatory and encourage its use for supplementary needs. The key objective of the initiative was to promote the practice and use



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of RWH in households and institutions. This is in recognition of the multiple advantages of RWH including environmentally friendly solution to supplement water requirements, increase of ground water table and quality as a result, mitigation of effects of drought and reduction of run off and flooding, reduction of soil erosion, power saving etc.

## PROCESS AND KEY FEATURES

Following the adoption of policy to make RWH structure mandatory it was decided to provide technical support and initiate Information, Education and Communication (IEC) programmes to promote RWH through a series of steps discussed below:

**Constitution of Core Group of Experts:** to conceptualise, steer and prepare detailed guidelines and toolkits for planning and implementation of the outreach programme which included technology / models/ filtration devices/ approximate estimate for each model.

**Training Programmes :** Organised 50 training programmes for plumbers, engineers , architects and other professionals in which 1,364 people have participated. Contact information of these trained plumbers is provided to citizens.

**Abhiyana Programme:** Conducted mass awareness programme – the Rain Water ‘Abhiyana’ which includes street play to propagate RWH and water conservation. Over four lakh leaflets were distributed and 60,000 letters of appeal were sent to the building owners to install RWH structures.

**Rain Water Theme Park:** A RWH theme park, the first of its kind in India, was built in March 2011 at a cost of around Rs. 2 crore. The Karnataka Council of Science and Technology has collaborated with the BWSSB. The Theme Park exhibits various models for RWH , educates people on water management issues through exhibits and audio visual learning material, screens documentaries and has an amphi theatre for cultural programme, shows etc . The Theme Park is visited by large numbers of from not only Bangalore but also the rest of India, estimated at around 15,000. The Theme Park has a Help Desk to attend to citizen requests and provide technical support both face to face and on the telephone. Around 988 requests have so far been processed. The Parliamentary Committee on Water Resources visited the Theme Park to study the model and recommend it in their report.

**RWH in public buildings:** RWH structures were installed in all the BWSSB offices, the Vidhan Souda, official residences of the Chief Minister, Speaker, Leader of Opposition etc. All key government buildings are covered under RWH using scientific filtration system which is used for non-potable purposes.

**Follow up and monitoring:** A system of regular follow up and monitoring is undertaken to keep track of functioning of RWH in not only new buildings but also existing ones. The appreciation of ground water due to RWH is being monitored on a routine basis in the Viswesvariah RWH Theme Park. It indicated rise in ground water table levels during harvested period. Water Quality is also monitored. An independent evaluation by the Centre for Sustainable Development has also been carried out for monitoring the quality of ground water.

## RWH STRUCTURES

These include harvested rain water through sumps, artificial recharge through scientifically planned structures, storage structures for rain water and artificial recharge structures. The break up is given in the table:



**Table 8: RWH Implemented**

Domestic	32,579
Commercial Building	4609
Partial Commercial	2715
Apartments	5731
Industries	128
Govt Building & others	161
<b>Total</b>	<b>45,923</b>

Amount incurred for RWH Awareness programme, Maintenance of RWH Theme park, RWH Help desk, Street play, Production of films are given in the table 9:

**Table 9: Expenditure in RWH Initiative**

Year	RWH Help desk	Maintenance of Theme park	RWH public Awareness & Abhiyana	50 nos. Plumbers training	Production of films	Appeals to the public	Street play	Total
2009-10 from Nov-10 to Mar-10	188,335	-	45,000	135,000	-	94,500	-	462,835
2010-11	303,996	-	374,685	480,000	200,000	-	84,000	14,42,681
2011-12	303,996	564,000	543,700	135,000	475,000	349,650	-	23,71,346
2012-13	303,996	226,400	115,000	-	14,11,840	-	-	20,57,236
2013-14 April-13 to June-13,	182,022	135,840	-	-	-	-	-	317,862
<b>Total</b>	<b>12,82,345</b>	<b>926,240</b>	<b>10,78,385</b>	<b>750,000</b>	<b>20,86,840</b>	<b>444,150</b>	<b>84,000</b>	<b>66,51,960</b>

Total Cost incurred for Construction of Theme park consist of Tunturu, Landscape, 26 type RWH models, Water conservation models and 72 seater capacity auditorium=2.66 crores

The guidelines for RWH prescribe storage structure to be constructed of capacity 20 litres per sqmt of the roof area, and 10 litres per sqmt of open paved area with a minimum of 5,000 liters capacity tanks. The water harvested during rainy days by these tanks lasts for 2-3 days. Considering 60 rainy days in a year, a minimum of 120 days consumption is taken care by rain water harvested which comes to about 30% of the total annual water consumption in a household. BWSSB is contemplating RWH on catchment area basis which shall mandate collection of large volumes of water through storm water drains into the natural or artificially created lakes.

## IMPACT

The impact of the programme is substantial and include:

- ◆ About 46,000 buildings have installed RWH structure;
- ◆ a number of offices including the Vidhan Soudha, Secretariat and public institutions have put in place RWH structures;
- ◆ a state of the art RWH theme park with demonstration units was established;
- ◆ RWH help desk is fully functional;
- ◆ legislation for regulation of ground water is in place with the necessary rules and amendments;

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- ◆ contact information of 1,300 trained and licensed plumbers was made available to citizens;
  - ◆ around 30 Million Liter per Day (MLD) of rain water has been successfully harvested and around 25 MLD of water has been used to recharge ground water;
  - ◆ reduction of rain water entering the sewerage network, drainage and chocking and overflow from manholes;
  - ◆ resulted in a range of innovations from Government and private sector. Currently more than 50 filter options are available; and
  - ◆ business generation and livelihoods for plumbers and the market continues to grow.

The programme owes its success to a comprehensive approach starting with policy and legislation which took into account the experiences of RWH in cities like Chennai and applied the lessons in designing the programme for Bangalore. The programme provided not only sensitisation and creative IEC programming (plays, songs, video documentaries) but also technical support through demonstration of various models, research and development and constant innovations.

## CONTACT DETAILS

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# 9 REBIRTH OF WATER BODIES IN BERHAMPUR FOR ITS CITIZEN

*Berhampur Municipal Corporation*

## SUMMARY

*Berhampur Municipal Corporation (BMC) has revived and rejuvenated 27 water bodies by a scientific approach and by mobilising citizens' participation; thereby improving quality of life of citizens, improving ground water levels and water security in Berhampur.*

## CONTEXT

Berhampur is the fourth largest city of Odisha and is one of the oldest cities in India, with a population of about 3.56 lakhs (Census of India 2011). The city is declared as a municipality in 1867 and notified as a municipal corporation on December 2008 with its jurisdiction spreading across an area of 79.8 square kilometers. With the increase in population in the recent decades, the lakes and ponds gave way to residential or commercial areas. Most water bodies have turned into cesspools, posing public health hazards for the people living around. Historically, there were numbers of water bodies in the city which were interconnected through underground channels. These water bodies were built during 18th and 19th century to meet the water requirement of the population. However, over the years, these channels have vanished and water bodies started disappearing.

The demand for water supply in Berhampur is about 47 million liter per day (MLD) against which the water production is about 33 MLD. The existing water bodies support in meeting the non-potable requirement of the city. In the absence of simultaneous replenishment of water after withdrawal, these bodies do not act as sources for piped water supply. These man-made water bodies were initially constructed for irrigation purposes. About 300 million litres (dry seasons) of water is estimated to be available for public use from these water bodies. Majority of the urban poor (~30 percent of city population) in the city, who do not have access to piped water supply and depend on these water bodies for the household needs such as bathing, washing, etc. Thus water bodies have become an integral part of the daily life of urban poor in Berhampur.

## THE INITIATIVE

Berhampur Municipal Corporation (BMC) initiated the maintenance of these dilapidated water bodies in 2008 by renovating them with the central assistance under Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT). Of the existing 42 water bodies, 39 of them covering an area of 270 acres are proposed to be developed as a part of the approved project under UIDSSMT. The restoration and preservation work has already been completed for 27 water bodies. The scope of the project includes purification of water bodies and up gradation of peripheral areas. The existing water bodies are being renovated to meet the following objectives:

- ◆ recharge of ground water in the open wells and to achieve open defecation free city
- ◆ reduce the burden on existing water supply system:
  - a to meet the demand of water for non-potable use, construction activities in the city and fire-fighting
- ◆ to maintain a temperature balance in the city especially during summer months
- ◆ to ensure aesthetic value of the city and use in various religious/cultural activities

## PROCESS AND KEY FEATURES

The key implementation steps are as follows:

- ◆ the process began with consultations with the stakeholders especially people residing on the periphery of the water bodies. After taking them on board the restoration work started;
- ◆ draining the tanks in a phased manner and allowing them to dry up;

- ◆ excavation of earth and silt up to the required depth and removal of foreign matter and cleaning the periphery of the water bodies;
- ◆ diversion of all the open drains discharging sewage into the ponds;
- ◆ filling up the bottom surface of the pond with granular sand for recharging of ground water;
- ◆ construction of new or improvement of existing bathing ghats;
- ◆ undertake embankment protection works;
- ◆ improvement of aesthetics of the peripheral area and construction of concrete pavements around the tanks and cattle barriers;
- ◆ plantation of herbs and plants around the tanks;
- ◆ placing molded RCC/fiber dust bins around the tanks on the embankments;
- ◆ lighting arrangement around the ponds to prevent nuisance;
- ◆ earmarking and developing the places around the ponds for meditation, yoga and leisure; and
- ◆ construction of drinking water outlets around the ponds.

It has been a challenging task for the BMC to undertake the preliminary works of removing the thick vegetation, de-watering, de-silting, etc., in the prevailing unsanitary conditions. Support from the local elected representatives is one of the enabling factors during the implementation of this initiative. They played an important role in generating awareness among the local residents about the proper usage of water bodies for designated non potable purposes. Necessary support and cooperation was extended by the local residents during implementation.

Government of India (GoI) under UIDSSMT approved an amount of Rs. 1665.89 lakhs constituting 80 percent of the expenditure. State government and BMC shared ten percent each. Apart from the grant received from UIDSSMT, BMC made following investments from its own funds:

- ◆ construction of public toilets costing Rs. 40 lakhs to ensure that people don't practice open defecation;
- ◆ drainage: Rs. 98 lakhs to divert sewer water from entering water bodies;
- ◆ lighting: Rs. 20 Lakhs to make the surrounding visible encourage public walking and keep the space out of notorious people;
- ◆ paving: Rs. 1.5 Cr spend to ensure its surroundings are pedestrian friendlier; and
- ◆ parks: Rs. 20 lakhs to ensure the lands are not misused and children get proper space for play-ground.

At present 10 water bodies are maintained by the communities and rest by BMC. Since, the initiative of preserving these water bodies is taken up with bulk of funds received from GoI, there is an inherent danger that Operation and Maintenance (O&M) of these water bodies may be compromised in the long run. Therefore, BMC is making efforts create a self-sustaining model and anticipate to mobilise Rs. 25 lakh from advertisement and another Rs. 10 lakh from various social entertainment activities created around the water bodies. A part of the revenue will be shared with the community to manage the water bodies. BMC is also planning to transfer fishing rights to community to ensure management of water bodies. Some water bodies which are leased out for fishing are able to generate on an average Rs. 10,000-15,000 per annum. BMC is launching annual awards to create competition amongst communities on management of water bodies; where one time grant of Rs. 2 lakhs will be provided to best water body to be chosen by community itself.

At present, the residents in the vicinity of some of the preserved water bodies are demonstrating a sense of ownership towards the maintenance of sanitation within and around the water bodies. Currently, there is no dedicated budget earmarked for the maintenance of these water bodies and dedicated staff is yet to be deployed for maintenance of water bodies. ULB is exploring the options of developing recreational facilities around the preserved water bodies through partnerships with private sector.



## IMPACT

The following are the achievements as a result of renovating the water bodies:

- ◆ ground water recharge –with the restoration of water bodies many dry wells& tube-wells are back with water. Residents feel that the taste of the water is much better than in the past years;
- ◆ records show that number of water tankers supplied during summer is reduced.
- ◆ controlling open defecation – with the preservation of water bodies and creation of infrastructure near the ponds like public and community toilets, open defecation is hardly visible and on an average 95-97% people are using community public toilets or their own toilets;
- ◆ health benefit – earlier due to open defecation, there used to be cases of diarrheal and malaria, etc. but now Berhampur has not seen diarrheal and malaria in last few years;
- ◆ contributed towards improving the quality of life of local residents;
- ◆ improved bathing habits among urban poor within the vicinity;
- ◆ added recreation facilities for children and youth.;
- ◆ jogging tracks being developed along the embankments in few cases; and
- ◆ prevention of water pollution

**Figure 5 : Situation before and after**

**Before**



**After**



## CONTACT DETAILS

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# Public-Private Partnership



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# 10 CONTRACTING OUT O&M SERVICES

## *Navi Mumbai Municipal Corporation*

### SUMMARY

*Navi Mumbai Municipal Corporation (NMMC) has significantly improved water service delivery by introducing performance based Operation and Maintenance (O&M) via a PPP arrangement. Multiple service operators were introduced covering various zones and they were made accountable for water leakages, reduction in energy charges, good and timely water supply, public grievances, distribution of bills and notices, detection of illegal connections and misuse of water, maintenance of residual chlorine content, coordination with other organisations, etc. This approach led to efficiency improvement and increase in cost recovery from 67% to 108%.*

### CONTEXT

To address the needs of the growing Mumbai metropolis, Government of Maharashtra developed a counter magnet city, New Bombay in 1968. Navi Mumbai Municipal Corporation (NMMC) was established in 1992 to manage the civic affairs. The City is spread over an area of 108 sq km with a population of 1.1 million (Census of India 2011). The NMMC is divided into 88 electoral wards and there are eight water supply nodes (Belapur, Nerul, Vashi, Turbhe, Koperkhairane, Ghansoli, Airoli, and Digha), which are in turn divided into 18 zones. NMMC supplies 334 Million Liter Per Day (MLD) water, i.e., 195 liter per capita per day (lpcd). About 97% households are covered with direct water connections. The total length of pipelines of various diameters is approximately 770 km and nearly 60% of the city is served with 24X7 Water Supply and the remaining is served with five hrs supply.

Until 2004, NMMC undertook Operation and Maintenance (O&M) activities through rate contract system involving multiple agencies like capital work contractor, O&M contractor, electrical / mechanical work contractor, pipeline work contractor and civil works contractor.

The rate contract system did not improve operationally but promoted “More repairs more payment regime”. Repeated operational failures occurred such as failure of motor, pumps, electrical equipment, etc. Moreover, water pumping requirements assumed during initial phases changed over time due to increase in demand. This was, however, not factored during the O&M process, thus often resulting in mismatch between pumping capacity and actual requirement. As a result of the rate contract system and presence of multiple agencies working at cross purposes, the following problems were encountered by NMMC:

- i. lack of coordination among different agencies;
- ii. lack of accountability and constant finger-pointing at other contractors
- iii. absence of complaints registration and communication system;
- iv. lack of maintenance and frequent breakdown;
- v. no preventive maintenance;
- vi. frequent leakages;
- vii. inordinate delay in attending breakdown(s); and
- viii. inefficient water management system.

### THE INITIATIVE

The water supply system in city area was handed over to NMMC from City and Industrial Development Corporation of Maharashtra Limited (CIDCO) on 1st November 1999. NMMC had limited man power to undertake O&M work of water supply system. Therefore, NMMC selected multiple contractors for carrying out different activities related to water supply system. Due to the involvement of multi-agencies in O&M works were undertaken in isolation which increased huge administrative burden and caused delays and there was no proper maintenance of pipelines,



pumping machinery, electrical equipments and leakages rates were very high due to rusty network. Lack of preventive maintenance and delay in repairs led to frequent breakdowns. In addition, there was no system for communication and registration of complaints. The combined result was inefficient water management system and poor response to citizen complaints. Further, water audit and energy audit was not being carried out.

To rectify this situation, NMMC developed a performance based comprehensive O&M system where a single operator is made responsible for O&M related tasks. The contractors are responsible to carry out capital works to improve the water supply system, accountable for water leakages, reduction in energy charges, good and timely water supply, grievances redressal, distribution of bills and notices, detection of illegal connection, to maintain residual chlorine content, coordination with other organisations etc.

The objectives of the initiative undertaken in 2004 are to:

- ◆ provide quantity and quality water with required pressure to citizens;
- ◆ provide effective O&M system;
- ◆ reduce water losses through leakage, misuse of water by consumer;
- ◆ minimise power consumption and financial burden;
- ◆ periodically undertake water & energy audit;
- ◆ address public complaints in adherence to the citizen charter;
- ◆ reduce the paper work;
- ◆ simplify water connectivity for disadvantaged group;
- ◆ improve monitoring capacity and full cost recovery; and
- ◆ increase revenue & to achieve full O & M cost recovery.

## PROCESS AND KEY FEATURES

The key steps involved in the execution of the project include:

- i. appointment of expert committee to develop and set benchmarks for the O&M of water supply system;
- ii. preparation of comprehensive performance based O&M contract which includes roles and responsibilities of the contractor and capital investment requirement for improving the system;
- iii. selection of contractor through transparent bidding process;
- iv. outsourcing O&M activity through single contract for each zone;
- v. development of MIS reporting system for recording the complaints, leakages, meter connections, bills distribution, cost recovery mechanism etc.; and
- vi. linkage of the performance to incentives (good performance) and penalties (non-compliance) on attainment of targets.

The parameters developed for the incentive system are given in the table 10:

**Table 10: Incentives**

<b>Basis of Incentive</b>	<b>Incentive Benchmark</b>	<b>Incentive Value</b>
Reducing water loss. Water loss = Water received –Water billed.	For water loss reduced beyond current base level and maintained over a two month billing period.	Rs. 2/kl of water loss reduced.
Detecting illegal use of water (use other than permitted use)	Every case detected and after penalty is remitted to the Corporation.	Rs.100 per case
Detecting Unauthorised connections.	Every case detected and after penalty is remitted to the Corporation.	Rs.100 per case
Reducing power consumption. Where a generator is used the electricity consumption shall be determined as follows: Electricity Consumption (KWH) = Meter Reading (KWH) + 1.10 times the Electricity Equivalent of diesel consumed (KWH).	For power saved beyond current base level based on water supply schedules and maintained over a two month billing period.	Rs. 1.50/KWH of power saved.

The penalties levied on the operator for non performance are given in the table below:

**Table 11: Penalties**

<b>Basis of Penalty</b>	<b>Penalty Benchmark</b>	<b>Penalty Value</b>
Supply of water not as per schedule or with inadequate pressure. An occurrence shall be counted for any deviation of more than 15 minutes from the schedule, over a 2-month period.	Up to 2 occurrences 2 to 5 occurrences 5 to 10 occurrences More than 10 occurrences	Rs.500/ occurrence. Rs.1,500/ occurrence. Rs.2,500/ occurrence. Cause for termination.
Supply of treated water not as per prescribed quality. Penalty shall apply for higher or lower than the prescribed residual chlorine of 0.20 – 0.40 ppm, over a two-month period.	Up to 2 occurrences 2 to 5 occurrences 5 to 10 occurrences More than 10 occurrences	Rs. 300/ occurrence. Rs. 600/ occurrence. Rs. 1,500/ occurrence. Cause for termination.
Increasing water lost. Water lost = Water received – Water billed.	For water loss increase beyond current base level over a 2-month billing period.	Rs. 10/kl of water loss increased.
Inadequate maintenance of Facilities/ System. Increasing power consumed. Where generator is used electricity consumption shall be as follows : Elec Consumption (KWH) =Meter Reading (KWH) + 1.10 times the Elec Equivalent of diesel consumed (KWH).	For each case detected. For power increased beyond current base level based on water supply schedules and persisting over a two-month billing periods.	Rs. 2,500/ case. Rs. 5/ KWH of power increased.
Any equipment not brought back into working conditions within 24 hours of its breakdown.	For each case detected for which the equipment is unavailable beyond 24 hours.	Rs. 1,000/- per day.
Delay in recording meter readings, entry in computerised billing system and distribution of water bills.	For each day of delay.	
New connections to Customers without due authorisation of the Corporation.	For each unauthorized connection detected by Corporation.	Rs. 2,000/ case.
Sale of potable water without due authorisation of the Corporation or non-reporting of sale to Corporation.	For each case of sale.	Rs. 2,000/case/day.
Non-provision of connection within two working days from receipt of order from the Corporation.	For each case and for every day of delay.	Rs. 500/ case.
Non-provision of safety equipment, fire-fighting provision and first aid box in proper condition.	For each case and for every day.	Rs.1000/- case/day.

The key enabling factors involved in this initiative are good leadership, direction from the expert committee and strong service delivery record.

## IMPACT

The execution of the initiative with set objectives resulted in following outputs:

- ◆ Reduction in leakages in pipelines;
- ◆ Management Information System (MIS) and Daily reporting resulted in improved control and management;
- ◆ Good housekeeping of Elevated Service Reservoirs (ESR) / Ground-Level Service Reservoir (GSR) complex;
- ◆ Reduction in public grievances from 4,260 in 2004 to 927 in 2013;



- ◆ Reduction in power consumption reduced from 129.35 per million litre in kilo watt per hours (KWH) in 2003-04 to 87 per ML in KWH;
- ◆ O&M cost recovery increased from 67% in 2006 to 108% in 2013;
- ◆ Water quality complaints brought down to almost nil;
- ◆ NMMC has also introduced sensor based automated radial system which is appreciated by the citizen because it is completely transparent;
- ◆ NMMC has also involved electronic media to bolster this initiative, to gain support in public and also ensure accountability; and
- ◆ NMMC published the telephone numbers of the key officials' related to the water supply department and also those of the O&M Contractors.

There are other initiatives that propelled attainment of benefits like construction of balancing reservoir because of which dependency on energy for pumping reduced to 87% from 129%. This in turn lead to a near full gravity based distribution system. As a result, energy consumption drastically came down. Some of these benefits like performance based O&M system, rewards and penalties and shift in the mind-set of contractors from 'more repair, more revenue' to preventive maintenance of the components of water supply in the city that accrued through this initiative may not have come out otherwise.

## CONTACT DETAILS

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# Communication Strategy and Awareness Generation



# 11 IEC for Implementation of Integrated Urban Sanitation Programme in Madhya Pradesh

*Urban Administration and Development Department (UADD), Government of Madhya Pradesh (GoMP) and City Managers' Association, Madhya Pradesh*

## SUMMARY

The Urban Administration and Development Department (UADD), GoMP introduced a comprehensive communication strategy for promoting universal access to safe sanitation in Madhya Pradesh. The communication programme played a key role in implementing Integrated Urban Sanitation Programme of GoMP through demand creation and behavior change. Over 318 community toilets in 52 Urban Local Bodies (ULBs) and 15,538 individual toilets were constructed and innovative use of Information, Education and Communication (IEC) is playing a key role in functionality and sustainability of this programme. This initiative has resulted in minimisation of open defecation.

## CONTEXT

As per Census of India 2011, there are four million urban households with a population of 20 million (approx.) in Madhya Pradesh. Poor sanitation was prevalent in most of the Urban Local Bodies (ULBs). Need for proper sanitation facilities was felt, especially in slums. The state government and the ULBs have been implementing various programmes to address the problem of urban sanitation, but in the absence of uniform policy guidelines, lack of a monitoring and weak information, education and communication (IEC) activities, the efforts have not been very encouraging.

Urban sanitation has become critical in states like Madhya Pradesh with highest number of ULBs. In most of the small urban areas lack of awareness about the importance of sanitation leads to low demand for sanitation infrastructure. Moreover, hygiene practices, which are critical for sanitation, are not given much importance in sanitation promotion and until this is done, improvement in the sanitation outcomes will be very difficult. A survey of 13.76 lakh families conducted in 2008-09 brought out the following:

- ◆ in the urban areas, 25% households do not have safe sanitation facilities and were found to be practicing open defecation;
- ◆ level of information available to the citizens on proper and the existing method of disposal of toilet waste were found to be quite low in all the cities; and
- ◆ sanitation initiatives taken earlier were not successful as only construction of toilets was not enough without proper IEC and awareness activities.

## THE INITIATIVE

To tackle sanitation challenges, the Government of Madhya Pradesh (GoMP) launched a state level sanitation mission and initiated the Integrated Urban Sanitation Programme (IUSP) in consonance with the Government of India's National Urban Sanitation Policy 2008. The IUSP was initiated as a pilot project for two years and in the first year, 35 ULBs were selected. Additional 110 ULBs were included in second year. The initial target of the IUSP was to construct 100 community and 20,000 individual toilets. The programme was designed to be demand driven and led by the community. The prime objective of IUSP is to make at least 4-5 towns open defecation free, so that the success can be replicated in other cities and towns. IUSP was a pilot programme which is later scaled up as "Chief Minister's Urban Sanitation Programme" covering all 377 ULBs. The earlier efforts did not give expected results and investment on infrastructure was not reflecting improvement in people's health. Thus a comprehensive communication strategy and awareness generation for behavioral and attitudinal change was designed and implemented with the following objectives:

- ◆ prepare public opinion for the construction of toilets;
- ◆ motivate citizens including the children and the aged to use the toilet;
- ◆ make aware the people to make them agree to follow the importance of domestic and community hygiene;
- ◆ build capacities at agency (governmental, non-governmental, office, school, college, etc.) and community level;
- ◆ take initiatives for making door to door awareness regarding solid and liquid waste management and to motivate people for hygiene practices and to change situation; and
- ◆ suggest the ways and importance to prevent pollution of water resources and to build environment for changing situation.

## PROCESS AND KEY FEATURES

The main objective of IUSP is to develop sanitation facilities in the urban areas but recognising the need for Information, Education and Communication (IEC) campaign, the GoMP earmarked 7.5% total project cost towards IEC activities. Orientation programmes for Chief Municipal Officers and engineers were organised. To assess the overall sanitation situation in urban areas and to understand the perceptions of people deprived of proper sanitation facilities, a sanitation survey was conducted in the ULBs. Based on survey results, a comprehensive city level IEC campaigns were designed with the following activities in three stages:

- ◆ Stage 1
  - a. selection of work area;
  - b. selection of NGO (based on requirement);
  - c. determination of methodology and process for implementation by NGO; and
  - d. identifying IEC activities.
- ◆ Stage 2
  - a. selection and training of motivators;
  - b. formation of sanitation teams at city and ward levels;
  - c. formation of special teams of women and youth and ensuring their active involvement;
  - d. inauguration of programme;
  - e. participative road walks; and
  - f. arrangement of IEC materials.
- ◆ Stage 3
  - a. contacts and meetings;
  - b. mobile IEC Display / unit;
  - c. study and Experience Tour;
  - d. sanitation education in schools;
  - e. organisation of special days;
  - f. participation of media; and
  - g. participation of representatives / other leaders.

Figure 6: IEC for Sanitation



To recognise better performing ULBs, an award scheme was launched and three ULBs namely Sailana, Kukshi and Pannawere given the awards for better implementation of the programme.

For purposes of town level assessment Sailana was selected. Sailana is a town in Ratlam District of Madhya Pradesh with a population of 25,699 covering 2,194 households (HHs) (Census of India 2011). The Sanitation survey was conducted in 2008, which identified 264 HHs without toilet facilities. Sailana Municipal Council (SMC) has constituted Sanitation Committee under the Chairmanship of the president and a Sanitation Cell under the administrative control of Chief Municipal Officer.

SMC undertook a door-to-door campaign for sensitising the citizen on sanitation problems and encouraged them to use toilets. SMC has distributed template and also took help of local electronic and print media for creating awareness. Wall paintings with slogans, public announcements, etc. were undertaken as a part of awareness campaign. The SMC organised IEC campaigns as described above and received very good response from the community. The IEC campaign was successful in making the citizen understand the problem and could bring a behavioral and attitude change. All the HHs without toilets made 10% contribution. SMC successfully constructed 315 individual toilets and one community toilet within the stipulated time. Once the individual toilets for all the households were constructed, SMC has imposed a penalty on people if they found to defecate in open. It is observed that the usage of toilets was 100% and the town achieved the Open Defecation Free status.

IEC initiated under IUSP resulted in motivating citizens for usage of toilets and to adopt hygiene practices which has led to successful implementation of the programme and achieving the target of universal sanitation. Required emphasis was given on IEC activities which has resulted in improved use of constructed infrastructure and was the key for success.

### IMPACT

- ◆ It has been noticed that usage is almost 100% wherever toilets were constructed and with continuous awareness efforts, towns adopted safe sanitation;
- ◆ During the five years of programme implementation, the state successfully constructed 318 community toilets in 52 ULBs and 15,538 toilets across the state;
- ◆ The IUSP has been very successful in making people believe that safe sanitation is equally important for them similar to water;
- ◆ With the similar activities under the programme various cities and towns would achieve the status of OD free towns; and

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- ◆ The success of IUSP encouraged the State Government to launch “Chief Minister Urban Sanitation Mission” which is actually extension of IUSP programme and GoMP has earmarked specific funds for the purpose.

## Contact Details

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# Urban Sanitation





# UPGRADATION OF RIVER SWARNAREKHA GWALIOR

MUNICIPAL CORPORATION, GWALIOR

## SUMMARY

*The Gwalior Municipal Corporation (GMC) has restored and rejuvenated Swarnarekha River by introducing a number of technical measures and citizens' participation. The project was implemented by GMC with the support of government and non-governmental agencies. This initiative has resulted in sanitation and health improvement of the poor situated near the river, improvement in local economy, tourism development and minimisation of risk to poor living on the river banks.*

## CONTEXT

Gwalior, the third largest city of Madhya Pradesh with over a million population (Census of India 2011) is famous for its monuments, sculptures, culture and heritage and rich traditions of art, literature and music. It is also a commercial center and extends administrative, medical, agricultural, engineering and higher educational services thereby playing a vital role in the economy of the region and state. The Scindia Dynasty, the then rulers, executed a sewerage scheme for Gwalior sub town in 1936. After few years in 1942-43 similar sewage facility was provided to the Morar Area. A sewerage pumping station of 3.5 Million Gallon per Day (MGD) capacity was installed at Gwalior sewage farm, while 0.5 MGD sewage pumping station came up at Morar Sewage Farm. As the same system continuous till date, it is overloaded due to increase in population.

Two rivers flow through the city - Swarnarekha and Morar. The Swarnarekha River flows through the heart of Gwalior city for a length of 13.65 km and joins river on upstream of Pllowa Dam, which is a tributary of River Chambal. Sanitary sewers ranging from 200 mm dia to 750 mm dia were laid in most areas of Gwalior. The outfall sewer of 750 mm dia laid in 1928 presently disposes the sewage into Swarnarekha River. The drainage system, particularly Swarnarekha river not being properly canalised along with road crossings, poses water logging problems in the low lying built up areas resulting in environmental problems.

The open drains and over 300 nalas discharge into the Swarnarekha River directly. Houses are constructed on the river banks and sewers laid by colonisers discharge sewage directly into the river. It is estimated that over 90 Million Liters per Day (MLD) sewage flows into the river and the BOD is estimated to be about 150 mg per liter. There were more than 200 dairies around the Swarnarekha River contributing to major part of pollution. There were more than 100 motor garages and were the main source for pollution in environment as well as river. Due to exhaust from the automobile, poisoning deadly gas flow through open drains into the river. Cattle breeding and dhobi ghats, caracass disposal into the river, etc. are common. Solid wastes are also dumped into the river contributing to pollution and other environmental challenges.

## THE INITIATIVE

Upgradation of River Swarnarekha' was taken up with the following objectives:

- ◆ prevent the pollution of Swarnarekha River;
- ◆ free the of the people living near Swarnarekha river from health hazards;
- ◆ reduce the silt and sludge deposition in Swarnarekha River to improve river capacity and control floods;
- ◆ introduced pisciculture fishes for aquatic weed control;
- ◆ develop recreational facilities through boating, chat bazaar, etc.; and
- ◆ develop the area around the Swarnarekha River as a tourist hub attracting both domestic and foreign tourists which will also promote visitors to see world heritage sites, etc.



There are many a stakeholders who contributed for its successful execution which is given in the table:

**Table 12: List of stakeholders**

Key actors	Stakes
UN Habitat	Watson class room, providing awareness in slums
MoUD	Funding the initial project
GMC	Project funding and management
Pollution Board	Control of pollution in the river bed
ADB	Awareness campaign through mobile van unit with boards of pictures and photographs. Models for awareness on rain water harvesting , sanitation and water management
World Bank	Beautification of the river for a cost of Rs.60 cr
DFID	Sanitary staff trained
Communities	Active support to the project

## PROCESS AND KEY FEATURES

The implementation of the scheme went through several steps like awareness creation, nala interception and diversion, etc. To motivate the people one slum – Laksmipura - was taken up for development and this motivated others to support and to participate. Thirty slums on the river bank were developed with the Department of International Development (DFID) and Asian Development Bank (ADB) project funds.



### Public Awareness Creation

Mass awareness campaign was launched with the help of Non-Government Organisations (NGOs) and Resident Welfare Associations (RWAs) on segregating waste at source into biodegradable and non-biodegradable components; educating public through group meetings, workshops, exhibitions, and different channels of mass media; public sensitisation through print media, cable TV, use of cinema halls, street plays, posters, pamphlets, hoarding, resident associations, etc. These efforts enabled the communities to acquire adequate understanding about good practices of solid waste disposal and its importance for environmental and public health; promoted safe handling practices through health education and capacity building of the sanitary workers; enabled the municipal corporation and other hospitals to handle the bio-medical wastes as per norms; and awareness to minimise use of plastics. The 349 RWAs were trained under Madhya Pradesh Urban Services for the Poor (MPUSP).

### Good Practice Dissemination

Best practices were collected and disseminated to educate the people as to how community can participate in sanitation improvement and the likely impact. They also explained the role of RWAs and other civic groups in mobilising and motivating the communities.

### Training the Sanitation Workers

All the sanitation workers were trained with the support of DFID in safe handling of wastes, sewage, health education, etc., which motivated them to actively involve the project.

### Nala interception and diversion

- ◆ all 83 open drains were connected to main sewers by interception and diversion structures to prevent sewage water from entering into the river. During the storm water flow the sluice gate will remain closed and arrangements were made in such a manner that water directly flows to the Swarnarekha River. This consists of a collecting chamber in which all sewage water enters along with silt and sludge settle down. Another chamber was constructed by using Bar screen and sluice gate connected with the sewer manhole at Swarnarekha River with the help of sewer pipe line. During dry weather flow the sluice gate will remain open allowing sewage water after screening to flow in main manhole;

- ◆ 84 Screen Chambers and 150 Gally Traps were constructed;
- ◆ the entire city is divided into two zones - broad gauge railway line marks the line of demarcation. On one side is Lashkar-Gwalior Zone while on the other side the Morar zone. Parallel sewers were laid on both side of the Swarnarekha River. Each zone has its own outfall, trunk main and branch sewer lines.
- ◆ all sewer flow through gravity and carries the sewerage to the respective sewerage treatment plants, where the excreta and wastewater treated and discharged to the Swarnarekha River;
- ◆ the sewer networks comprise of laterals, branch sewers, and main sewers. They convey the waste water and sewage to the trunk sewers which discharge into outfall sewers and outfall sewers convey the waste water to the proposed treatment plants;
- ◆ protection wall constructed throughout the length of the river to prevent stray cattle from entering the riverbed;
- ◆ over 50 persons were deployed for supervising the interception structure;
- ◆ 165 houses were demolished on both sides of the River which are mostly encroachments and 120 temples and mosques were relocated or removed through community consultations;
- ◆ toilets were constructed to enable poor communities to use under low cost sanitation;
- ◆ for educational efforts Mobile Van fitted with educational material was sent to schools to bring awareness among the school children with funding from UN-Habitat.

In order to create awareness among the slum dwellers residing along the river, the leaders of these slums were taken for an exposure visit to Trichi to see and understand the Gramalaya scheme which immensely improved sanitation and cleanliness in the slums. With the DFID support sanitary staff were trained and other staff were trained at ASCI. Extensive awareness campaign undertaken among 349 resident welfare associations. Total expenditure incurred on the projects is estimated to be around Rs 60.00 crore. Mostly funding came from the Gwalior Municipal Corporation. The expansion plans are estimated to cost about Rs 40 crore and it is proposed to mobilise their internally and also from funding agencies like the World Bank. Some projects are also proposed through PPP.

Community support and participation, political will including active support from the GMC, funding and support from several international agencies discussed earlier, dedicated administrative and project leadership and staff contributed for the success of the initiative. Resources was a major constraint to undertake the project comprehensively. Initially there were protests from the residents on the River banks to vacate which were overcome through consultation. Other significant factors include trapping and diversion of wastes from the garages and dairies to sewer lines, construction wall along the river and construction of community toilets under low cost sanitation along the river which contributed to reduce the open defecation. Beautification of river was done through:

- ◆ boating in the river;
- ◆ construction of an aquarium with 30 species of fishes;
- ◆ construction of a Baradari and recreational center .
- ◆ these facilities attract large number of visitors daily.
- ◆ twenty of the 60 wards started door to door collection of solid waste; and
- ◆ over 120 temples/ mosques were shifted to a hill top, which was a pain in the road improvements, which was made possible with the active support of the citizens



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## IMPACT

Outputs/achievements against the set objectives include:

- ◆ a beautiful spot for boating was developed in the city;
- ◆ a chat bazaar as well as park was developed;
- ◆ very old Baradari was renovated and converted in to historical monuments;
- ◆ at both the bank new road has been developed, resulting in lesser traffic load;
- ◆ contributed towards building civic consciousness and orientation;
- ◆ over 2000 people visit these areas daily; and
- ◆ became a scenic beauty and movies started shooting at the place.

Effective orientation to the residents living on the river banks created pollution free areas contributing to better environment. Land prices increased substantially and health condition of poor living near Panchmuk Hanuman, Jiwaji Ganj, Ramkui, Nirdhan Nagar, Hajira Area, Ranipura and Lootpura improved substantially.

The future plans include:

- ◆ musical fountain, laser show and ropeway from fort Phulwar through PPP.
- ◆ development of all 83 nalas in phases based resource availability;
- ◆ construction of a cycling track;
- ◆ construction of community toilets to discourage open defecation; and
- ◆ construction of three STPs near the project site and water to be used for gardening and other activities.

## CONTACT DETAILS

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# 13 DELIGHT BHARATH E TOILET

ERAM SCIENTIFIC SOLUTIONS PVT. LTD.

## SUMMARY

*Eram Scientific, a private organisation, in partnership with governments has been promoting portable, hygienically maintained and eco-friendly eToilets to address the needs of public sanitation in urban areas. The eToilet are introduced in schools and public places in cities of Kerala resulting in improvement in sanitation situation.*

## CONTEXT

India spends 5.1 percent of its Gross Domestic Product (GDP) on health and there are Rs. 3,000 billion economy losses due to lack of toilets and sanitation facilities in the country. Lack of toilets costs India 6.4% of its GDP a year. Poor sanitation infrastructure takes toll on public health and there are neither effective mechanisms to address the sanitation challenges nor a comprehensive approach. There is no technology intervention and in the absence of self-sustaining sanitation model, existing public toilet structures lack hygiene and cleanliness.

## THE INITIATIVE

‘eToilet’ is a comprehensive solution for world-class urban sanitation infrastructure which addresses two important perspectives:

- ◆ the health and hygiene of the citizens; and
- ◆ how sanitation facilities would be direct contributors to economic development of the nation by supplementing infrastructure for sectors like tourism.

Objective takes a pentagonal approach on:

- ◆ setting up clean public sanitation infrastructure,
- ◆ proper management and maintenance of units through facility management;
- ◆ making tourism more sustainable and responsible by promoting clean environment;
- ◆ creating more employment opportunities and improving the decency of jobs in this area; and
- ◆ providing the country a face lift in the urban public sanitation front

## PROCESS AND KEY FEATURES

The process includes:

- i. Public-Private Partnership (PPP) Model for comprehensive community development;
- ii. involvement of stakeholders: PSUs, Government Agencies, LSGs institutions;
- iii. robust manufacturing units across India;
- iv. strong network of installation, logistics and customer service professionals; and
- v. model replication across India.

## KEY FEATURES

- i. automatic payment collection & access controls;
- ii. automatic door opening;
- iii. alerts to users;



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- iv. display boards;
  - v. sensor-based interior facilities;
  - vi. automatic closet washing & platform cleaning;
  - vii. traditional power & UPS;
  - viii. water tank;
  - ix. SMS alerts to control room;
  - x. safety to women & children;
  - xi. remote monitoring & shutdown;
  - xii. biological treatment of sewage;
  - xiii. sturdy built-up;
  - xiv. user fee collection and external advertisement panels;
  - xv. touch free cleaning;
  - xvi. web & mobile reports on unit status;
  - xvii. external advertisement panels & internal audio ad options;
  - xviii. sewage Treatment: STP in eToilet connected to:
    - a. Option 1: DRDO Bio digester;
    - b. Option 2: A package: This works on an anaerobic biological treatment solution for the on-site treatment of sewage waste. System is designed to discharge an effluent which can meet most of the international standards for treated effluent safe disposal in watercourse or underground by absorption;
    - c. Option 3: Septic tank/ Sewer line.

## IMPACT

e-Toilet is India's first electronic public toilet and has made a wide scale impact in the public sanitation front. The impacts of the initiative are as follows:

- ◆ improved urban sanitation infrastructure;
- ◆ brought better sense of hygiene and cleanliness;
- ◆ new avenues for sustainability;
- ◆ decrease in water-borne and other related diseases;
- ◆ adds to the region's overall ambience;
- ◆ appropriate technologies and components to handle huge public usages;
- ◆ efficient water conservation techniques;
- ◆ optimised energy consumption;
- ◆ eco-friendly waste management;
- ◆ sustainability of operations;
- ◆ employment generation assured;
- ◆ elevated job status for the cleaning & maintenance personnel;
- ◆ accountability built-in for proper monitoring;
- ◆ supplements tourism infrastructure;

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- ◆ paradigm shift in urban public sanitation front; and
  - ◆ end to end solution in sanitation from entry to exit;

The impact can be summed up as follows:

- ◆ face lift india urban public sanitation infrastructure;
- ◆ portable, hygienic, eco-friendly;
- ◆ improvise health & hygiene of common man;
- ◆ generate mass employment opportunities;
- ◆ develop & promote sustainable tourism;
- ◆ 400 + installations pan india; and
- ◆ won 16 national as well as international awards including Bill &Melinda Gates reinvent the toilet challenge 'round 2' grant award.

## CONTACT DETAILS

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