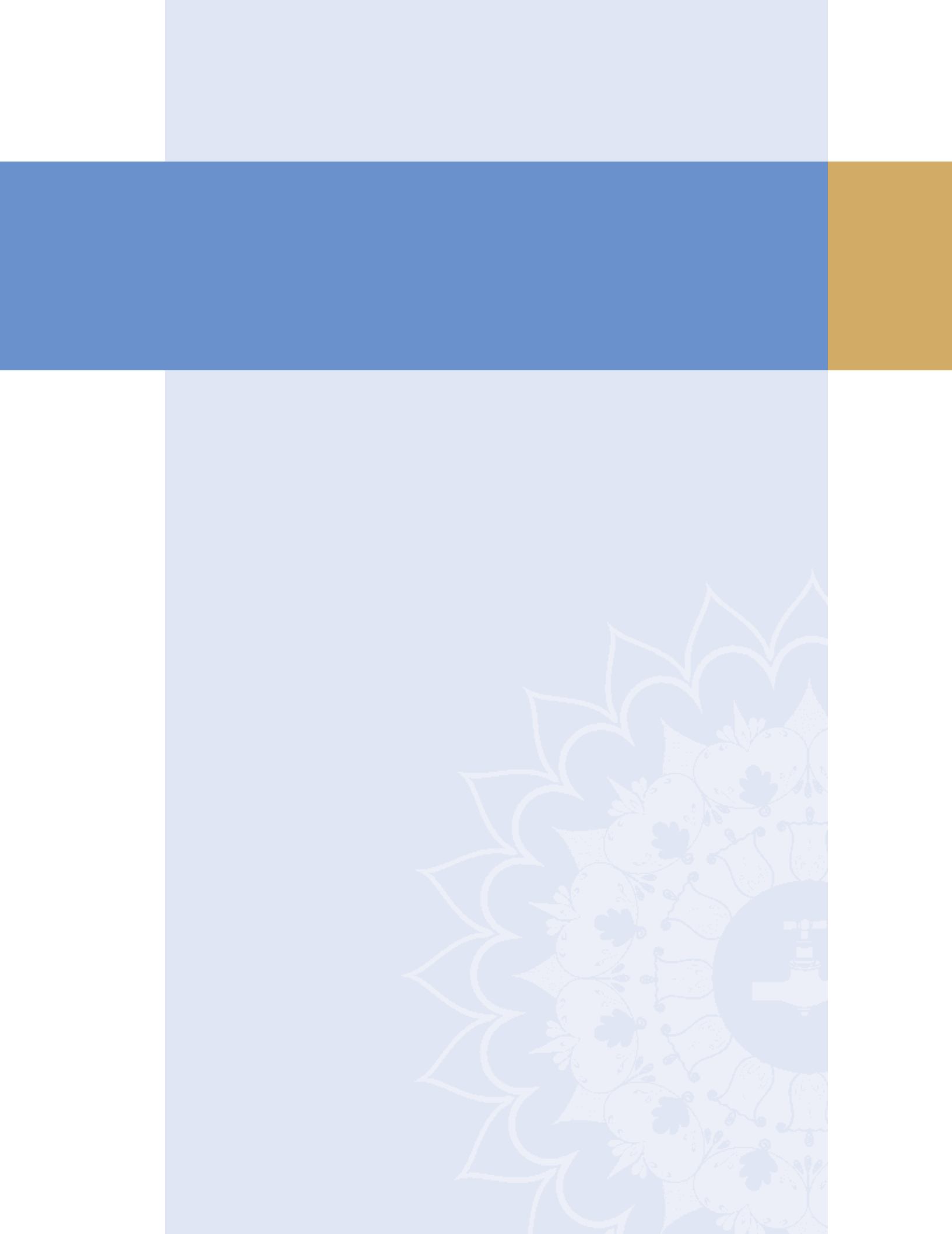


# Towards Drinking Water Security In India

Lessons from the Field





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# Towards Drinking Water Security In India

Lessons from the Field



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## Acronyms and Abbreviations

AFPRO	Action for Food Production	HDPE	High Density Polyethylene
AKRSP-I	Aga Khan Rural Support Program-India	HRD	human resource development
APFAMGS	Andhra Pradesh Farmer Managed Groundwater Systems	HUN	Hydrological Unit Network
ARWSP	Accelerated Rural Water Supply Programme	ICPP	Integrated Child Protection Programme
AWMAs	Aquifer Water Management Associations	IDA	International Development Agency
AWMS	Aquifer Water Management Sabha	IDP	Internally Displaced People
BG	Beneficiary Group	IEC	information, education and communication
BPL	below poverty line	IVR	Interactive Voice Response
CCDU	Communication and Capacity Development Unit	KL	kilo litre
CLTS	Community Led Total Sanitation	KRWSA	Kerala Rural Water Supply and Sanitation Agency
CWB	Crop Water Budgeting	lpcd	litres per capita per day
CWS	Center for Water and Sanitation	lpm	litre per minute
DIA	District Implementing Agency	m <sup>3</sup>	cubic metre
DSMG	Demand Side Groundwater Management	MANTRA	Movement and Action Network for the Transformation of Rural Areas
DSU	district support unit	MEDA	Maharashtra Energy Development Agency
DWSM	District Water and Sanitation Mission	M-DAWS	Multi-District Assessment of Water Safety
DWSS	Department of Water Supply and Sanitation	MDG	Millennium Development Goal
ESR	Elevated Storage Reservoir	MDPE	Medium Density Polyethylene
FAO	Food and Agriculture Organization	mg/l	milligram per litre
FFS	Farmer Field School	MJP	Maharashtra Jeevan Pradhikaran
FWS	Farmer Water School	MoU	Memorandum of Understanding
GIS	geographic information system	MSEB	Maharashtra State Electricity Board
GMC	Groundwater Monitoring Committee	MTBF	Mean Time Between Failure
GP	Gram Panchayat	MVS	Multi Village Scheme
GPOBA	Global Partnership for Output-Based Assistance	MWS	multi-village water scheme
GPS	Global Positioning System	NABARD	National Bank for Agriculture and Rural Development
GSDA	Groundwater Surveys and Development Agency	NGP	Nirmal Gram Puruskar
GVRT	Gram Panchayat Volunteer Resource Team	NGO	non-government organization
ha	hectare	NREGS	National Rural Employment Guarantee Scheme
ha m	hectare metre	NRDWP	National Rural Drinking Water Programme

ODF	open defecation free	SNK	Shikayat Nivaran Kendra
O&M	operation and maintenance	SRP	Sector Reform Pilot Project
PHED	Public Health Engineering Department	SSF	Slow Sand Filter
PRI	Panchayati Raj Institution	ST	Scheduled Tribe
PRWSSP	Punjab Rural Water Supply and Sanitation Project	SVS	Single Village Scheme
PSU	Project Support Unit	SWAp	sector wide approach
PWS	piped water scheme	SWSM	State Water and Sanitation Mission
RGNDWM	Rajiv Gandhi National Drinking Water Mission	TBS	Tarun Bharat Sangh
RMDD	Department of Rural Management and Development	TSG	Technical Support Group
RO	reverse osmosis	TWAD	Tamil Nadu Water Supply and Drainage
RSPMU	Reform Support Project Management Unit	UFW	unaccounted for water
RTI	Right to Information	UJN	Uttarakhand Peyjal Nigam
RWSS	Rural Water Supply and Sanitation	UJS	Uttarakhand Jal
SC	Scheduled Caste	UV	ultra violet
SDF	Sikkim Development Foundation	UWSSC	User Water Supply and Sanitation Committee
SHG	Self Help Group	VCA	Vanvasi Chetna Ashram
SIRD	State Institute of Rural Development	VWSC	Village Water and Sanitation Committee
SLSSC	State Level Scheme Sanctioning Committee	WASMO	Water and Sanitation Management Organization
		WSP	Water and Sanitation Program
		WUG	Water User Group

## Numbers

1 lakh=1,00,000

1 crore=10,000,000



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## Foreword

India being a vast and diverse country, we face many challenges in ensuring reliable, sustainable safe drinking water supply to rural households of the country. Though, in terms of provision of safe drinking water, we have covered more than 90 percent of the rural households, according to the National Sample Survey Office (NSSO) 65th round survey 2008-09, we have to recognize that much remains to be done to improve levels of service delivery, water quality and sustainability. Though chemical contamination of drinking water is being tackled today in the National Rural Drinking Water Programme (NRDWP), bacteriological contamination, which is more dangerous and also more prevalent, has to be systematically measured and tackled. This requires convergence with the Total Sanitation Campaign to ensure an open defecation free and clean environment. Slightly more than 30 percent of rural households obtain their drinking water supply through taps which are more convenient, saving time and labour specially of women and children. However, this varies widely ranging from less than 5 percent in Uttar Pradesh and Bihar to more than 80 percent in Tamil Nadu and Himachal Pradesh.

In the course of implementation of rural water supply schemes since the launching of the Accelerated Rural Water Supply Programme (ARWSP) in 1972 and Rajiv Gandhi National Drinking Water Mission (RGNDWM) in 1986 and NRDWP in 2009, a large number of successful models of providing sustainable and safe drinking water have been tried out throughout the country. These are build on traditional experience and also chart out new paths using the latest technologies and innate wisdom of the people. Though conditions vary widely among the states, in today's globalized world where countries learn from one another, there are many lessons that states and regions of the countries can learn from each other. Experts and practitioners in the field of rural water supply are aware of many good practices that have succeeded and sustained in different parts of the country.

With the help of Water and Sanitation Program (WSP), the Department of Drinking Water and Sanitation has collected some models of good practices from different parts of the country. Care has been taken to ensure these are drawn from as many states as possible. In addition, the good practices identified cover a variety of areas ranging from improved service delivery, operation of multi-village schemes, efficient operation and maintenance, ensuring water quality, measures to ensure source sustainability, pioneering efforts for waste water management, effective communication practices that have been adopted and institutional reforms at state level that have been tried out.

We can see from these case studies that local governments, through community participation, have been able to provide 24x7 water supply to save women's time, water and energy cost, install household connections with meters to provide each and every one with an adequate service and achieve financial sustainability, entrust independent bodies to take care of operation and maintenance, develop efficient water tax collection, learn from one another to improve their management practice, increase consumer voices and service providers accountability, and manage multi-villages schemes.

Water quality can also be tackled, by ensuring an open defecation free environment, empowering communities to develop water safety plans, protect their sources and develop partnership with the private sector for providing purified water for drinking purpose at affordable price.

Achieving sustainable aquifers is possible with community participation, traditional technology, science and demand management. The ground water table can be increased by 20 to 50 feet, dead rivers could be brought back to life and dark zones brought back to white zones.

It is recognized that there are many more such practices that need to be documented.

We hope that different states would identify their own best practices and document them at the state level. The Department would be happy to bring out further compendia of good practices that do not find place in this compendium.

To take the lessons from these good practices forward, the State Departments in charge of rural water supply are encouraged to send teams of elected panchayat representatives, engineers and grassroot level workers to see the good practices for themselves to learn from them.

I wish to place on record our deep appreciation of all of the officials of the state and central governments, Panchayati Raj Institutions, non-governmental organizations, external assistance agencies, partners, and grass root level champions of all states who have worked tirelessly to find new and better ways to ensure drinking water security to rural communities.



**(Arun Kumar Misra)**

## What Drinking Water Security Means

Every rural person has adequate safe water for drinking, cooking and other domestic basic needs on a sustainable basis. Safe water should be readily and conveniently accessible at all times and in all situations.

## What Drinking Water Security Involves

1. Plan for **improved rural water supply** service, based on clear operating, maintenance and management procedures including clear operation and maintenance (O&M) cost recovery policy, measurement for equitable distribution, and transparent arrangement for renewal, replacement and expansion of the source and/or the systems.
2. Design and implement of a series of preventive measures at the basin, source, system and household levels to protect water quality and develop water quality testing facilities at appropriate levels in the field for ensuring the **quality of drinking water supply**.
3. Measure water availability and supply (water budgeting), implement measures to conserve, protect, enhance and manage surface and ground water resources (including construction of rainwater harvesting and ground water recharge structures), develop local self regulation for water demand management, modify agricultural practices and crop patterns and use of more efficient irrigation systems to ensure **source sustainability**.



# IMPROVED RURAL WATER SUPPLY SERVICE



## 24x7 Water Supply: Saving People Time, Water and Energy Cost

### Location: Jepar village, Surendranagar District, Gujarat

Jepar of Chuda Taluka in Surendranagar District, Gujarat, is a village that embraced the decentralized community managed water supply system in 2006. It has developed a water distribution system, which allows all 160 households to have tap connections and enjoy 24x7 water supply. The village's two sources of water – a well and Narmada pipe water supply system – supplement each other to ensure regular safe water supply to the village. The total storage capacity

is an Elevated Storage Reservoir (ESR) of 50,000 litres and one sump of 20,000 litres.

Before the village adopted the 24x7 water supply system in 2006, the supply was available for about two hours a day and the average consumption of water was around 400 litres per day per household. When each household was assured of 24x7 supply, the consumption per household reduced to 250 litres per household, thus saving 25,000

litres per day which represents 38 percent of the water previously distributed. Power consumption reduced too by 4.39 units per day or a decrease in one-third of the previous electricity bill; an annual saving of about Rs. 7,900.

The reduction in consumption of water occurred primarily because people abandoned the practice of storing water to cover several days' needs. Now, 125 villages in Gujarat are successfully operating the 24x7 water supply system.

**Table 1: A comparative statement of consumption of water and power per day in Jepar**

No. of connections (Nos.)	Water consumption for cattle (litres)	Water consumption per day (litres)			Power consumption per day (units)			Saving of power at Rs. 5/unit (Rupees)	
		Before 24x7 (2 hrs/day)	After 24x7	Water saving	Before 24x7 (2 hrs/day)	After 24x7	Unit saving	Per day	Per year
160	10,000	65,000	40,000	25,000	13.15 units	8.76 units	4.39 units	21.95	7,900

Inputs by: **WASMO**, Gujarat



## Metering Household Connections: For Equitable Distribution of Water and Financially Self-Sustainable Water Schemes

**Location : Dakshina Kannada District, Karnataka**

Dakshina Kannada, a coastal district in Karnataka bordering Kerala, is situated on the western coast of India, which spreads from the Western Ghats to the Arabian Sea. The major part of its length lies along the seaboard. The population is about 1.3 million people (2001 census). The district is characterized by scattered habitations, isolated households, hilly terrain and saline water in the coastal belt in the summer months. The district is made of five blocks and 203 Gram Panchayats (GPs) including 368 villages and 2,683 habitations.

In 2010, 128 of 203 GPs<sup>1</sup> adopted meters for household connections coupled with volumetric-based tariff and computerized billing and collection in Dakshina Kannada District. This is unique in rural India. In 2010, there were about 43,000 metered connections against less than 4,500 prior to adoption of this practice.

<sup>1</sup>**Sources:** Mr. P. Shivashankar, Chief Executive Officer, Zila Panchayat, Mangalore, Karnataka.

**Table 2: Taluka-wise types of schemes and the number of house connections in Dakshina Kannada**

Taluka	No. of WS schemes by type			Total house connections	No. of metered connections
	MWS	PWS	HP		
Mangalore	402	271	1,294	31,414	16,244 (52%)
Bantwal	206	213	1,123	21,332	4,401 (21%)
Puttur	156	238	1,233	13,815	10,952 (79%)
Sulia	49	108	682	5,259	3,466 (66%)
Belthangadi	96	159	887	1,08,949	8,564 (79%)
Total	909	989	5,219	82,714	43,627 (53%)

MWS: multi-village water scheme; PWS: Piped water scheme; HP: Hand pump; WS: Water supply

Meters have successfully addressed the issue of unequal distribution of drinking water, misuse of water by advantage groups, constant complaints about inadequate supply of drinking water, non-payment of water tariff due to poor services and unbalanced budget leading to huge pending electricity bills and diversion of development funds towards maintenance of schemes by the GPs. Meters have saved water and energy cost. Eventually, every household gets water supply and pays according to what it uses.

The meters have also triggered the professionalization of the Village Water and Sanitation Committees (VWSCs). VWSCs began to hire and manage technical staff, prepare the annual budget, report to GP authorities and the Gram Sabha, fix and adjust tariff to fully cover increasing operation and maintenance (O&M) cost, charge on volumetric basis, and develop a computerized billing and collection system. In fact, VWSCs manage their water supply systems on a utility management model.

The first GP that introduced meters for all house connections

is Kinnigoli GP, in 2000, under the sector reform program introduced by the Government of India. Based on the success in Kinnigoli, metering was adopted by other GPs with guidance from the district-level officials in Dakshina Kannada. District and Block level meetings of the GPs' Presidents and Secretaries were the forums for sharing the experiences, which worked very well. Since then, GPs in other districts such as Davangere and Shimoga in Karnataka have also adopted meters to improve water services and save water and energy cost.

The cost of the meters is generally borne by the households in addition to a one-time connection fee and installation costs. In case of the households belonging to the Scheduled Castes (SCs) and Scheduled tribes (STs), the GPs have met the expenditures towards the meter and connection from GP funds meant for SCs/STs under various programs. Presently, each meter costs up to Rs. 750 with proper cover for protection. The life of the meter is around five years depending on preventive care. Most meters are available in the local market and manufactured either in Bangalore (state

capital) or Punjab. The VWSC takes the responsibility of either replacement of the meter or repair of the defective meters.

Monthly tariff varies from GP to GP. Most GPs have opted for volumetric billing based on consumption. There are different slabs with a minimum charge of around Rs. 50. There are different tariffs for domestic and commercial users.

Each GP/VWSC has a fixed timeframe for metering, billing and collection of tariffs. The responsibility of meter reading, issuing the bills and collection rests with the pump operator or bill collector or any other available functionaries in the GP/village. Recovery of water supply tariff is more than 90 percent in the district.

The introduction of meters helped the GPs, with support from VWSCs, to fulfill Government of Karnataka requirements along with delivering a much better service. Since the Karnataka Panchayat Raj Act, 1993, O&M of rural water supply schemes has been a statutory responsibility of GPs. In 2002, the Government of Karnataka issued orders stipulating that GPs should also

recover full O&M costs from the users only and the development grants should not be diverted to the O&M expenses.

This experience demonstrates that, if properly managed, drinking water supply schemes can be made financially self-sustainable. Most VWSCs managing piped water systems with metered connections in the district are able to meet O&M expenditure. Some GPs have substantial amount of bank balance to earn a good amount of interest on the deposits, as shown from the survey in seven villages in Dakshina Kannada District in Table 3. In Tokur, for instance, the VWSC is working for the last 10 years. It is providing 24x7 water supply for the last seven years and maintaining a bank balance of more than Rs. 5,00,000 in the VWSC account. The village also pumps four times less water since the meters were installed. Meters save water and energy.

Meters quickly and fully addressed the issues of poor service and



inequitable distribution of water. The benefits of meters were immediate and undisputable. They were the best and simplest solution to the problems of unequal distribution. The Kannada district experience also shows that empowerment of GPs to take charge of the technical and financial responsibilities for O&M and the autonomy of VWSCs in day-to-day management of

the system were critical steps to resolve these local issues, to build a professional management and sustain the service over time. Strong support from the Block and Districts authorities was also absolutely critical to scaling up this practice and in achieving impressive results. The next main issue is to set up clear procedures to ensure the quality of water distributed.

**Table 3: Income and expenditure on water supply of the sample villages for 2008-09**

Village/ GP	Income (Rs.)	Expenditure (Rs.)			Total	Surplus/ deficit
		Salaries	Electricity	Repairs		
Tokur #	179,976**	28,754	19,200	21,595	62,838	+ 110,427
Guthakadu #	152,660	57,557	33,000	24,872	115,429	+ 37,231
Haleyangadi*	783,064	214,600	225,800	179,353	618,953***	+164,111
Amatur Keshavanagar #	29,700	10,000	31,018	300	44,018	- 14,318
Amatur junction #	104,304	24,000	52,508	6,600	83,108	+21,196
Pilatha Bettu*	716,820	-	-	-	617,662	+99,158
Kukkipadu*	257,273	64,200	121,703	62,838	248,741	+8,532

**Note:** \*\* including the interest of Rs. 32,547 on bank balance of the VWSC ; \*\*\* including capital expenditure of Rs. 50,000; # Single villages/schemes ; \*Entire GPs covering more than one village as well as water supply schemes.

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## Efficient Collection of Water Taxes and Operation of Water Supply Scheme by Women's Self Help Groups

**Location: Khambegaon Gram Panchayat, Parbhani District, Maharashtra**

To sustain a water supply scheme, collection of water tax is critical. This is one of the major challenges faced across the country and Maharashtra is no exception. Various ideas were examined to solve this dilemma. One was adopted in Khambegaon GP, that provided a new model called the Khambegaon model.

The model is based on entrusting Self Help Groups (SHGs) with the responsibility of water tax collection and day-to-day O&M of the water supply scheme,

wherein the GP retains only the responsibility of heavy maintenance, based on an 80/20 percent share of the water taxes collected. This idea was developed in the World Bank-funded Jalswarajya Project. Khambegaon water supply scheme maintenance is a successful model offering the fullest potential of replication across the project villages where the SHGs are strong and empowered.

Since 1980s, the Government of India has shown increasing

concern for women's issues. Empowerment of women and its subsequent implementation boosted the women's SHG movement across the country. Rural development received a new face in the form of active participation by women and women's groups in the decision making processes, implementation of schemes and projects at the GP level. The slogan of the project was *lokancha pudhakar tyat shasanancha sahabhag* (peoples' leadership and governments'

participation). The paradigm shift from 'demand driven policy' to 'supply driven policy' saw a major breakthrough in the sector and yielded overwhelming response from communities. SHGs in the Jalswarajya project initiated over 27,000 income generation activities within the state.

Khambegaon has a population of 1,500 people and got a new piped water supply scheme to manage. The Jalswarajya project identified women as an important stakeholder in this process driven approach and incorporated various measures for their active participation, taking into consideration the amendment in the Mumbai Village Panchayat Act 1959. For formation of constitutional committees in Gram Sabhas, a 50 percent women's quorum is statutory, 50 percent women must be in various committees, and a separate sub-component for women's development is the key step to address the empowerment issue. These components aimed to empower the women to play an effective

role in village development activities, including water supply and sanitation. O&M of the water supply scheme is an innovative activity started by the SHGs of Khambegaon GP.

Sailani Women's SHG took up the innovative work of water tax collection in May 2008. The SHG first undertook the exercise of understanding the reasons behind poor tax collection. They decided that the communities should pay the water tax in advance so that the habit of paying for services is developed.

The SHG's women adopted various methods for tax collection. First of all, in a meeting, they decided to pay regular tax. Secondly, they carried out door-to-door visits to explain the importance tax payment. The results were seen in a month's time. With the help of the GP, a separate women's gram sabha was organized. It was unanimously decided to pay tax for the sustainability of the water supply scheme. This SHG collected an advance

of Rs. 100 and regular monthly collection of Rs. 30 per household. They achieved a successful 90 percent collection. The innovation was successful and the Gram Sabha decided to enter an agreement with the SHG for tax collection.

On May 17, 2008, a meeting of the Sarpanch and officers was organized in which the SHG members shared their ideas about the O&M of the water supply scheme which were appreciated by senior officers. A detail circular was issued stating that the maintenance of water supply schemes must be carried out by SHGs and the model must be replicated in the state. The circular included detailed guidelines regarding expenses such as the salary of waterman, TCL powder and minor repairs. The SHG would get 80 percent of the annual total collection of tax to cover regular operation and 20 percent would be given to the GP for its maintenance fund. The SHGs save their profit and utilize it to build a corpus and to provide loans to its members.



The model has been successfully operating for three years and the SHGs' income has risen from a mere Rs. 6,000 to Rs. 56,000 yearly. This part-time profit making activity has boosted the confidence of the SHGs. Khambegaon has become a successful example of sustained water tax collection, and a promising model that can be replicated.

Some factors for success include the active participation of SHGs, the faith shown by

the Gram Sabha in SHGs, the clear distribution of roles and responsibilities within SHGs and GPs, the initial recognition received across the state, and finally the incentives through income generation for members of SHGs.

Currently, the Khambegaon model has been replicated in 253 GPs in Maharashtra. However, there is a need for continuous handholding of GPs and SHGs as the committees keep changing.

**Table 4: Balance sheet of the water supply scheme managed by Self Help Group in Khambegaon**

Total no. of households	140
Total no. of connections	135
Monthly collection per household	30

Items	Expenditure Rs.	Revenue Rs.
Waterman payment : 750*12	9,000	
MSEB light bill yearly	5,000	
TCL Powder : 240 Rs. * 12	2,880	
Other exp : 500*12	6,000	
20% Amount to GP	9,720	
Number of connection * water tax *12 months		48,600
<b>Total</b>	<b>32,000</b>	<b>48,600</b>
<b>Balance</b>	<b>16,000</b>	

MSEB: Maharashtra State Electricity Board



**Inputs by: Mahadeo Jogdand**, Gender Specialist, Jalswarajya Project (RSPMU) Water Supply and Sanitation, and S.N.N. Raghava, Water and Sanitation Specialist, SASDU, World Bank

# An Independent Society to Manage Water Supply Service with Greater Authority and Efficiency

**Location: Chinchali village, Belgaum District, Karnataka**

Chinchali has a population of about 25,000 people. Two decades ago, this village was well known in the district for water scarcity. Women and men used to carry water from a river 2-3 kilometres away. However, the situation is totally different today. The first piped water supply scheme was introduced to the village under the World Bank-assisted Integrated Rural Water Supply and Environmental Sanitation Project in 1994 and subsequently augmented during 2001-02 under the second World Bank-assisted Jalnirmal project.

Water is supplied every day for about two hours. The village piped water supply scheme uses a surface source, has an independent water treatment plant, pumping machinery (80 HP) and 1,100 cubic metre (m<sup>3</sup>) storage capacity, and about 49,00 metres of distribution lines. The water is supplied through private house connections as well as public stand posts. There are 810 house connections compared to only 394 in 2001 and the remaining households fetch water from the public stand post or share the private connections.

What is unique is that the water supply system is operated and maintained by an independent society. In 2008, the VWSC changed its status to become an independent society, fully registered, to better manage the system. The society is comprised of 14 village leaders from different sections, who were all members of the VWSC.

The GP and the independent society have signed a Memorandum of Understanding (MoU) two years ago. Basically, the GP is the owner of the assets while the society (Krishna Drinking Water Supply and Rural Development Society) is responsible for operations, repairs, maintenance, expansion, and billing and collection of tariff.

The MoU details the following points:

## Functions of GP

- The GP is the owner of the all water supply assets. It is responsible for according permissions for any new water connections
- It is also responsible for fixing and revising tariff based on the budget forecast proposed by the society

## Functions of the society (operator)

- Operation, repairs and maintenance of the water supply scheme
- Any repair (to be attended to within 24 hours)
- Billing and collection.
- Retaining income to cover all O&M charges
- Placing money collected as one time connection fee in fixed deposits

- Monthly expenses such as all wages, electricity bills, O&M expenditures
- Submitting details regarding income and expenditure to the GP every month and sharing with the community once a year
- Financing extension of the distribution line to facilitate new house connections
- Testing water quality on a regular basis



Initially, while planning and implementation of the World Bank assisted project, the VWSC was established in the village to mobilize the community. After the completion of the project in 2002, the GP took over the responsibility of O&M. However, the GP was unable to recover the water tariff or control illegal connections. As a result, the O&M responsibility was transferred to the VWSC in 2003. Despite the efficient and transparent management of the system by the VWSC, some households (particularly, the rich and village politicians) were resisting paying for water. The VWSC did not have legal powers to issue notices to defaulter and disconnect. This is the main reason for registering the VWSC as an independent society under the Karnataka Society Act in 2008-09 and signing an MoU with the GP for O&M of the water supply systems, with clear roles and responsibility and powers.

Various training and awareness building activities have been carried out by the district support unit (DSU) of the Jalnirmal project. In addition, advice and training have been provided by DSU.

The current water tariff is Rs. 60 and Rs. 10 per month for private household connections and public stand post users, respectively. The society has been able to recover the tariff and has a positive bank balance of Rs. 3,00,000; there are no pending bills.

Thanks to the community's commitment, the water supply system has been well maintained for the last nine years. Transparency is a key feature of the community's practice. Details of income and expenditure have been published and shared with all customers in the villages for the last 10 year. Records related to financial matters, including the capital cost sharing, are available with the society.

The next project of the society is to introduce metering to continue to provide good and equitable service to the increasing population, reduce electricity bills and save water.

**Inputs by: Mariappa Kullapa and Christophe Prevost,**  
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# 24x7 Water Supply with Cluster Storage: Increasing Incomes and School Attendance and Reducing Health Expenditures

**Location : Khintala village, Surendranagar District, Gujarat**

The 378 households of Khintala village in Sayla Taluka, Surendranagar District, used to face severe water supply problems. There is no local ground water aquifer available and, therefore, no hand pumps. The nearest source was a river about 2.5 kilometres from the village. Women and men used to spend about three to four hours fetching drinking water from this source. The village was covered by government schemes but the water seldom reached the village.

This changed when a new water supply scheme was constructed based on the 'cluster storage' design, proposed by the Water and Sanitation Management Organization (WASMO) and the Aga Khan Rural Support Program-India (AKRSP-I) as part of the Swajaldhara scheme. The village was divided into 16 clusters. Water pumped from the intake-well was distributed to each cluster storage.

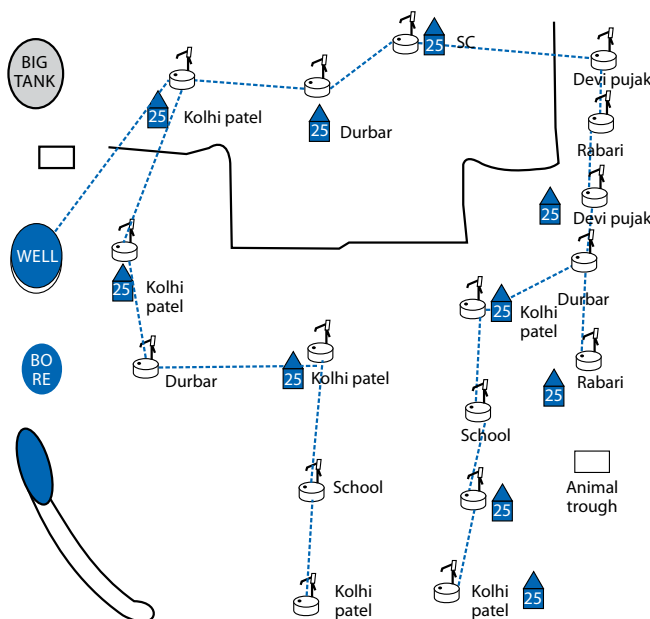
Each underground storage has a capacity of 10 m<sup>3</sup> and is equipped with a hand pump on the top. It can store water to supply 20-25 households per day. Two storages are constructed in the primary school for school children. The scheme has been running successfully from 2004 and life of the people in Khintala has greatly improved.

Cluster storage has many advantages. Firstly, water is available at anytime; in fact, many see this as a 24x7 water service. Secondly, power consumption is reduced as there is no need to pump water to an elevated tank. Thirdly, underground storage tanks are easy to clean. Finally, it is easy to repair hand pumps on tanks. Overall, O&M costs are lower than with piped water supply schemes.

It all started in 2004 when a school teacher from the village, Mr. Joru Bhai, heard about WASMO and the Swajaldhara scheme. He held discussions within the village to convince people to take up this scheme to solve their drinking water problems. However, there was resistance to contributing 10 percent towards the capital cost, as the villagers felt that their money would not be well utilized. AKRSP-I also supported Mr. Joru Bhai. Finally, the people agreed to participate in the scheme. The villagers formed a Pani Samiti (equivalent of the VWSC in other states) with 14 members, including four women. AKRSP-I and WASMO district teams trained the Pani Samiti to manage the water supply system. The cost of the project was Rs. 14,00,000 and the community's contribution was Rs. 1,35,000; the remaining 90 percent was provided by WASMO.

The Pani Samiti is responsible for O&M of the system. In consultation with the villagers, the Pani Samiti decided Rs. 150 per year as a 'water user charge' for every household. The charge for individual connections is Rs. 450/year (about 20 households

**Figure 1: Cluster storage network in village Khintala**



have taken connections). The Pani Samiti undertakes regular chlorination of all tanks and monitors cleansing of tanks by beneficiary households. With the savings in the O&M account, it has built cattle troughs. In July 2008, the Pani Samiti had savings of Rs. 41,000 in its account.

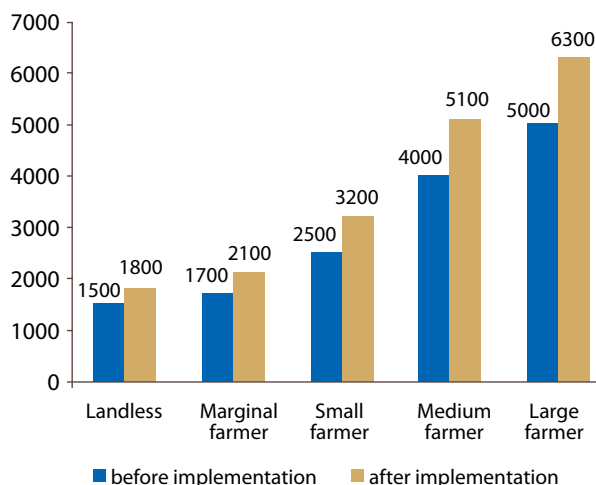
The impact of the scheme has been outstanding as revealed by the 2008 AKRSP-I study. Both women and men saved about 3.8 hours with the new scheme. Some of this time is productively used to enhance their incomes. Incomes across all groups have increased from Rs. 300/ month for landless labourers; Rs. 400/month for marginal farmers; Rs. 700/month for small farmers; Rs. 1,100/ month for medium-sized farmers and Rs. 13,00/month for large farmers.

The overall family expenditure on health has significantly decreased over the four years. Health problems included, beside water borne diseases, headache, acute chest aches, and backache and spine ailments in women due to carrying water for long distances. The average annual expenditure on diseases after the scheme was implemented is Rs. 500 per household compared to Rs. 1,820 earlier; a percentage reduction of 72 percent for the village.

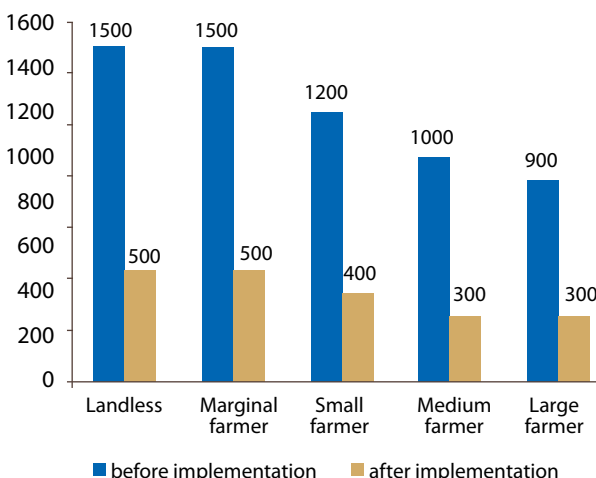
The school drop out rate had reduced to 1.5 percent in 2007 compared to 10-15 percent before the implementation of the scheme. Earlier, as women were busy fetching water, girl children were involved in domestic chores.

According to Mr. Joru Bhai, 50 percent credit for higher school attendance goes to the drinking water supply system and 50 percent to the other factors such as increase in awareness about education, active involvement of teachers, developed infrastructure and sanitation facilities in the school.

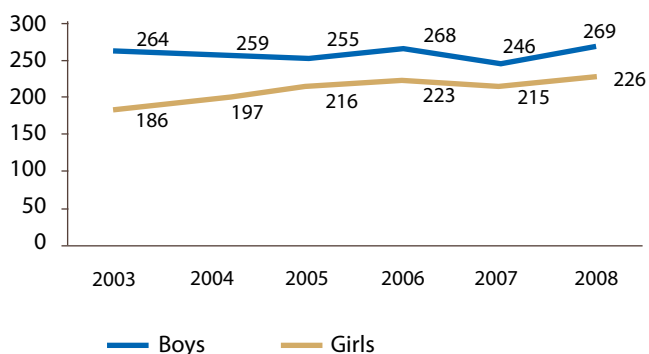
**Figure 2: Average monthly income of households (Rs.)**



**Figure 3: Expenditure on disease (Rs.)**



**Figure 4: Number of children being admitted to school**



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## Three Taps, One Toilet, One Bathroom for All: Inclusion, High Level of Services and Long-term Support Ensure Sustainability

### Location: Orissa

Unique to Gram Vikas<sup>2</sup> is the adoption of the social inclusion approach wherein all families of a habitation, irrespective of their economic, social and caste considerations, are provided the same infrastructure and service. Under the Gram Vikas scheme, every family gets access to good quality toilets and bathrooms, coupled with three taps per household and 24x7 piped water

supply. Gram Vikas' scheme integrates the concepts of demand-led supply through decision making processes and cost sharing.

In addition, this scheme differs from other approaches by breaking with the formula that equates poor people with low quality services and products. The quality, convenience and privacy of the

design have really changed the daily lives of these poor rural communities and led to widespread behaviour change, inducing communities with no history of fixed point defecation to adopt new habits. Gram Vikas' Movement and Action Network for the Transformation of Rural Areas (MANTRA), as on March 31, 2010, has served about 2,50,000 people in 787 villages in 22 districts of Orissa.

<sup>2</sup> Joe Madiath, Gram Vikas, Mohuda, Berhampur Ganjam, Orissa; [www.gramvikas.org](http://www.gramvikas.org); [gramvikas@gmail.com](mailto:gramvikas@gmail.com)



Gram Vikas' core program, MANTRA, is a response to the abysmal quality of life prevailing in rural Orissa. MANTRA is an integrated habitat development program with water and sanitation as the key entry-point activity. The MANTRA approach sets a new pattern for water and sanitation coverage by prioritizing sanitation in addition to safe drinking water.

Clean water will remain a distant dream until open defecation is eradicated throughout the community. Therefore, toilets and shower rooms are built first. In each village, people, primarily the landless, are trained in masonry, enabling them to contribute skilled labour. The masons lead the construction of the toilets and bathrooms. Investment cost per household for toilet and bathroom is estimated at Rs. 10,000, of which households contribute two-thirds and Gram Vikas one third. Households contribute in the form of collection of locally available material – stones, sand, making bricks and unskilled labour. Gram

Vikas' contribution is external material including ceramic pan, footpads, doors, and cement and steel for roof casting. However, the subsidy amount is fixed at a limit of Rs. 3,000 per family. Subsidies are released once all toilet walls are up to the roof level and the two soak pits are complete and covered. All villagers build pour-flush twin pit latrines. Piped water is important because it has been found, over time, that toilets without water supply are ineffective and unused.

The water supply system is designed to provide 70 litres per person per day. All households contribute to the building of the water tank in labour and in material. The main pipeline is provided through the government water supply program, while people bear the cost of laying the distribution pipes to individual households. Interestingly, participation of all households is a non-negotiable condition of the program. Equal representation and participation of men and women in community decision-making and control are

the key features of the institution building process. As the result of the 100 percent inclusion criteria, it could take one or two years or even more for a community to agree to work with the program. Capacities of men and women in technical and organizational aspects are built over time to enable handing over to communities and Gram Vikas' withdrawal. The maintenance of infrastructure is the responsibility of the villagers. Local youth are trained to undertake minor repairs and maintenance of the pump, motor and pipelines. Since 2009, wherever water is pumped using electricity, communities are installing water meters to better control water use and promote equity.

Ninety-six percent of water supply systems constructed are still operational, even after more than 10 years in some instances. (The oldest systems are 13 years old and the latest two months.) That means that communities have been able to cover O&M and management costs through various strategies, such as: (i) collecting user fees to

pay the monthly electricity bill; and (ii) using the income from community horticulture patches, fish rearing in community ponds and social forestry according to context-specific resources. If this is not enough, the villages contribute another 0.5 or 1 percent of the gross product at harvest time. Since the inception of the program, five pumps have been replaced by the community with their own funds at a cost of Rs. 25,000.

On the other hand, to cope with the population growth, the interest on the corpus fund is used for extending support to new families, thus ensuring 100 percent coverage of all families at all times in the future. Nearly 300 families have benefited from this arrangement since 1996.

Source and environmental sustainability is also addressed. In some drought-prone areas such

as in western Orissa, ground water recharge is implemented in about 30 percent of the schemes to raise the water table and prevent springs from drying up through watershed management activities. The area around the source is kept clean to prevent pollution of the water and ensure the pipes are not blocked by debris. The tree cover around the source of the spring is maintained at the watershed level to slow down surface water run-off.

In case of gravity flow water supply systems, though the initial investment can be high (depending on the length of pipeline and size of storage tank), the recurring costs are low. On the other hand, tube wells and dug wells require water to be pumped, thus raising the cost of O&M. To meet operations cost, a monthly fee per household of Rs. 30 to 50 is fixed to pay the electricity bill for pumping (Rs. 800 to 1,500). In

case of metering, the tariff is half paise per litre (Rs. 5 per m<sup>3</sup>). Assuming that the monthly household budget is Rs. 3,000, water expenditure represents about 1-2 percent, which compares favourably to acceptable standards.

The water source is physically and chemically tested before the water supply is connected. Once the supply is connected, water is tested every three months in the dry season and almost every month in the rainy season as, after a heavy downpour, it is most vulnerable to the infiltration of contaminants. In some areas, it was found that contaminants such as arsenic, fluoride and nitrates in the tube well water have increased.

Gram Vikas educates people about health and hygiene, hand washing and the importance of cleanliness in general. The impact



on people's health is impressive. Data for 2006 show that of 81,000 villagers, where the water and sanitation program is implemented, the majority were free from diseases. An internal analysis by Gram Vikas of their health data for a sample of 4,976 people shows an 85 percent reduction in water borne diseases/illness overall after implementation of the water and sanitation program, with 88-90 percent reduction in incidence of diarrhoea, jaundice and malaria.

Program rules have evolved over time but key principles have remained the same: "all or none" and "toilet before water" means that the village becomes free of open defecation soon after the facilities are built and health benefits are experienced at the early stage. Gram Vikas enables the community to become

self-reliant. Communities drive the program and bear a large proportion of the work and costs. The Government of Orissa plays the role of a facilitator in this particular scheme and provides the bulk of financing for the water supply infrastructure.

This experience shows that very poor and small communities can manage and take charge of the O&M cost. High levels of service along with the community's long-term support are key factors for sustainable service delivery. The high level of services makes a real difference in people's life. Household connections and 24x7 service spare women the drudgery of fetching and carrying water, and gives them more time to pursue productive activities. Toilets provide privacy and convenience to women, sparing them the indignity of

having to walk to potentially unsafe places in the hours of darkness just to perform basic bodily functions. Bathing rooms eliminate the need to bathe fully clothed and often in the presence of men in contaminated ponds in which animals wallow. There is clearly a "willingness to pay" for this improved level of service.

Long-term technical and institutional support provided by Gram Vikas to build capacity of the community to take care of the system, develop norms for O&M and undertake other development activities is also critical. Incorporating livelihoods training (fish farming, social forestry, masonry, plumbing, etc.) as an integral part of the long-term support program helps the community to meet capital and O&M costs.

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# Enhancing Ownership and Access to Water and Sanitation with Swajal

**Location: Kumbhrota village, Mahoba District, Uttar Pradesh**

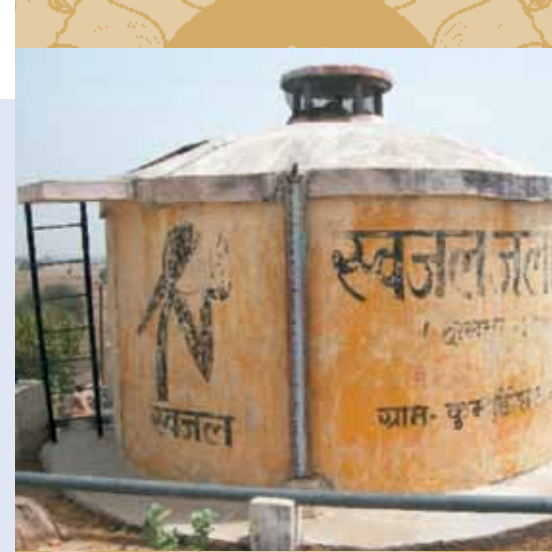
Kumbhrota is located in the drought hit area of Mahoba District, on a hilly slope, and is inhabited by 1,619 people.

Before implementation of the dug well-based piped water supply scheme, the village suffered from lack of water; the three open wells and eight hand pumps were inadequate to meet demand. The hand pumps, installed by Jal Nigam, dried up during the dry season as the ground water levels dropped. The minimum discharge available in summer was 10 to 15 litre per minute (lpm). The open wells were not protected; their surroundings were unhygienic, leading to the threat of water borne diseases.

People were unaware of healthy sanitation practices and open defecation was rampant, leading to a serious environmental threat for the village and also the water source. The small tank in the village used by villagers for bathing, animal washing, washing clothes and other daily work, was the source of disease and infection as the majority of households was dependent on this highly polluted water. The other water source was situated far from the village and inaccessible in the rainy season.

The project objectives were to improve the quality of life of the villagers through interventions in water and sanitation to enhance access of the community to water and sanitation by involving the government and the GP and enhancing people's ownership of the scheme, which were achieved to a greater extent during the project period.

Kumbhrota was selected in 1996 as part of the Swajal project in phase one. The planning phase took nine months. A demand driven approach was the criteria for village selection. The community played a leading role in planning and implementation activities through decision making. Support organizations such as Gramonnati Sansthan provided support in community development activities as well as construction work. Women's development activities were undertaken for women's empowerment with an emphasis on behavioural change. A systemic learning approach was followed throughout the scheme. A balanced approach to hygiene and sanitation awareness; a choice among different water and sanitation technologies; strong emphasis on water and sanitation approaches; the strengthening of environmental catchment protection, water shed management and water security plan for the village; systematic use of the participatory method; a



community-based approach to service delivery; and community-based O&M of the water supply scheme were the project priorities.

Mobilization of resources included: Swajal project Rs. 9,02,551, WaterAid India Rs. 1,30,000, and government and community contribution Rs. 2,10,000.

At present, the scheme runs on electric power supply. WaterAid provided further support to implement integrated water resources management activities such as roof water harvesting with recharging pit and mini check dam near the water source, which has contributed to making the scheme sustainable.

Traditional thinking hampered the progress of the project in the beginning. The elders from the villages were not ready to accept the simple facts related to water and sanitation. Certain innovations such as integrated water resource management did not receive support from the community. The community, with its prejudices and biases about new technology and its usefulness, could not put a few changes into practice. The fact that hand pumps are safer sources of drinking water than open wells was also not accepted in the beginning. The age-old methods of storage, handling and using water and food were first discussed and their pros and cons were also explained to the community. After demonstrations and rigorous discussions, the community began to be convinced. Because of lower levels of literacy, the exposure of the villagers was also limited and hence awareness generation took more time than expected.

Drought was the biggest hurdle during the project cycle. Around 40-50 percent of the villagers migrated because of consistent drought for four years. The program received a set back in some villages, where the migration was higher. In these villages, community action and individual responses were slow. People had other priorities rather than construction of toilets. Another difficulty was the collection of local contributions; the VWSC had difficulties in collecting the required money. O&M also took a back seat sometime. The VWSC worked hard to persuade people and encourage them into common action. But once they understood the importance of water and sanitation in improving health, activities gained momentum.

Thanks to the project, people have realized the importance of safe drinking water and are using hand pumps rather than wells for drinking water purposes. The incidence of water borne diseases has reduced leading to improved status of health and less expenditure on illness; hygienic practices related to water and food have considerably improved; the villagers have understood the importance of the quality of water and take necessary measures to maintain it; the community now has local skilled persons for O&M; and, finally, the attitude of dependency either on the government or organizations has reduced.

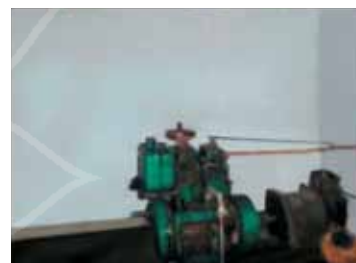


The community's sense of ownership has increased and people depend on themselves for O&M of water resources.

At the beginning of the project, it was observed that it was difficult to communicate information to adults. Children proved to be the best change makers. They have the inquisitiveness and a desire to learn. They can pass the information onto their parents and other elders once they understand it. The activities related to the hygiene program were based on these facts and were successful. Parents, especially women, started saying that they had been pressurized by their children to follow safe and hygienic practices related to food and water handling and they were trying to change their behaviour.

Bundelkhand is infamous for its socio-cultural traditions that provide hardly any space to women in the public sphere. Women initially need some support to come out and learn and share information and start actually participating in decision making processes. This boosts their confidence and gives them status in the family and the village. It takes months to create a conducive atmosphere for women to come out and participate. Once they become part of various committees, they are exposed to an array of issues and this, in turn, encourages them to speak their mind. This strategy has helped the project and now women as caretakers, as hand pump mechanics, as members of VWSC, are performing well.

For sustainability, the government has to be a part and parcel of the program. Knowing this, Gramonnati, from the first day, involved various government departments in the project. Departments such as education, Panchayat Raj, health, and rural development were involved from time to time. The resources of the government at Panchayat, Block and District levels were mobilized. The officers were also invited for various community programs throughout the project period. These officers were also informed about the progress of the project and their guidance was sought.



This continuous inflow of information and sustained efforts to create awareness paid off in terms of change in behaviour of 60 percent of the population. However, the task was indeed a difficult one. People, with their own convictions, always tried to follow old patterns of behaviour. Senior citizens argued with village workers and it took time for them to understand the reasons to change their existing behaviour.

An initial survey showed that 90 percent of the population was unaware of healthy practices of handling food and water. During initial meetings, people did not show interest in these topics. After much deliberation with the VWSC, it was decided to conduct healthy home competitions in each village to create interest and awareness among the people about healthy behaviour. The community monitoring teams visited houses and selected the winners on the basis of pre-decided criteria. The houses with maximum marks were given gifts at a community function. This strategy proved beneficial as family members gained status and recognition and were self motivated to follow hygienic behaviour.

In the beginning, when hygiene educators started talking about quality of water and its relation to various diseases, no one believed them. People argued that they have been drinking water without testing for generations and did not feel the need to test it.

Through a series of meetings with community-based organizations, people were convinced to undertake this activity in their villages. They were given information about various salts, impurities in water and diseases they cause. Water from various sources was tested and results were discussed with them. After seeing the results, people started using water hand pumps for drinking purposes rather than open wells. When this change happened, the percentage of water borne illnesses decreased. This fact was brought to their notice. Since then, testing of quality of water has become a regular feature of the program.

All these efforts helped the community as well as the government to become active in delivering improved services. People have also become aware about different schemes related with water and sanitation and have pressurized the GP for their implementation. It helped to establish a direct communication channel between the concerned officers and people. The VWSC was also strengthened to use a convergence approach.

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# An Efficient System to Recover Water Taxes

**Location: Shiraguppi village, Belgaum District, Karnataka**

Shiraguppi, the GP headquarters, is situated at a distance of 150 kilometres from the Belgaum District centre and lies at a distance of 60 kilometres from the Taluk centre, Athani. River Krishna flows close to the village. The population of Shiraguppi is 9,186. Sugarcane is the prominent commercial crop. Shiraguppi has a piped water system with 740 homes having tap connections. Home connections are charged a monthly fee of Rs. 41.50. Households getting water from the public tap are charged a monthly fee of Rs.10.

The Rural Water Supply and Sanitation Committee gets a monthly electricity bill of Rs. 35-40,000, paid every two-three months. After most of the sugarcane growers of Shiraguppi harvest their crop, they pay the water bill between the months of January to March. In Shiraguppi, the method for payment of water bills is unique. Door-to-door collection of water tax has been stopped. The water users themselves pay the annual water tax. Defaulters are incentivized to pay by excluding them from GP meetings and not issuing them civic or legal documents.

## Three Challan System

The Rural Water Supply and Sanitation Committee has an account in Shiraguppi's Karnataka Vikasa Grameena Bank. All water users have to pay water tax into this account. There is a challan system to pay the water tax. It is a tri-copy (carbon copy) challan. The year of payment of the water tax, property number and name must be filled in the challan, along with the bill amount, and paid to the bank. Of the three challan copies, the bank retains one, another is given to the Rural Water Supply and Sanitation Committee. In this manner, after paying the water tax, the challan number, bill number, bill amount are all recorded in the Committee's records. One of the copies is retained by the water user.

## Non-payment of Water Tax means Non-issue of Documents

Those who do not pay water tax or other bills are not issued any documents or certificates by the GP. Only after paying the bills are they allowed to attend the GP meetings.

In 2007-08, a person from the village paid thousands of rupees as water tax at one go. Along with water tax, this person had not paid his other GP taxes for many years. When the Rural Water Supply and Sanitation Committee meeting was held in village community hall, this issue was discussed. It was suggested that a notice be sent or procession or *jatha go* marching to homes of people who do not pay their dues. However, in a few days, the person paid all his dues together, and has been prompt with his payments since.

Awareness levels among the people of Shiraguppi are so high that they pay their water tax of their own volition.

**Inputs by: S.N.N. Raghava**, Water and Sanitation Specialist, SASDU, World Bank



## Community Contracting for Cost Efficiency, Transparency and Accountability in Construction

**Location: Jalanidhi Rural Water Supply Project, Kerala**

Instead of engaging contractors to build the water supply systems, Beneficiary Groups (BGs) directly procure materials and construct the schemes on their own, employing local workers – both skilled and unskilled. The community contracting system adopted in the implementation of the Jalanidhi Rural Water Supply Project in Kerala has successfully demonstrated the value of empowering communities to be responsible for the implementation and management of the water supply systems.

Community contracting resulted in substantial reduction in the construction costs (about 15 percent less than the approved estimates), ensuring good quality construction and transparency. The average capital cost per capita is about Rs. 3,000. This approach also helped in mobilizing local resources, especially manpower for construction, and making the beneficiaries actively involved in the entire process whereby their ownership and sustainability of the schemes are enhanced. Equally important, the water

supply schemes completed and commissioned are now being operated and maintained (many of these now for more than five years) by the BGs. Water tariffs have been fixed appropriately, corresponding to O&M expenditures, and are being levied and collected in all the schemes.

The objective of the adoption of the community contracting approach was to ensure transparency and accountability in the construction activities and eliminate contractors and

associated problems. The project funds were transferred to the bank accounts of the BG. All payments were made from that account by the office-bearers of the BG. The risk in entrusting the construction funds with the BGs and their lack of technical capacity in building the infrastructure was overcome through intensive capacity building programs for the office-bearers of BGs, close monitoring and supervision from the staff of the support organizations and Kerala Rural Water Supply and Sanitation Agency (KRWSA) and putting in place necessary systems for checks and balances.

To ensure transparency in purchases and payments, regular meetings of the Executive Committee and General Body of the BG were held, in which quotations were presented and decisions taken collectively for all major expenses. In order to facilitate proper selection of construction materials like pipes and their specials, product demonstrations were organized in GPs in which manufacturers were invited to present their samples. Independent Construction Quality Monitoring consultants were engaged to help ensure the appropriateness, timeliness

and quality of the construction undertaken and of the other services provided during project implementation.

The Jananidhi Project implemented by the Government of Kerala with World Bank assistance adopted the community contracting system, wherein the entire construction responsibility was vested with the Executive Committee of the BG. Members of the Executive Committee responsible for the construction activities were given training in various aspects of construction management such as procurement procedures, quality assessment of materials, fund management, record keeping, accounting, quality checks, etc., by the training division of KRWSA. The support organizations employed at the GP level provided handholding support to the Executive Committee of the BG in construction management.

Jananidhi Project was implemented in 122 GPs in Kerala during the period 2001-08 by KRWSA. The project implemented about 3,700 micro water supply schemes mostly in remote and water scarce locations, which benefitted about 1.8 million people in the rural areas of 13 districts of Kerala.

A typical Jananidhi scheme provides piped water to about 50 households, on an average, using a ground water source (open wells or bore wells), storage tank and pumping and distribution lines. The beneficiary households are provided with yard taps which



supply about 70 litres per capita per day (lpcd) of drinking water. The schemes are owned and operated by the BGs. O&M costs, including power charges, wages of the pump operator and repair costs are borne fully by the BGs by collecting monthly water charges from every beneficiary household. The monthly water charges are generally around Rs. 40-50 per household.

The GPs facilitated the implementation of the schemes by providing 10 percent contribution towards the capital cost and the necessary technical support through support organizations. The beneficiaries contributed 15 percent of the capital cost and are responsible for O&M costs. The balance 75 percent of the capital cost was provided by the Government of Kerala using the World Bank credit. There was reduced beneficiary contribution in the case of marginalized communities (ST) and within a BG there was cross subsidization to ensure inclusion of the poorest households in the villages. Out of the total project funding of Rs. 392.2 crore, Rs. 52.96 crore had come as community contributions and Rs. 26.82 crore from the GPs. Even the tribal populations, who hitherto had only received free services, have accepted the change in thinking and contributed Rs. 83.6 lakh in cash and labour towards their capital cost contributions.

This cost sharing approach has been considered as an effective means of “ownership” and as a demonstrable commitment towards the maintenance of the assets created under the project for the beneficiaries.

The success of the community contracting approach is evident in the good quality of the infrastructure constructed, cost savings, timely completion of the work, community ownership of the assets, etc. The majority of the Jananidhi schemes were completed below the initial estimated costs. The community contracting resulted in 15 percent savings in the capital costs of water supply and sanitation schemes. There was transparency in the entire construction work, with the community choosing and procuring the materials and employing the required labour. Payments were made through transparent processes which resulted in beneficiaries getting convinced about the expenditure and the utilization of the resources at their disposal. The project also showed that the involvement of poorly educated or technically unqualified local people in the planning, design, contracting and management phases has not adversely affected the quality of the infrastructure. On the contrary, the majority of the schemes have been completed well in time and with superior construction quality standards.

The success of the community contracting method depends mainly on : (i) the capacity building for the leaders of the BGs in the construction processes; (ii) the handholding support to the BG during the construction phase through support mechanisms; and (iii) the checks and balances in place through appropriate systems in fund and procurement management.

The community contracting method is replicable. It will help in a big way to get the community fully involved in the project processes and develop a sense of ownership towards the assets created. It will bring down costs and win the confidence of the people and build their capacities to successfully manage the systems by themselves.

This experience shows that the myth that the villagers cannot build engineering projects was proved erroneous by the fact that thousands of small water supply schemes were built successfully using the community contracting method. Indeed, people can implement and manage water supply projects and meet the O&M needs of the resultant water supply schemes if they are properly trained and authorized to do so. Transparency and accountability can be ensured if the roles and responsibilities of the different stakeholders are balanced through well defined powers.

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## Successful Implementation of Sector Reform Pilot Project: Panchayati Raj Institutions can Do it!

### Location : Kasaragod District, Kerala

The Government of India initiated the reform program in rural drinking water supply through the Sector Reform Pilot Projects (SRPs) in 67 selected districts across the country in 2001. In Kerala, the districts of Kasaragod and Kollam were included in this reform initiative which aimed at facilitating demand driven, community based micro water supply schemes in rural communities, suffering due to scarcity of proper drinking water facilities. The reform philosophy was to promote community

participation and ownership in developing and maintaining simple and sustainable water supply schemes which can ensure affordable and safe drinking water. The SRP in Kasaragod District has come out with flying colours in demonstrating the feasibility and viability of community managed water supply programs in the rural areas. This decentralized approach generated tremendous enthusiasm and confidence among the people towards the project. It also ensured

transparency and accountability in project implementation.

The state government decided to entrust the responsibility for implementing this SRP with the Panchayati Raj Institutions (PRIs). The District Panchayat was made the implementing agency. The GPs were given the responsibility to identify the water scarce areas, mobilize the communities, and plan and implement the drinking water supply schemes. Support was provided by the Project Support

Unit (PSU) and Gram Panchayat Volunteer Resource Team (GVRT). The PSU had a multidisciplinary team of professionals with qualifications and years of experience in management, community development, training, engineering and finance. The GVRT also was a multidisciplinary team with qualified persons in engineering, community mobilization, accounts, etc., and many of them were residents of the respective GPs. While the PSU operated from the District Panchayat office, the GVRT operated from the GP office. The GPs in Kerala are quite large compared to other states with a population of about 25,000, on an average. The water supply schemes are implemented through BGs of households interested in becoming beneficiaries of the project. These BGs were registered under the Charitable Societies Act with a General Body of member households and an elected Executive Committee. On an average, each BG had about 40-50 member households.

Five GPs were selected for the initial phase and later it was extended to 12 more GPs. The selection of the GPs took place through a transparent process using well defined criteria. In every GP, about 25 water supply schemes each were taken up after a detailed resource mapping and community mobilization process. The water scarce areas within a GP were identified through Gram Sabhas and BGs were formed. The office-bearers of the BGs were given intensive

training at various stages of implementation by the PSU and GVRT. The BGs were actively involved in the identification of the source, designing the scheme, mobilization of the 10 percent beneficiary contribution towards capital cost, construction supervision, etc. The entire construction was carried out through the community contracting method in which

connections through a yard tap, according to people's demand. The total expenditure is about Rs. 343 million of which the community contributed about Rs. 33 million (10 percent) and the rest was contributed by the Government of India.

These schemes are now fully managed by the BGs under the guidance of the GPs. The entire



the BGs were responsible for procurement of materials, employing skilled and unskilled labour, etc. The SRP funds were transferred to the bank accounts of the BG. All payments were made from that account. The progress was monitored by the GVRT and PSU.

In all, 439 community managed drinking water supply schemes and 97 school water supply schemes in 32 GPs were completed under SRP and the subsequent Swajaldhara Project. These water supply schemes benefit about 1,50,900 people in 23,627 households, who have been provided with house

O&M cost including the power charges, wages to the pump operator and the repair expenses are paid from the monthly collection of water charges from beneficiary households, which is on an average Rs. 50 per month per household. A majority of these schemes (more than 90 percent) are still functional, quite well managed by the BGs with their own resources and no subsidy from the government or PRIs.

The dedicated and efficient leadership of the PRIs in the district is the major reason behind this success story. The leadership of both the District Panchayat and the GPs exhibited

a deep sense of commitment and worked hard in implementing this difficult new initiative which is different from the conventional subsidy oriented programs. The maturity shown by the PRI leadership in rising above narrow political considerations and cooperating in successfully implementing this project is a good model for decentralized development administration.



The capacity development activities undertaken made substantial contribution in the effective implementation of the project. It educated the user groups on the philosophy of community managed water supply programs and capacitated them to take up the challenging tasks of building a water supply scheme by themselves. The various systems and procedures developed by the project to

help the BGs to manage various aspects like procurement, finance, book keeping, O&M, monitoring and evaluation, etc., are good examples of an effective capacity development strategy. The project implemented several capacity development programs for the PRIs to capacitate the PRI representatives to play a facilitating role in the implementation of the project.

The transparency with which the entire process was carried out is an important feature. The community contracting process adopted in construction of the schemes helped in eliminating malpractices. This enhanced the faith of the people in this program which maximized their participation. It also helped in reducing the costs which is reflected in the completion of schemes at about 85 percent cost of the approved estimates.

The success of the project has demonstrated that, to a large extent, solutions to drinking water problems in the villages can be found locally by harnessing local resources under the aegis of the local governments. The initial support for information, education and communication (IEC), capacity building and capital cost can empower people to mobilize themselves and act collectively to find solutions

locally. It is cost effective and can provide satisfactory levels of service.

The project has proved that rural communities are willing to contribute to developing facilities for their betterment. The general perception that people are unwilling to contribute for water facilities is now an old story. Here, a majority of the beneficiaries are the poor – below poverty line (BPL), SC/ST and other backward classes. They contributed 10 percent towards the capital cost and are now sharing the O&M cost without hesitation. The management of the O&M aspects by the BGs, especially their control in regulation of water supply and collection of monthly user charges, is an indication of their level of ownership and capacity.

The enthusiasm and momentum created by the SRP in developing a culture of participative development in the rural communities of Kasaragod is tremendous. The success of this approach is now motivating people in uncovered areas to put pressure on their local government leadership to initiate similar programs in their localities also. At the end of the project period, it has emerged as a good model for PRI led, demand driven, and community managed water supply program in the state and the country.

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## Successful 24x7 Water Supply in a Small Town

**Location: Malkapur town, Satara District, Maharashtra**

The water supply system in Malkapur town is the first initiative in India where the entire town is operating on 24x7 basis. The initiative at Malkapur has led to remarkable efficiency improvement: i) per capita daily consumption reached an average of 110 litres; ii) water requirement reduced by 30 percent; iii) operational cost requirement reduced by Rs. 75,000 per month; iv) revenue collection efficiency increased from 60 to 80 percent; v) sufficient pressure in the distribution network has reduced electricity consumption of the Municipal Council as well as for the consumers to the extent of 27.528 kilowatt (KWH) per month; and, finally, unaccounted for water (UFW) represents between 8-12 percent, which is an extremely good performance. The water supply system is operated by the technical unit under the supervision of the Municipal Council.

The Malkapur area is well known for its enterprising farmers and an efficient co-operative sector managing sugar mills, lift irrigation systems, milk production, and collection and selling. It is fast growing town because adjoining Karad does not have space to accommodate a growing population. The growth rates between 1981-91 and 1991-2001 are 58 percent and 275 percent, respectively. The population in 2009 was around 35,000 while the 1991 census population was 5,976. In 2007, Malkapur got the status of town.

A piped water supply scheme, commissioned in 1988, was designed for an expected population of 14,000 in 2010 on the basis of 40 lcpd. In 2001, the population was already about 23,000 surpassing the initial forecast, which resulted in poor service levels. The GP could not meet minimum requirement for water even after operating the system for all those hours of the day when electricity was

available. There was no fixed time for water supply to the citizens; it was usually two or three hours every alternate day. People had to resort to tanker and bore well water. The GP was under pressure and also depended on 11 bore wells with power pumps, in addition to the piped water supply system. With no fixed schedule for water supply, people had to wait day or night. The poor, unreliable, untimely service led to non recovery of water charges for the GP. Trying to provide service under the given constraints, the GP incurred additional expenses on energy for bore well pumps and tankers.

Augmentation of the water supply system was approved in June 1999 but started in December 2002. The system was designed to provide 55 lpcd of water for a population of 67,196 people projected for the year 2030. The bulk water system consisted of water abstraction from perennial river Koyna, and pumping it to the water treatment plant. The treated water is pumped to the master balancing reservoir located on the hill. The treated and disinfected water is transferred to the five service reservoirs covering six zones of distribution. The system up to the ESR was ready by January 2005. Water supply distribution was done through the earlier system.

The next phase for improving the water supply in Malkapur focused on the distribution network. Maharashtra Jeevan Pradhikaran (MJP) suggested the concept of 24x7 water supply. The engineers of MJP provided “the” critical input, extensive mobilization and

high quality technical support to the GP to ensure this 24x7 initiative succeeded.

In January 2007, the GP met and resolved in the Gram Sabha to effectively implement 24x7 water supply. The elected representative and MJP engineers formed teams and conducted ward wise meeting of consumers and women in particular and explained the benefits of 24x7 water supply. It was also explained that telescopic rates would help them in avoiding wastage of water. The charges would be only for the water they used as read by a meter as against the earlier flat rates. To curb excessive utilization of water by the consumers, the elected representatives, supported by MJP, agreed on the telescopic rates tariff structure and decided on three slabs with the following rates: up to 70 lpcd at Rs. 4.50 per 1,000 litres; 70 to 120 lpcd at Rs. 7.00 per 1,000 litres and above 120 lpcd at Rs. 10.00 per 1,000 litres. Rates for commercial connections were decided as Rs. 9, 14, and 20 per 1,000 litres depending on the type of activity. The actual work on the distribution network started in March 2008.

The GP and MJP pursued the initiative as a single team. The Government of Maharashtra provided complete support to the initiative through funding under the Accelerated Rural Water Supply Programme (ARWSP). The Member Secretary, MJP, helped in imparting education for using the software, WaterGems, and designing the system himself when he was Chief Engineer. The

manufacturer of polyethylene pipes allowed the elected representatives and engineers of MJP to visit the factory and explained manufacturing and quality. The after sale support from M/s. ARAD Meters, Israel, is notable.

The main outcomes of shifting to a 24x7 water supply are:

- Improvement in delivery time and services. 24x7 supply has totally removed the constraints of waiting for irregular water services and people have more time for productive activities. Women are especially appreciative of the 24x7 supply as they do not have to fetch the water from long distances.
- Quality of water. The quality of water is now guaranteed as the pipes are continuously pressurized. Krishna Medical College, Karad, carried out a study on the quality of water after the commissioning of the 24x7 system, and reported that 100 percent of the samples were potable and free from contamination.
- Decrease in water borne illnesses in children. The survey carried out by Anganwadi Sevika indicated that the water borne diseases in children have reduced remarkably to near zero level.
- Reduction in wastage of water. Wasteful use of water has reduced by about 30 percent. Demand management by IEC and the telescopic tariff structure contribute to this performance. All zones are now getting 24x7 supply and pumping requirement

has decreased to 13-14 hours compared to 19-20 hours before the demand management exercise and implementation of the telescopic tariff.

- Shifting control of the distribution system from the valve man to the consumer. Valves are no longer required to be operated in the distribution network and consumers do not depend anymore on the valve operators.
- Meter reading and billing are simplified. The type of water meters installed can be read remotely by driving through the streets using handheld devices and radio frequency. Data are free from errors compared to manual handling. The readings are downloaded from the i-paq (a handheld device) to the computer and monthly bills are generated immediately. Thus the earlier annual billing procedure is now carried out on a monthly basis. As a result, the cash flow of the Municipal Council has improved. The system makes it easier for consumers to pay at the end of each month compared to earlier when a large sum had to be paid once a year. At the same time, revenue recovery has improved from 60 percent earlier to 80 percent and is improving day by day.
- Saving in electricity. Huge savings in electricity have been made as water is no longer required to be pumped by people living in two or three storey buildings and the Municipal Council also stopped using its 11 power

## Box 1 : Key principles followed in Malkapur to implement 24x7 water supply

The consumer shall get water whenever he opens the tap. Consumers need water at different times of the day. This makes redundant the concept of storage of water and throwing it away the next day when fresh water is received. The investment in storage vessels/tanks also comes to an end.

Consumers pay as they use: This principle of consumers paying as per their usage provides the incentive for resource conservation. The metered water supply system provides an opportunity to charge as per the volumes of water consumed, unlike in un-metered flat rates, where the quantity consumed is not the criteria. This encourages consumers in a metered system to minimize the use of water, close the tap when they do not want water. This helps the pressure in pipes to be maintained and consumers located at higher elevation do not suffer as lower elevation consumers try to close the tap as soon as their requirement is fulfilled. This provides equity amongst consumers.

Pay at higher rate when using higher per capita water: The telescopic rates adopted require the higher per capita usage of water to be paid at higher rates. The minimum required water is provided at affordable rates. Thus the poor are catered to while they also enjoy the benefit of 24 x 7 water availability. The higher rate in slabs for higher consumption recycles the wealth from the rich to the poor.

The service to work on no loss basis: The water supply service was advised not to be run at a loss. Tariff rates were determined accordingly. Great care was also needed to keep operational expenditure to its minimum. Efforts should be made to automate as many components of the system as possible.

pumps on bore wells for supplying water. This has saved electricity to the tune of 3,30,336 KWH a year, basis actual electricity billing data pre- and post-project. This exercise was carried out to submit a proposal for the Energy Conservation Award to the Maharashtra Energy Development Agency (MEDA). The energy saved is equivalent to a reduction of 450 tonnes of carbon dioxide

in the atmosphere.

- Reduction in operation cost. A simple automation such as operating raw water pumps from the water treatment plant using GSM technology has reduced the cost of operation as the raw water pumping station is now un-manned. This has eliminated the requirement of two pump operators there.
- Reduction in UFW. Using AMR type bulk meters has

made it possible to take all the readings remotely and with these snap readings it is possible to carry out day to day water audits. The measured UFW in the system is between 8-12 percent, which is an excellent performance.

The project has come up with a number of innovations. Firstly, the design of the WaterGems software to design the system. Secondly, the use of rolls of long lengths of High Density Polyethylene (HDPE) pipes that requires fewer joints. The joints are made using electrical fusion welded couplers and specials. The house service connections use fusion welded tapping tees fixed with brass ferrule, followed by compression fitting, single length of Medium Density Polyethylene (MDPE) pipe to tap tee to the meter in the premises of the consumer's house, AMR meter and ball stop cocks before meter. All this material of construction and jointing methodology made the system innovatively leak proof, which is the basic requirement for 24 x7 operation of any system. Thirdly, the use of AMR meters for bulk metering to measure the flow leaving service reservoirs and on all consumers connections has made it possible to read them using a handheld device while driving along the street for 10 minutes for each zone. This has made effective water auditing

possible at any point of time and to 100 percent accuracy. Fourthly, the successful implementation of the telescopic tariff is another innovative aspect of the initiative. Its successful implementation is possible only with greatest micro detailing and AMR type meters. Fifthly, the provision of bulk meters at the outlet of the ESR and at consumer premises, and the pressure sensor at the salient point in the distribution network has made it possible to calibrate the hydraulic model and simulate the system. This has made it possible to monitor the system and determine where it has gone wrong by understanding the pressure sensor reading transmitted to the computer, using GSM at fixed time intervals and comparing it with the range in which the pressure should normally be. Possible leakages in the system are discovered without going to site.

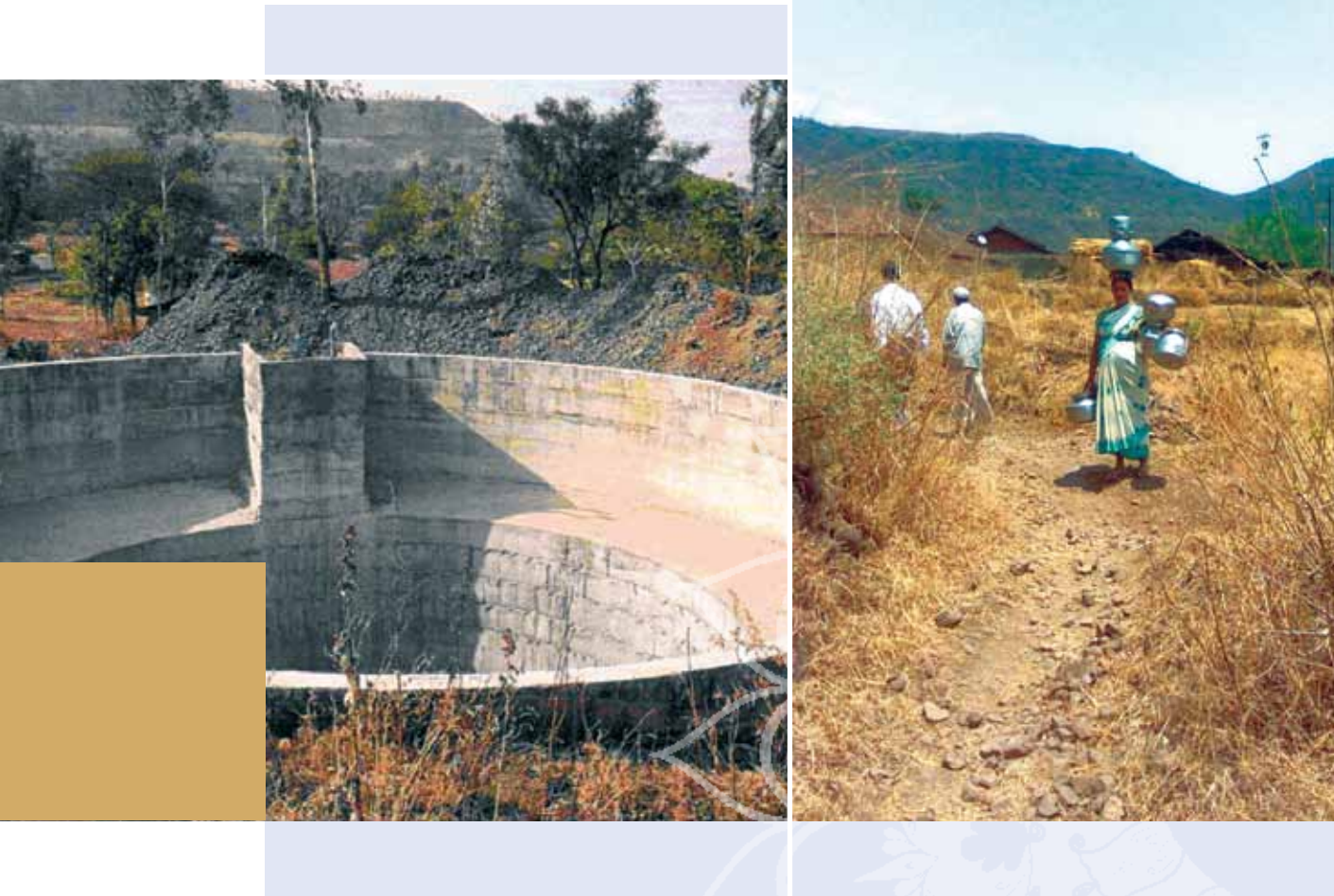
By using AMR meters, it has become possible to understand the leakages in the plumbing system at the consumer's premises even beyond the water meter. This is possible by taking readings at different points in time in a day or night. Those meters which show abnormally high consumption at night can be investigated by approaching the consumer and confirming where the leakages are in the plumbing system. This exercise has made consumers aware and the leakages in

plumbing have been removed, leaking taps have been changed and there has been a positive change in habits of people

The initiative is replicable where the system capacity is sufficient to cater to an increased demand in the transition phase when the town is switching over to 24x7 supply and demand is effectively managed through mass awareness and telescopic rate implementation. The peri-urban areas where the distribution network is to be laid totally afresh are the best areas where the system can be replicated successfully.

The scheme is sustainable, both physically and financially. The water availability in the source river Koyna is sufficient. The system capacity is sufficient to take care of fluctuations in demand for another 10-15 years. Financially, the scheme is sustainable as the operations cost and revenue match closely. The Municipal Council has decided to increase the rates every year to retain the sustainability of the system. In fact, a committee of the ruling party, opposition party, experts and those who were opposing the initiative or requesting for lower rates has been constituted. The committee has been tasked to propose rates in such a manner that there will be no loss in operating the system. The recovery levels are also increasing.

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## Use of Solar Energy for Dual Pump Scheme: A Boon for Women

### Location: Maharashtra

More than 75 percent of India's population lives in rural areas and 85 percent of the rural water supply is ground water based. Hence bore wells with India Mark II hand pumps are the most important elements of rural water supply. However, it is also a well known fact that, during summer when the water levels deplete, accessing water becomes that much more difficult. If pumping levels deplete below the lifting capacity of the hand pump, 36 metres, it stops working and water scarcity is declared in that area

despite water being present in the bore well. In rural areas, generally women have to face all these problems. The patriarchal society holds women responsible for such routine tasks hence these women crave for a tap water supply.

The Groundwater Surveys and Development Agency (GSDA) of the Water Supply and Sanitation Department of the Government of Maharashtra, realized the plight of rural women and came forward with an innovative solution called Dual Pump Scheme.

In this scheme, a single phase 1 HP powered submersible pump is installed in the existing high yielding bore well having a hand pump. Pumped water is stored in a 5,000 litre tank and water supply is provided to each house through a tap. Roof top rainwater harvesting is mandatory to make the scheme sustainable. Hence, water supply is restored by either one of the pumps.

After implementation of 1,000 such schemes, due to huge demand, the Government

of Maharashtra decided to implement these schemes using renewable sources of energy such as solar energy in difficult hilly habitations, where electricity supply is not available near the source. The scheme has become one of the most useful, economical, eco-friendly and popular schemes in the state.

These schemes have now been implemented in Left wing affected blocks of Gadchiroli District. These villages are situated in deep forests and mostly inaccessible due to the hilly terrain where the collection of recovery of the maintenance of the hand pump scheme is a serious problem and repairing hand pumps is a great problem due to difficult road conditions and inaccessibility, particularly during the rainy season.

If the solar pump does not function due to cloudy weather, people can restore the water supply with the help of the hand pump, as usual. These

schemes differ from the previous schemes which are bore well based. Earlier, submersible pumps were installed on the high yielding bore wells without taking care of artificial recharge. Hence, shifting of pumps was common when the ground water availability decreased. House to house tap connections were not provided. Pumps installed were also of higher capacity. Electricity charges were beyond the financial capacity of the end users. Removal of the hand pump cylinder and riser pipes for regular maintenance and repairs, without removing the submersible pump, is appreciated by the hand pump mechanics and village artisans, now possible due to a special water chamber developed by the GSDA.

This is a demand driven scheme with several IEC activities carried out at the Block and Zila Parishad levels. A numbers of workshops with audio video and power point presentations were conducted. Habitations with high yielding bore wells and totally dependent on hand pumps made aware of the scheme with the help of printed material. A documentary was screened in the workshops and meetings. Junior engineers from the Zila Parishad were imparted training. Progress was reviewed at state, regional and District levels through video conferences to save time and money. All schemes are implemented by GPs only, under the guidance and supervision of engineers of the department.

The scheme comprises five major components: i) high yielding

bore well/tube well (yield not less than 2,800 litres per hour); ii) installation of solar energy powered submersible pumps with required photovoltaic arrays; iii) HDPE storage tank of 5,000 litre capacity and arrangement for elevating it to 3 metre height to give sufficient head for the distribution system; iv) distribution system for 30 houses with individual tap connections; and v) rainwater harvesting structure.

As per demand, individual tap connections can be provided by the GP. Generally, two to three stand posts are provided at the beginning to supply water to all habitats. The GP can decide the rate of recovery for O&M of the scheme, which is negligible as the first five years' annual maintenance of solar water pumping system is provided free by the supplier according to the terms and conditions of contract.

The solar water pumping system is promoted by the Ministry of New and Renewable Energy, Government of India. Hence, subsidy at the rate of Rs. 70 per watt is reimbursed if the system without battery back up is procured. Generally, 5,000 litres of water is stored in a tank so battery back up is not required. However, if required, the same solar photovoltaic arrays can be used for other purposes such as street lighting if the energy is stored in the batteries. In this case, the subsidy is Rs. 90 per watt. The GP has to submit necessary reimbursement forms along with a project report.



Basically, this 900 watt water pumping system is very small, having a pumping capacity of 5,000 litres per day. During hot sunny days, the 5,000 litres tank takes two to three hours to fill.

Due to this innovation, both the system and source have become sustainable. Hence, funds received under the National Rural Drinking Water Programme (NRDWP) for sustainability are used for these schemes. Making this scheme compulsory for habitations which are totally dependent on hand pumps is currently being considered.

First the yield of the bore well / tube well is checked with the help of a yield testing unit provided with the submersible pump and generation set. If this pump test gives the yield not less than the desired limit of 2,800 litres per hour, the scheme is proposed. Estimates are prepared by the Junior Engineers of the Zila Parishad for all these components. Technical sanction is accorded by the Executive Engineer of the Rural Water Supply Division working under the Zila Parishad and administrative sanction by the Gram Sabha. GPs are provided funding through GSDA. The state government's energy department made a rate contract for the solar water pumping system suitable

for bore wells for 900 and 1,800 watts, which made procurement easy for the GP. Man power is available with the Zila Parishad and GSDA for the supervision. In very few places, some contractual engineers were engaged for the project period.

Generally, a scheme can be completed within a week if techniques developed by GSDA such as pre-fabricated steel structures, pre-cast RCC foundation blocks, are used. Monitoring is carried out from the regional and state level offices of GSDA.

Dual pump based water supply schemes, either powered by conventional electricity or on solar energy, proved to be the best ever solution to the drinking water problems of habitations dependent on hand pumps.

Key factors of success of this scheme include: effortless pumping; assurance of 24x 7 water supply; no electricity charges; five years' free maintenance by the contractor; security of water due to 5,000 litre storage tank; arrangement of special water chamber for easy removal of hand pumps for maintenance without disturbing the submersible pump; availability of spare time for agriculture and

other household chores; regular school attendance of girls; and sustainability of the scheme and source.

There is a high demand for this technology as initially only 66 schemes were implemented on conventional energy based dual pump schemes. Then it was replicated on pilot basis in 200 habitations. Then 1,000 schemes are demanded by the Konkan Region (four districts) and 1,500 by the Nashik Region (five districts). Of these, three schemes have been implemented on solar energy based dual pump schemes, 139 solar energy based dual pump schemes were demanded by all the districts of the state during 2010-11. The state government has issued a resolution for guidelines of these schemes on August 21, 2010. MEDA made a rate contract of solar water pumping systems of 900 and 1,800 watts suitable for bore wells only.

Lesson learned include that: any new scheme requires IEC to be accepted by the end users; any innovation by the departmental team members should be rewarded and appreciated; every suggestion should be considered and if it strengthens the scheme, should be incorporated; and field visits and feedback are most important.

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## Peer to Peer Learning: Training of Communities by Communities

Location: JALMITRA, Maharashtra

The Maharashtra Rural Water Supply and Sanitation program's Jalswarajya Project, was implemented with World Bank assistance in 3,008 GPs of 26 districts of the state. This project was based on the principles of a demand driven approach and implementation based on participative mode by the GPs and VWSCs.

Some of the VWSCs have mastered the technique well and were found to be in a position to guide the less developed VWSCs in project activities. Therefore, an innovative initiative was taken to develop these VWSCs as Master Trainers who will then train the remaining GPs in a scaled up scenario. These Master Trainers were called JALMITRA (meaning friend of water). Out of 3,021 GPs, 228 VWSCs and their 1,380 members were selected and trained as Master Trainers. They, in turn, trained 10,500 members of the community.

As the responsibility of carrying out 100 percent O&M of the water supply schemes rested on the community and the GP, it was necessary to devise mechanisms to involve these two stakeholders in the process. Capacity building mechanisms were developed for district and village levels. At the district, a capacity building consortia carried out the task which also included guiding the village processes. At the GP, support organizations took up the task. However, both had limitations and it was also necessary to continue the process beyond the project period.

Simultaneously, due to poor experience of capacity building at the GP level, there was a pressing need to find suitable functionaries for performing the task. Under the newly launched NRDWP, the task has assumed huge proportions. It was required to sustain the process in 28,000-odd GPs of the state by providing credible institutions for the process of capacity building. It was against this background

that it was decided to develop capable VWSCs as Master Trainers and sustain the process of capacity building at the GP level.

The objectives of initiating the program were to: i) prepare community members and GP committees to conduct training for capacity building of the other GPs on various aspects of O&M of the water supply schemes; and ii) to develop capable GPs as key resource centres as agents of capacity building in future programs in the water supply and sanitation sector.

The strategy consists of ascertaining the training needs of the members of GP/Sarpanch, Gram Sevak, committee members, and SHG members to assume their roles; and develop a training plan based on need assessment of GPs for the community to understand the importance of O&M, preventive maintenance, regular disinfection of water, adoption of self monitoring mechanisms, the concept of rational tariff setting of the water taxes, and judicious use of water.

Training methodology developed included: i) adequate use of power point presentations and audio visual media such as film clippings, short documentary films, role play technique to simulate training situation; ii) a special short film produced in-house covering the major aspects of O&M; and iii) a trainers handbook prepared in simple, easy to understand, local language

The district teams identified the trainer GPs. GPs targeted were those which have exited or are in the O&M phase. Willingness on the part of the GPs to carry out the training process was also a prime consideration. The trainees selected were VWSC/GP members, Gram Sevaks, women members of SHGs, and members of the youth groups. Six trainees were selected from each GP.

The training schedule developed for the Master Trainers included: i) training of members of the district team; ii) actual training of Master Trainers -- the community/GP; iii) hands-on training, including training of the community on the various sub works of the scheme for understanding the working, defects and their remedies and the preventive maintenance; iv) eight to 10 days of role play of the trainers; and v) training of other GPs by the Master Trainer GPs.

Topics covered included O&M of the components of water supply schemes such as water source (dug well/bore well), pumping machinery, pump house, rising main pipeline, storage tank (ESR/GSR), distribution pipeline in detail, disinfection practices

for water and mechanism for ensuring effective disinfection; management of household connections and judicious use of water; and rational tariff setting and issues related to the collection of water taxes and its effective utilization.

This practice worked well. The training sessions were carried out by the community at the level of the GP. Factors of success are: i) the trainer community had an experience of actually implementing O&M activities and hence had clarity on the process; ii) the community which was trained identified themselves with the trainers and peer to peer learning played a large role; iii) hands-on training on the water supply scheme increased its

effectiveness as it was “learning by doing”; iv) simple, non technical local language acted as a good vehicle; and v) a short film on O&M specially made for the program helped in increasing the impact.

The learnings until this stage can be summarized as: i) members of the community were willing and interested in the training process as seen from the average attendance; ii) the community is ready to disseminate the knowledge gained from the project and prepare plans for it; iii) the training process gave an opportunity for cross learning within communities; and iv) to scale up the process, sustained hand-holding by the district team is essential.

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# MULTI-VILLAGE SCHEME INNOVATIONS





## Public Complaint Redressal System: Increased Consumer Voice and Service Provider Accountability

**Location: Department of Water Supply and Sanitation, Punjab**

The Punjab Department of Water Supply and Sanitation (DWSS) set up a unique public complaint redressal system called Shikayat Nivaran Kendra (SNK) in Mohali in December 2009. Rural consumers can call a toll free number (1800-180-2468), and lodge complaints as well as retrieve the latest updates through a unique complaint number provided to them and make requests for other customer services. The call centre is operated on a 24x7 basis with the help of an advanced Interactive Voice Response (IVR) system.



The objective of SNK is to improve the service delivery system by monitoring O&M of the rural water supply schemes more efficiently. In order to achieve the best results with minimum inputs of men, machine and material while utilizing the latest e-governance methods and techniques, it was decided to set up an independent monitoring system by outsourcing the work to an outside agency which would register the complaints as well as monitor their timely redressal. The aim was to improve service delivery of existing systems, to enhance efficiency and financial sustainability of the water supply system operations by reaching out to the beneficiaries.

Online registration of complaints through SNK has helped in achieving sustainability and efficiency in service delivery, reduction in closure/downtime days of water supply schemes, check on absenteeism among lower ranks of operational staff and field staff of DWSS in villages, time bound delivery of services, and higher O&M standards. All these factors have ultimately helped in the availability of clean water, improved efficiency and enhanced the financial sustainability of the rural water supply infrastructure in the state of Punjab as a result of increased customer outreach.

Before the implementation of the system, the consumer had to either enter the complaint in the complaint register maintained at each water supply scheme or go to the distantly located office of

## Box 2: Enhanced accountability

For efficient operation of the complaint redressal system, detailed information about the field officers who are handling the rural water supply schemes in 9,851 habitations (as on March 31, 2010) has been made available. E-mail ids and names of Divisional Offices, mobile numbers of Executive Engineers, Sub Divisional Engineers and Junior Engineers who are handling the rural water supply system have been fed into the software. At the time of registration, the names of officers relating to the complaint village pop up on the screen and the complaint is forwarded to them through sms and e-mail for immediate redressal.

the controlling officer. The officer checked the registered complaint when he visited the particular site during his occasional inspection. Now, every official is directly connected to the online complaints system through telephone, e-mail and sms immediately upon the registration of the complaint. If the problem is not rectified within the prefixed redressal time, the complaint is escalated to senior officials for their intervention.

SNK is an easily accessible grievance redressal system which allows consumers to demand quality service, and their confidence in the rural water supply system has grown since its initiation. At the same time, the accountability of the DWSS staff responsible for O&M can be clearly targeted and assessed.

To make villagers aware about SNK, advertisements were placed in print and electronic media. Apart from this, the toll free number was painted on walls at prominent locations in villages.

Information about SNK is also inserted in the quarterly news magazine which is circulated in project villages.

A large number of rural water supply schemes are located in remote areas where DWSS was finding it difficult to monitor the absenteeism of staff deployed for O&M. Substantial delays were caused by the field staff in rectifying minor defects and leakages in the distribution system and, at some schemes, operational staff did not supply water after its disinfection. As a result, quality of water suffered. At many schemes, the timings fixed for the supply of water were also not adhered to by the operational staff.

Keeping in view the shortage of staff to monitor O&M of rural water supply schemes, it was decided to set up an independent monitoring system by outsourcing the work to a local information technology company which would register the complaints as well as monitor their timely redressal to improve

the service delivery of the existing systems.

There are 14,111 habitations in Punjab. As on March 31, 2010, 9,851 habitations were provided with water supply, 8,600 with piped water and 1,251 with hand pumps. Traditionally, water supply services are operated and maintained by the DWSS through the field offices located at sub-divisions/Block level. However, since the 73rd constitution amendment, O&M of single village piped water supply schemes in 876 habitations has been handed over to GPs. Overall, the performance of GPs was rated from average to poor. Presently, the Government of Punjab annually spends around Rs. 1,500 million on O&M of existing 5,205 water supply schemes (as on April 1, 2010) and had deployed operational staff of more than 12,000.

Currently, three different models are followed for O&M of water supply schemes in Punjab: DWSS through its own operational staff; GPs; or outsourcing to local contractors from the village/agency. For the schemes implemented under the state government's Medium Term Programme (being funded by the World Bank aided Punjab Rural Water Supply and Sanitation Project and through Governments of India and Punjab funded sector wide approach – SWAp), O&M of all single village schemes and intra-village works for multi-village schemes is done by GPs/VWSCs.

In the long term, the Government of Punjab intends to

hand over O&M of all completed water supply schemes to GPs/VWSCs as, at present, DWSS is facing difficulty in operating and monitoring the existing systems due to shortage of staff. However, to turn over the water supply system in all habitations to communities will take time. DWSS has been progressively transferring O&M management responsibility of schemes to GPs. In addition, DWSS is also utilizing private sector service contracts for O&M of single and multi-village schemes.

The operation of SNK has been outsourced. Outsourced services include designing of software, deployment of operators for the receipt of complaints and their further transmission to the concerned official at an annual cost of Rs. 9,00,000. A service standard was prepared to redress various types of complaints and DWSS was restructured so that authorized persons who provide redressal are located no further than 5 to 10 kilometre from habitations. The Junior Engineer is in-charge at the lowest level and has been delegated adequate financial powers to redress routine complaints. For the redressal of major complaints, the Junior Engineer has to seek prior approval from the competent authority.

Registered complaints are forwarded to concerned field officers through sms and e-mail for immediate redressal. The information regarding the status of various complaints registered at SNK is monitored

by departmental officials. The following system has been adopted:

- A unique number is issued to every registered complaint which is also issued to the complainant during registration
- Time to redress complaints has already been prefixed for different categories of complaints
- The nature of typical complaints is provided in Table 5 and the concerned officials are expected to rectify /correct the system within this fixed timeframe and report back to SNK through phone/sms so that SNK can update the complainant
- In case a complaint is not rectified within the stipulated period, it is escalated to the next level senior officer (Superintending and Chief Engineer) for his intervention after every 48 hours
- The complainant is informed by the operator deployed at the complaint centre regarding redressal of the complaint and it is not closed till the consumer is satisfied
- Consumers can also check the status of their complaints through the unique complaint number provided to them

Though the redressal system is very successful, the following problems still persist:

**Table 5: Common complaints received at SNK**

Comp. Code	Complaint description	Maximum days allowed for redressal of complaints
1	Failure of water supply due to electrical or mechanical fault in the machinery	2
2	Failure of water supply due to absence of operator	1
3	Failure of water supply due to large-scale leakages in pipes	2
4	Failure of water supply due to bad quality of water	2
5	Failure of water supply in some specific area, may be due to uneven topography or some other reasons	3
6	Others types of complaints may be due to non laying of distribution system or insufficient discharge at source	Redressal time may differ according to situation

- At times field officers do not provide the status of the complaints within the prescribed time period
- Information is not provided in the prescribed format to SNK
- Genuineness of the complaint cannot be ascertained in the absence of consumer number/ connection number which is required to minimize receipt of fake complaints
- SNK is not provided immediate information about the transfers of the officers
- Schemes handed over to GPs are usually not restored in time due to non-availability of adequate funds with the GPs.

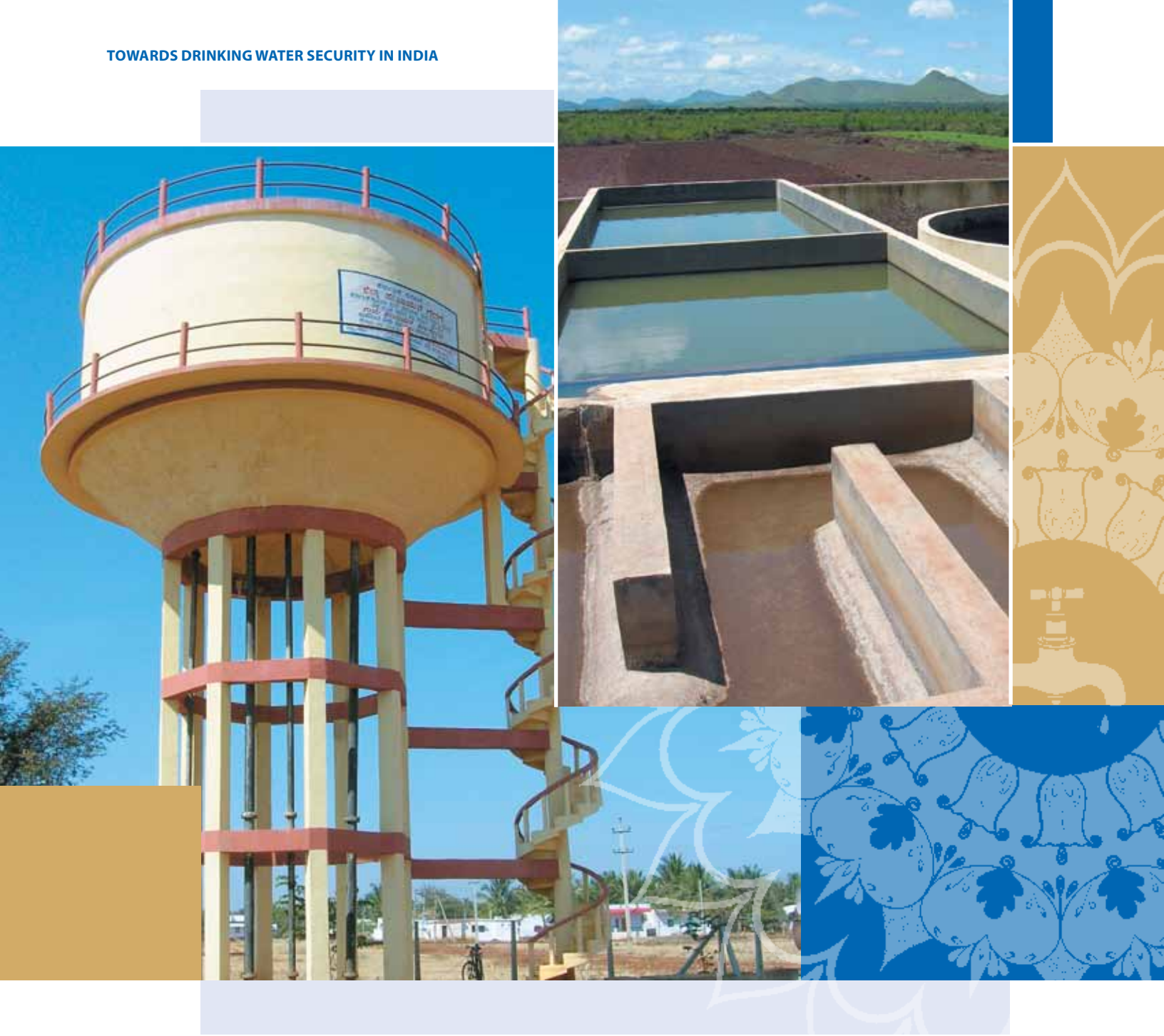
DWSS is providing water supply to 9,851 habitations. It is worth mentioning that 5,720 out of a total of 5,827 complaints have already been attended to the satisfaction of the complainants since SNK's inception (December 1, 2010). A daily progress report pertaining to redressal of

previous complaints and about the receipt of new complaints is sent to the highest level, that is, Secretary, Water Supply and Sanitation. In case of complaints of a serious nature, Secretary, Water Supply and Sanitation, immediately issues instructions to the concerned Chief Engineer for speedy action and timely redressal. As such, functioning of the department is assessed at the government level on a day-to-day basis.

Over the last nine months, with the increase in awareness amongst villagers about SNK, the participation of consumers in registering complaints has increased and consumers are enthusiastic about getting their complaints redressed through SNK. By and large, consumer experience with SNK has been good as consumers' complaints are redressed to their satisfaction and DWSS too takes preventive measures to avoid the complaints' recurrence.

This experience shows that an easily accessible grievance redressal system can change the participation levels of the beneficiaries and increase accountability. People are behaving more responsibly with the tool in their hands to ask for quality service and their confidence in the rural water supply systems has increased. The accountability of the DWSS staff can be clearly targeted and assessed. The Government of Punjab has decided to retain SNK by renewing the annual contract with the outsourced agency and continue to provide funds from its annual non-plan budget. The state government's Health, Electricity and Education departments are also exploring the idea of providing a similar service centre for the benefit of their consumers. A team of Public Health Engineers from West Bengal visited Punjab on September 30, 2010 to understand the working of SNK.

**Inputs by:** Department of Water Supply and Sanitation, Punjab, and **Shyamal Sarkar**, SASDU, World Bank



## Operation and Management of Regional Water Supply Scheme by Joint Village Water Supply Committee

**Location: Baragaon Nandur and 14 villages, Ahmednagar District, Maharashtra**

The Ahmednagar District in western Maharashtra is known for its excellent culture of co-operatives. The western part of Ahmednagar District is a canal irrigated area, growing sugarcane to a very large extent. One of the major rivers is River Mula, with a large dam (capacity 26,000 million cubic feet) on it.

The canal from this dam provides water for agriculture. Fifteen villages along the bank of Mula downstream of the dam developed salinity in the drinking water sources, as the sources were extracting ground water from the river. The heavy salinity posed problems of health, particularly abdominal diseases.

A multi-village water supply scheme for these 15 villages using water from Mula Dam was implemented by MJP and the system is operated and maintained by the Joint Village Water Supply Committee of the beneficiary villages.

The committee has been operating the system for the last eight years in a sustainable manner. It provides good quality water in the service reservoirs to each village, and thereafter the village operates the system within its area. The water rates for individual connection holders are decided by the committee. The revenue is collected by the individual GP and 80 percent of the collection is transferred to the account of the committee while 20 percent is retained by the village. This model has created a corpus of Rs. 113,00,000.

Before the implementation of the rural regional water supply scheme for Baragaon Nandur and the other 14 villages, all the local sources of these villages fell within the saline track hence most villages were tanker fed for most of the days in a year. The District Public Health Laboratory, Ahmednagar, confirmed the salinity of local sources of these villages. Considering all these problems of quantity and quality of local sources in villages, the District Co-ordination Committee made a resolution to implement a single regional piped water supply scheme for all these 14 villages and nearby habitations, with Mula Dam as an assured surface water source. It was also decided that the scheme should be implemented by MJP, a state level agency working in the water supply and sanitation sector.

The topography of the area and the location of villages as well as the administratively manageable

design by the MJP worked together in such a way that the power requirement is very low; 150 HP pumps are sufficient for a 162,000 population. The salinity in the drinking water brought all these villages together in the form of a joint committee under the leadership of Mr. Shivajirao Gade, resident of Baragaon Nandur, who continues to be chairman of the joint committee for the last eight years.

Sustainability, both physical and financial, was addressed. The source of water is Mula Dam, which is close to these villages with a large storage and good quality of water. From the financial point of view, the dam is located upstream of these villages and therefore the pumping requirement is low compared to other multi-village schemes. The design of the system was strategically created in such a fashion that an individual village can be isolated from the main line in case of non-payment of water charges.

The water supply system was commissioned temporarily in the year 2000 by pumping the water from Mula Dam to the villages without treatment, by chlorinating and disinfecting the water. This water was far superior to the earlier saline water and therefore people could feel the change even during the temporarily commissioning. Their mindset was therefore prepared for the system. Prior to commissioning of the system, many villagers who sold milk at Rahuri town would fill their empty milk containers with water from the ESR at Rahuri town and take it to their villages for drinking. On commissioning of the scheme, this practice has totally stopped.

The earlier drinking water had total dissolved solids ranging from 1,230 to 3,020 milligram per litre (mg/l) as against the accepted norms of 1,000 mg/l. The total hardness ranged from 400 to 960 mg/l as against the norms of 300 mg/l. After the operation of the new system, the total dissolved solids stand at 344 mg/l and total hardness is 136 mg/l. As a result, abdominal diseases have reduced to a minimum, according to government dispensaries and private doctors.

The operation of the system was taken over by the Joint Village Water Committee within three months of the trial run of the completed scheme in May



2002. The Block Development Officer and Mr. Shivajirao Gade, Committee Chairman along with MJP engineers held meetings in every village from the construction stage and informed the villagers about the system and its benefits. They were also informed about the water tariffs and running the system sustainably by generating adequate revenue. In the temporarily commissioned stage itself, the people could understand the value of good quality water due to reduced expenses on health. They were therefore prepared to pay for water and save on health expenses.

Current charges levied are Rs. 800 per year per connection and the number of connections are 3,680. The individual village collects this revenue and passes on 80 percent to the joint committee. From this revenue, the joint committee meets the expenses on electricity, chemicals, man power, maintenance and testing of the water including payment for raw water. The accounts of the joint committee reveal that presently it has a surplus of Rs. 113,00,000.

The joint committee consists of the Sarpanch of each village and one person from each village nominated by the Gram Sabha, totaling 30. The joint committee has the Block Development Officer as its secretary. However, due to his busy schedule, the authority has now been vested in one of the Gram Sevaks of Manjri village. The monthly meeting of the committee takes place regularly in which the status is reviewed. In each review, village wise complaints, village wise receivables due, and problems in system maintenance, monthly expenditure, etc., are discussed and better services attempted.

The success of the joint committee has resulted from: i) drastic change in the quality of the water and its positive impact on the health of the citizens; ii) the capacity building of the operators who have been properly trained in the Research and Training Centre of MJP at Nashik; iii) the strategic design of the system which helped in achieving financial sustainability, thanks to the location of

the source at a higher elevation which lowers operating expenses and the distribution network from which a defaulter village can be isolated and disconnected; iv) low manpower requirement and shared responsibility between an individual GP for village water distribution and collection of revenue and the Joint Committee for the operation of the bulk system and providing water to each village has made it manageable; and v) active involvement of all village leaders under the leadership of Mr. Shivajirao Gade.

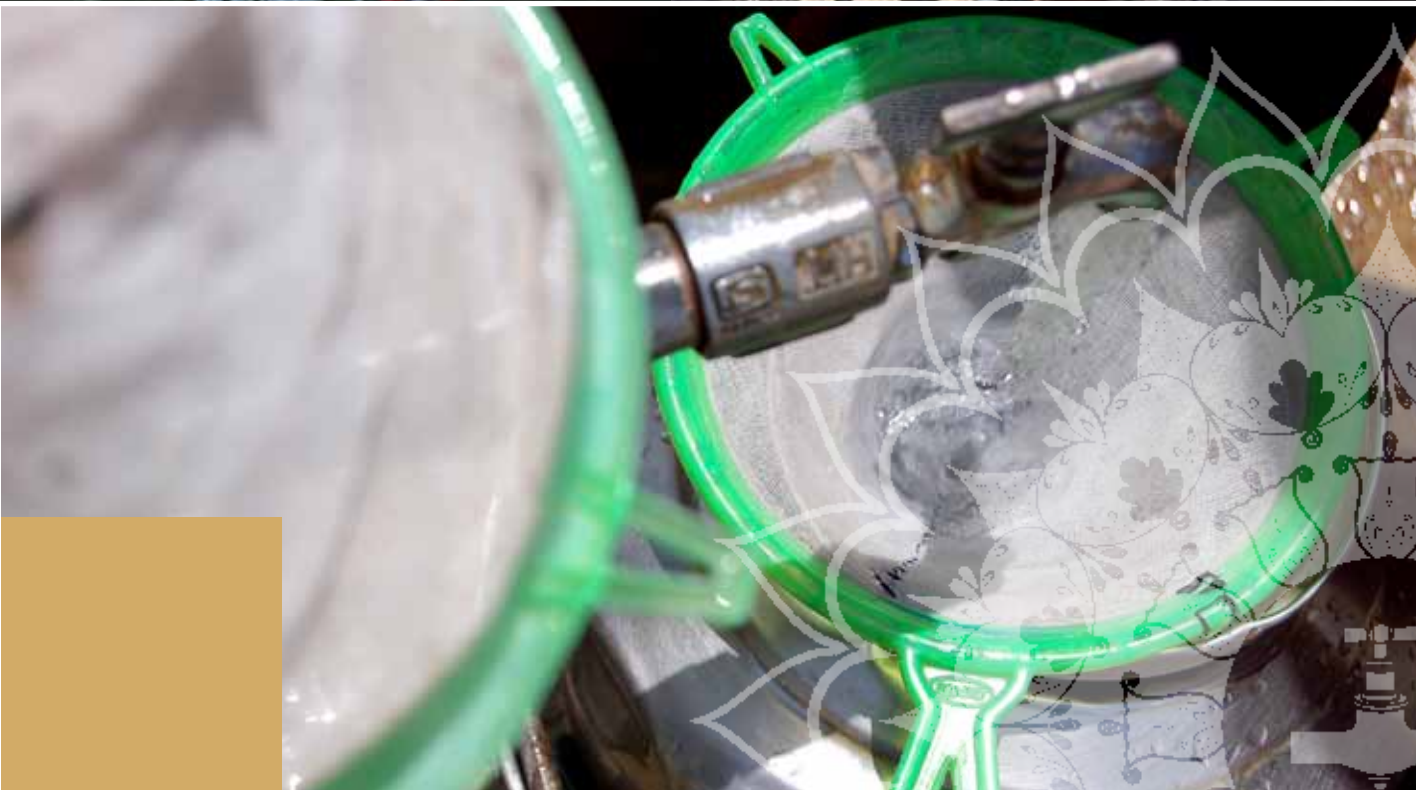
This project is being operated by the joint committee for the last eight years. The Mula Dam is large enough to feed the system, and has provided water every day to every village in the system. The financial situation is strong. Every year the system could generate revenue over and above expenditure. The corpus is Rs.113,00,000 as in March 2010. The annual expenditure in 2009-10 was Rs. 15.08 lakh and the sale of water brought in Rs. 18.48 lakh. Other receipts such as interest on fixed deposits and incentive grants from the state government are additional sources of funds.

That good leadership can bring like-minded people together to run a system in a physically and financially sustainable manner is the lesson learnt from this experience. This management system and institutional arrangements for operating a multi-village water supply scheme can be successfully replicated in areas that have faced drinking water problems and therefore know the value of good quality water. The problem itself brings the people together and grooms a good leadership which can sustain the outcomes of a viable project.

The replicability is certainly also there in the areas which are located in a geographically disadvantageous position and therefore require larger expenditure for bringing safe drinking water. The government needs to provide grants for O&M for these systems to assist the project to become sustainable in the long term.

**Inputs by:** **R.G. Holani**, Chief Engineer, MJP Region, Nashik; **P.R. Nandanware**, Executive Engineer, MJP Works Division, Sangamner; **N.M. Longani**, Sub-Divisional Engineer, MJP Sub-division, Shirampur; **R.S. Thorat**, Sect. Engr., Rural Water Supply Sub-division, Rahuri, Zila Parishad, Ahmednagar; and **Suryanarayan Satish**, Social Development Specialist, World Bank

# WATER QUALITY





## Sustaining Nirmal Gram Status

**Location: Gunderdehi village, Rajnandgaon District, Chhattisgarh**

In the tribal dominated village of Gunderdehi of Ambargarh Chowki Block of Rajnandgaon District of Chhattisgarh, capacity building and awareness generation efforts have resulted in demonstrating that communities can sustain the responsibility of village sanitation and drinking water sources. This has helped the village to sustain its status as a Nirmal Gram.

Water security is not complete without water safety. Providing adequate and safe water on a regular and sustainable basis continues to be a challenge within rural water supply systems. Chemical contamination of water requires technical mitigation measures. However, biological contamination is completely



### Box 3: Clean habitats and safe water for all

In Rampara habitation of Gunderdehi village, after a drain which was silted for several years was cleaned, the problem of stagnant water is under check. The problem of waste water entering the nearby houses of residents such as Saraswatibai is taken care of.

Similarly, when the cistern of the piped water supply system near the Anganwadi was cleaned after almost two years, people were able to access safe water from it. Ramotinbai, an elderly woman residing in the vicinity, is very happy. She no longer faces the problem of water-borne diseases caused by drinking the water from the nearby open well, as safe piped water is available in the vicinity of her home. She has planted a small kitchen garden to utilize the waste water from the cistern and keep its surroundings clean.

in the control of the users and results from the practices that communities observe.

Gunderdehi GP was selected for development as a model village, based on findings of a follow-up of the Multi-District Assessment of Water Safety (M-DAWS) carried out in 20 GPs of Mohalla and Chowki blocks of Rajnandgaon District in November 2009. As a part of the follow-up program, 461 hand pumps and 23 piped water sources were surveyed by Action for Food Production (AFPRO) with UNICEF's support in collaboration with the Public Health Engineering Department (PHED). The follow-up reiterated that biological contamination occurred mainly due to human induced activities such as washing, bathing, free access to animals, improper disposal of waste water, etc. People were found to be unaware about water quality issues and showed no concern for keeping their water sources clean. The need of the moment was an intervention focused on bringing about a change in community practices to prevent risk factors at the source as well as creating a sense of ownership and establishing a community-based system for monitoring of sources.

The Gunderdehi GP comprises village Kilargondi and has a population of around 1,835. The people depend on 15 hand pumps and two piped water supply systems for their daily water supply. This was one of the most vulnerable villages with all its sources in the medium to high risk category. The follow-up survey showed that all the sources were prone to risk factors such as washing clothes and



utensils and bathing near the source, inappropriate drainage of the waste water, free access to animals, stagnation of water, and poor handling of water.

The program was introduced to the village leaders and functionaries such as the Sarpanch, the Panchayat Secretary, Anganwadi workers, teachers and members from the Nehru Yuva Kendra and the women's SHGs. Street plays were performed to capture the interest of the community on issues of environmental sanitation. Source-wise meetings were held to generate interest and create a closer contact with the community. This motivated the community to maintain its Nirmal Gram status.

Convinced about the need for clean and safe sources, people immediately got together to initiate corrective action. Water User Groups (WUGs) were formed for every source and people took up the responsibility of maintaining clean water sources. They repaired the hand pumps, fenced them using



locally available material, constructed platforms and made arrangements for drainage of waste water. Kitchen gardens were cultivated by diverting the waste water from the hand pumps. Choked drainage lines were cleaned which now prevents stagnation of water. Rules were laid down for use of the sources. Activities such as washing clothes/utensils and bathing, etc., are now prohibited and fines fixed for breaking these rules.

These proactive steps taken by the community have resulted in many benefits. Today, there is a drastic improvement in the status of the sources. All the sources that were earlier either medium or high risk now fall under the low risk category. The water sources near the two primary schools and the Anganwadi too have been cleaned and safe water to the children ensured. According to the Sarpanch and other members of the community, the incidence of water-borne diseases has gone down. Even the Anganwadi worker of the village reports that the number of diarrhoeal cases among children below five years of age has gone down. The efforts of the people have resulted in achieving Millennium Development Goal (MDG) 7 of ensuring sustainable access to safe drinking water.

Since all the sources are well maintained, access to the water point has become easier and getting water from the hand pump is

no longer a distasteful task for the village women. Appropriate drainage of waste water prevents stagnation of water and breeding of mosquitoes. It is not just the water sources that the community has cleaned up. Earlier, the area leading to the Anganwadi and the primary school always had stagnant water, caused due to seepage from a nearby canal. This made it very difficult for the children to reach the Anganwadi and the school. It also led to a very unhealthy environment for the children. The community sorted out this problem by excavation of a temporary drain along the canal to connect to a nearby nallah so that seepage water could drain off easily.

The WUGs in Gunderdehi collect contributions as and when required for small repair works and to meet the costs of cleaning the sources. They meet every fortnight to take stock of the situation and take necessary action to maintain good sanitary conditions near the sources. They report to the GP once a month to address larger issues such as choked drainage lines, disposal of solid waste, etc. The formation of source-wise WUGs has decentralized the process to the lowermost level within the village. It has created the space for the involvement of more users in the entire process. With a little bit of facilitation, the community realized that it is well within its own means to maintain clean water sources and adopt good sanitation and hygiene habits to ensure safe water and improved health. For this they need not depend on the government or any other external agency. The people of Gunderdehi have demonstrated that the community in even a remote, backward tribal village can take ownership and assume the responsibility for safe water supply and improved health. It provides motivation to the other villages in the cluster where it is planned to upscale the intervention.

**Inputs by: Rushabh Hemani, UNICEF, Raipur**

## Status of Arsenic Mitigation Schemes in West Bengal

**Location: West Bengal**



In West Bengal, arsenic contamination of ground water was first detected during the early 1980s in different districts adjoining Bhagirathi/Hooghly rivers. Investigation showed that arsenic beyond permissible limit of 0.05 mg/l existed in the ground water. The arsenic problem was found to be geogenic, i.e., due to the presence of excessive arsenic in the geological formation. Ground water was the main and staple source of drinking water in such areas due to its easy, inexpensive and location-specific abstraction. Therefore, the drinking water supply system in the affected areas received a serious setback owing to arsenic contamination of ground water.

Ground water in 79 Blocks (out of 341 Blocks in the state) in the Districts of Malda, Murshidabad, Nadia, North 24 Parganas, South 24 Parganas, Howrah, Hooghly and Bardhaman is at risk of arsenic contamination. Basis the 2001 Census, the population of these blocks is 166.54 lakh (of the state's rural population of 577.35 lakh). Similarly, 2001 Census of population of urban areas at risk of arsenic contamination in the ground water is 120 lakh (out of state's total urban population of 224.86 lakh).

In order to tackle the arsenic menace in West Bengal, three types of mitigation measures have been taken up so far:

## Short-term Measures

- Hand pump fitted tube wells at deeper aquifers
- Ring wells

## Medium-term Measures

- Arsenic treatment unit with existing hand pump fitted tube wells
- Arsenic removal plants for existing ground water based piped water supply schemes
- Large diameter deeper aquifer tube wells for existing/new piped water supply schemes
- New ground water based piped water supply schemes

## Long-term Measures

- Surface water based water supply schemes

So far, the state government has provided arsenic free potable drinking water supply to a population of 106.43 lakh (Census 2001), which constitutes 63.91 percent of the total population at risk, through various short, medium and long term measures.

Though various measures have been adopted in the past, as an immediate and intermediate intervention, surface water based water supply schemes have been found to be the only permanent solution.

After so many years of experience in arsenic mitigation measures, it was essential to review the entire situation to implement future mitigation programs in a more judicious and organized manner. Some facts about the efficacy of the various short- and medium-term measures that has been observed over the years are:

- Ring wells are not well accepted by the people and prone to bacteriological contamination
- Arsenic treatment units attached to the hand pump tube wells have been found to be very effective as an intermediate intervention however,

in the long run these units have failed to serve the purpose due to O&M and sludge disposal problems

- Deep aquifer replacement tube wells, in some cases, turned out to be ineffective due to leaching of arsenic to the deeper layer from the top
- Tube wells of some of the ground water based piped water supply schemes, though sunk in deeper arsenic free aquifers, showed the presence of arsenic in time due to leaching action

Considering all these facts, a master plan was prepared on future mitigation measures in consultation with the Arsenic Task Force, Government of West Bengal. The master plan was prepared in order to cover all arsenic affected habitations identified on a long-term basis. The following strategy was adopted :

- All arsenic affected villages to be covered by piped water supply schemes
- Areas covered by existing short-term and mid-term measures such as arsenic treatment units attached hand pump tube wells, replacement tube wells, etc., to be included within the future plan of action
- Attempts to be made to cover the affected areas with surface water wherever available
- Affected areas, which cannot be covered under the existing / proposed surface water based piped water supply schemes, should be served by ground water based piped water supply schemes
- All proposed ground water based new piped water supply schemes should have provision for an arsenic removal plant unless a safe aquifer well, separated from the contaminated layer by thick impermeable barrier, is available
- All existing ground water based piped water supply schemes in the affected areas should have a provision for arsenic removal plants, except where safe aquifer wells separated from the contaminated layer by a thick impermeable barrier are available

**Table 6: Summary of the master plan**

Sl. No.	Type of Scheme	No. of Schemes	No. of Mouzas Covered	Census Population, 2001 (lakh)	Design Population (lakh)	Estimated Cost (Rs. crore)
1	Surface water based scheme	12	1,378	35.902	63.310	1,511.78
2	New ground water based scheme with/without acqifer recharge	338	1,479	40.412	65.850	974.32
3	Acqifer recharge in existing ground water based scheme	165	663	28.840	36.620	82.69
	Total	515	3,520	105.154	165.780	2,568.79

*Mouza: Administrative district*

Meanwhile, the Government of West Bengal decided to prepare an action plan which aims to cover all arsenic affected villages of West Bengal with a long term solution of potable drinking water supply. Towards this end, all public hand pump tube wells (1,32,000) in the 79 arsenic affected blocks were tested in laboratories with active participation of the local GP. Safe hand pump tube wells were painted blue, and the community was involved in generating awareness among the people. Tube wells were located by Global Positioning System (GPS) instruments and the test results were plotted on geographic information system (GIS) maps. Based on these GIS maps, hydro-geological studies conducted by various other departments of the state government, and the efficacy of the various mitigation measures already implemented by the government, a master plan was prepared to cover all the 3,229 villages with a long-term solution

Based on the present data on arsenic affected habitations and on the recommendations of the Arsenic Task Force, the Government of West Bengal, piped water supply schemes have been prepared to cover all arsenic affected habitations with a long-term solution.

The following considerations have been kept in mind while formulating the water supply schemes:

- Any village where there is an arsenic affected habitation has been covered under the present scheme. From previous experience, it has been

observed that arsenic contamination in ground water is dynamic in nature which spreads both horizontally and vertically, depending on the hydro-geological condition of the area. Presently, the village boundary has been considered as the extent of horizontal spread of arsenic contamination

- While formulating a multi-village piped water supply scheme, non-affected contiguous villages had to be taken within the command area of the scheme, because of the nature of arsenic contamination in ground water (point above)
- The provision for an arsenic removal plant has been made in all the newly proposed ground water based schemes
- The total number of the proposed schemes has been arrived at based on the present data on arsenic affected habitations

The state government is now poised to implement the master plan and it has taken ambitious steps to cover all arsenic affected and surrounding villages with arsenic free, potable drinking water under the Bharat Nirman program by 2011. The action plan envisages 515 piped water supply schemes in order to cover 3,520 villages benefitting a population of 165.78 lakh at an estimated cost of Rs. 2568.79 crore. A summary of the master plan for arsenic mitigation is presented in Table 6.

**Inputs by:** Public Health Engineering Department, West Bengal



## Community Empowerment for Efficient Hand Pump O&M

**Location: Kanjipani village, Dantewada District, Chhattisgarh**

Kanjipani is a small village located in the interiors of the civic strife affected district of Dantewada of Chhattisgarh. Although the people here face uncertain times due to the situation, today, they collectively own the responsibility of O&M of their water sources (hand pumps) and ensure that water safety is not compromised.

Dantewada is predominantly a tribal district with major parts under thick forest cover and many villages are located deep within these forests. Over the past decade, Dantewada has remained at the heart of civil conflict between the Maoists

and the government. Poor road connectivity and the prevailing conflict make access to and from villages very challenging and this has resulted in a slow pace of development in the area. It was under such adverse circumstances that an intervention for capacity building of the local community for O&M of hand pumps and for improved sanitation and hygiene practices was initiated in a group of 30 remote villages, 17 from Sukma Block and 13 from Chhindigarh Block, including Kanjipani.

The intervention was supported by the Integrated Child Protection

Programme (ICPP), a partnership between the Tribal Welfare Department and UNICEF. The intervention was supported at the field level by a team from AFPRO and Vanvasi Chetna Ashram (VCA), a local non-government organization (NGO). It was modelled on the initiative taken up in four camps of Konta Block of the district for Internally Displaced People (IDPs).

Kanjipani lies about 30 kilometre away from Sukma and has a total population of 1,000 people. The people depended on 13 hand pumps installed by the PHED. However, lack of understanding



on the issues of water quality and water safety had led to very poor upkeep of the water sources. Washing and bathing practices at the hand pump and animals straying near the drinking water sources were common. At many places, this had led to water stagnation within 2-3 metres of the source and even foul smell. People would have to cover their noses to avoid the repressive smell. According to some, the water would even turn brown after storage for a couple of hours in the pot. The incidence of diarrhoeal cases was high. With access to limited water, personal hygiene was also poor among the community.

Before the intervention, most water sources came under the high risk category as per the sanitary surveillance results. The women and girls faced a difficult time in dealing with these unsanitary conditions every day, while fetching water. Being a village in the interiors of a conflict prone area, linkage with the hand pump technicians of the PHED was difficult for the people of Kanjipani. As a result, even minor repairs of hand pumps would often take a very long time and cause inconvenience to the people. In case a hand pump became inoperable, the women and children would have to walk to the next closest hand pump and fetch head loads of water to meet their household needs.

Given the background of the conflict and insecurity, at the village level, the general environment was one of suspicion and trepidation. Hence, it was decided to first take into confidence the PRI and other functionaries of Kanjipani such as the Sarpanch, Panchayat Secretary, Anganwadi worker, and inform them about the purpose of the intervention. They, in turn, assisted with mobilizing the community and convincing them to come together for collective action. Gram Sabhas and habitation level meetings were held to get the people together. The community organizers from VCA were instrumental in establishing a rapport with the community. During the meetings, people were explained the relation between safe water, improved sanitation practices and health, the need for protecting water sources from contamination, handling and storage of safe drinking water, importance of hand washing, chlorination of sources and water testing through field test kits. Steps for mitigating the problem and ensuring water safety were also discussed. WUGs for each source were formed to create a mechanism for community ownership and initiate a community-based monitoring system.

After a few meetings for awareness generation, the people could see for themselves the risk that they were causing to their own health. Once the community understood the need for maintaining cleanliness around the water sources, they got to work immediately. Bio-fencing with locally sourced wooden logs was constructed around all

the hand pumps by community members, thus restricting the entry of cattle at the sources. As soak-pits were not feasible due to hard rock strata, the spillage was diverted through channels for making kitchen gardens. Washing and bathing near the hand pumps were strictly prohibited. Thus the community took the initiative to address all the major risk factors to their water sources. The hand pumps near the primary school and the Anganwadi too were fenced and protected from contamination to make safe water available to children. At the Anganwadi, the waste water is being used to develop a kitchen garden, where banana trees were planted. The children at the Anganwadi now get fresh fruit from their own garden which supplements their daily nutrition needs.

Madvi Kosa, Sarpanch of Kanjipani, is proud to state, "Every morning, we clean the surroundings of the drinking water sources and on the wall nearby we write a message for all stating that washing and bathing is strictly prohibited. Everyone respects this message. We are proud that gradually our village has come to be known as a model village."

As a part of the training imparted by UNICEF on basic repairs and maintenance for local care-takers and WUG members, two persons from Kanjipani have also been trained, one for the O&M of hand pumps and the other for water quality testing. Following the training, the hand pump technician, Mr. Shanker Negi, has repaired four hand pumps which were in disuse and the community has now started using

them. He ensures that all hand pumps are in good functioning mode and, if there is any major fault, he promptly informs the PHED about it. Earlier, when the hand pump was defunct, basic repairs would sometimes take almost a month and would cost about Rs. 500. The absence of an operable local hand pump also meant increased burden on women of having to fetch water from a distant hand pump. People would also resort to using unsafe sources. However, now with the trained care-taker available within the village, the repair is speedy and cost minimal. Butki Nagi of Kanjipani says, "Earlier we faced lots of problems whenever the hand pump broke down. Now the in-village care-taker repairs the hand pump immediately and water supply is restored within a day." For the women of Kanjipani, quick repairs mean having a regular, almost uninterrupted supply of water, saving them from the drudgery of having to walk to a distant hand pump in case of a break-down.

Mr. Buddu Ram carries out the chlorination at all 13 hand pumps, tests the water quality regularly, and reports the results to the PHED every three months. According to him, ever since the sources have been protected from contamination and chlorination is being done regularly, the water at all hand pumps is safe for drinking purposes. With the area around the hand pump now being cleaned and maintained regularly, accessing the water point is no longer an unpleasant task for the women. They are also confident of

the quality of the water that their family members consume.

WUGs have been formed for all the sources and people have started contributing for O&M of their sources so that they get basic repairs of hand pump done from their own resources leading to provision of safe water round the year. The WUGs meet every 15 days at the habitation level and meet the GP once every month to discuss larger issues, if any.

The training has helped the community to familiarize themselves with the different parts of the hand pump and even if major repairs are required in the below ground hand pump assembly, they are able to describe the problem accurately to the concerned PHED officials. Thus they have been empowered to raise O&M issues with PHED at Block and District levels in case of a major repair. A general observation has also been that the training has helped people to understand how to operate the pump properly (e.g., avoiding rapid pumping) and as a result breakdowns are also less frequent.

The people of Kanjipani have completely altered the surroundings of their sources and have taken ownership of O&M of the hand pumps as well as regular water quality testing to ensure water safety. O&M of hand pumps, including minor technical repairs and chlorination by the local level care-taker, is not a common sight. However, in Kanjipani, the local volunteers

have taken up this task wholeheartedly. Effective and efficient management of their drinking water sources has contributed to the MDG of sustainable access to safe drinking water to all bringing about improvement in the habitat of the community and the lives of women and children. In one of the most backward districts of Chhattisgarh, this is a major achievement. From being mere spectators of the deteriorating water supply systems of their village, the people have become performers by taking local action in making the village self-sustained and capable of managing its own affairs, with minimum dependence on any external agency.

While this is the story of Kanjipani, things have progressed in the other 29 villages too. The concept of safe water sources has gained favour with the community and people have started taking precautions to keep their drinking water sources clean. In almost all the villages, source-wise WUGs have been formed and they have accepted the responsibility of O&M of their sources, some very actively while others still need handholding and motivation. Kanjipani has demonstrated that, in spite of the civil unrest and the impending sense of insecurity, with some capacity building and facilitation, the user community can effectively manage its water sources and ensure efficient services. The positive role played by the community has enhanced its self-image and self-confidence and, in a tense environment, provides inspiration for other villages to follow.

**Inputs by: Rushabh Hemani, UNICEF, Raipur**



## Ensuring Good Safe Water with the Water Safety Plan<sup>3</sup>

### Location: Sikkim

In Sikkim, the government has introduced a comprehensive drinking water and sanitation program that includes Community Led Total Sanitation (CLTS) to achieve open defecation free (ODF) villages, village drinking Water Safety Plans to ensure potable water, and a Springs-shed Development Program (Dhara Vikash) to ensure source sustainability. This note describes the water safety planning initiative. It provides lessons about the demonstration and implementation approach, policy issues and institutional arrangements, and key success factors.

The main project partners were the Department of Rural Management and Development (RMDD), Government of Sikkim; the State Institute of Rural Development (SIRD); a local NGO, the Sikkim Development Foundation (SDF); and the Water and Sanitation Program (WSP).

<sup>3</sup> **References and key resources:** *Water Safety Plans for Rural Water Supply in India, Policy Issues and Institutional Arrangements*. DDWS and WSP, 2010.  
*Sikkim Village Water Safety Planning Training Manual and Planning Templates* (RMDD and WSP, 2010)  
Dhara Vikash - <http://sikkimsprings.org/>



Safe drinking water is key to ensuring improved public health. In Sikkim, in the period 2002-07, as many as 2.77 lakh persons were infected with water borne diseases like diarrhoea, cholera and gastroenteritis out of which 25 people lost their lives<sup>4</sup>. The number of actual cases of diarrhoeal diseases is probably even higher as many cases go unreported. Between 2006 and 2007, RMDD with support from WSP, conducted a 'Sector Assessment' for rural drinking water and sanitation. Subsequently, further support was requested for CLTS and water quality management.

The objectives of the water safety planning initiative were

fourfold: i) better management of water quality by preventing contamination before it happens; ii) it is a 'learning by doing' mechanism to achieve improved operational management; iii) it provides an approach to prioritizing improvement programs (physical and operational) based on health outcomes which emphasize customer services; and iv) it provides a concrete means of linking sanitation and hygiene to water supply.

The approach adopted was based on an "action research" methodology, which was subsequently rolled out in three phases:

- Phase one (2008, initial piloting): Initial pilot demonstrations

were conducted in two GPs (Kamling and Chisupani). This was followed by workshops in South and West Districts to get consensus and commitment to action and carry out activity mapping. Then a state workshop was held with RMDD in Gangtok to agree on policy issues and institutional arrangements

- Phase two (2009, scaling up to all districts): At RMDD's request, pilots were then held in eight GPs in all four districts in Sikkim. Training of trainer workshops were held for SIRD field facilitators, RMDD Junior Engineers and Panchayat Inspectors, and state workshops on district planning coordination were held to

<sup>4</sup> Comptroller and Auditor General, Government of India, August 2009.

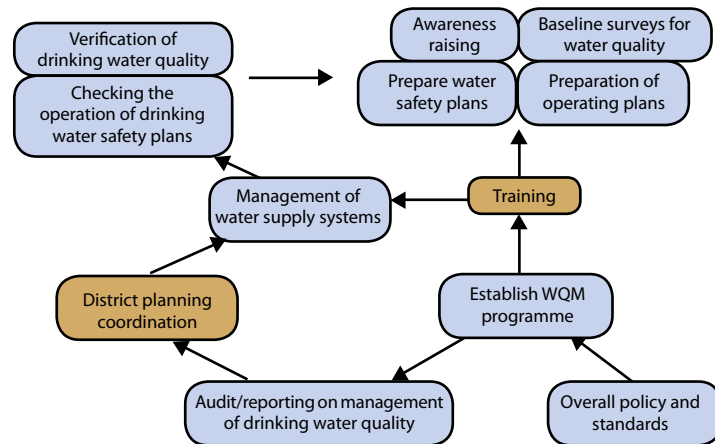
orient district officials. In addition, support was provided to prepare water quality testing protocols and recommend training options for district laboratory technicians, and SDF provided support to RMDD for a state IEC initiative

- Phase three (2009-10, establishing a state program): In the final phase, a State Rural Water Policy was drafted by RMDD and training programs for all VWSCs rolled out by SIRD.

In December 2009, a State Rural Water Policy was drafted by RMDD. The key policy issues identified were as follows:

- Adoption of the drinking Water Safety Plan approach (with the Springs-shed Development Program this can provide comprehensive drinking water security)
- Establishing new roles and responsibilities to support decentralized planning and implementation
- Using Water Safety Plan improvement programs as the basis for investment
- Convergence of funding at district level to integrate with programs that address protection and conservation of drinking water sources, e.g., National Rural Employment Guarantee Scheme (NREGS), Backward Regions Grant Fund (BRGF)
- Conjunctive use of ground water, surface water and rainwater harvesting, especially to ensure robustness to natural calamities

**Figure 5: Institutional arrangements**



The institutional arrangements are shown in Figure 5. Overall policy and standards are those set out at national level under the new NRDWP. Establishing a water quality management program is a state responsibility. Districts are responsible for planning coordination and water quality testing laboratories. Training is provided by SIRD. Planning, implementation, O&M and management is taken up by the GP and VWSC.

A number of factors of success were identified during the implementation process. Most important is to create ownership and commitment to action. In Sikkim, the process was led by the government (RMDD) and work was carried out by local partners (SIRD and SDF) with technical support from WSP. In addition, it is critical to build on the existing situation, for example, to dovetail to existing government programs and work with the existing institutional arrangements and stakeholders.

Lessons learnt regarding implementation show that there are advantages in adopting water safety planning, including: preventing contamination before it happens, improving operational management, prioritizing investments on the basis of public health outcomes, and linkages to hygiene and sanitation. In addition, by identifying the functions required to support water safety planning, it is possible to articulate activity mapping (roles and responsibilities), and improve needs based training programs. Also the preparation of Water Safety Plans (and associated operating plans and service improvement plans) becomes a transparent means for developing results based financing. Importantly, it is recognized that this requires long-term political commitment to implementation of the recommended policy and institutional framework.

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## A Village Model for Water Supply and Sanitation

**Location: Naudi Majhgaon Gram Panchayat, Solan District, Himachal Pradesh**

Naudi Majhgaon GP is situated about 15 kilometre. from Solan town in Solan District of Himachal Pradesh. The GP is a Nirmal Gram Panchayat with a population of about 1,500 persons (129 families).

The Total Sanitation Campaign was taken up in 2006 and now the GP is fully ODF. The water sources have been conserved by constructing rainwater harvesting tanks and underground tanks in every household. Water sources are properly covered and protected against pollution. Check dams have been provided on *nalahs* under the rainwater harvesting system. Tanks have been constructed for collection of rain water and this water is used for irrigation.



A drainage system provides for sewage disposal throughout the GP. Vermicompost units have been set up and incinerators installed for waste management along with the construction of waste water pits and the waste disposal system. Dustbins have been provided to every household, shop and office. Kitchen and bathroom waste water drains have been laid for waste disposal. Solar lights (82) have been provided for streets. Every street has been given a concrete floor with covered drains.

The GP has won the following awards:

1. National-level Nirmal Gram Panchayat award (Rs. 1 lakh) by the then President of India Dr. A.P.J. Abdul Kalam (2006-07)
2. Maharishi Valmiki Total Sanitation Award (Rs. 5 lakh) in 2008
3. State Maharishi Valmiki Total Sanitation Award (Rs. 10 lakh) in 2009
4. First Bima Gram Panchayat in the state

Inputs by: **Hemant Tanwar**





## Defluoridation of Water: A Public Private Partnership Initiative

**Location: Andhra Pradesh**

Drinking water quality in rural areas has emerged as a key policy concern for the Government of India. It has been estimated that, at the rural household level, access to drinking water is as high as 90 percent, but most households still have to make do with poor quality water. Bacteriological contamination due to poor sanitary conditions remains the major cause of concern, but other widely reported causes of contamination include: (i) fluoride; (ii) arsenic; and (iii) high total dissolved solids. Intensive use of fertilizers and pesticides in agriculture also results in contamination of surface water bodies (run off) and ground water (seepage).



Andhra Pradesh is among the worst fluoride affected states in the country, with an estimated 1,881 habitations reporting fluoride incidence in addition to other types of contaminations (physical and bacteriological). The incidence and intensity of water pollution is higher among poor households. Provision of safe drinking water in a sustainable manner, therefore, is crucial for improved quality of life in the rural areas, in general, and that of poor households, in particular.

The existing water purification process, under the rural water supply schemes, involves accessing water from surface (tank, river, canal, etc.) sources; processing it through Slow Sand Filters (SSFs), chlorination and pumping to an overhead tank for subsequent piped supply to the community or households. In the case of fluoride affected areas defluoridation plants are established at the community or village level. In some areas, domestic defluoridation filters<sup>5</sup> were provided to the poor households. Despite a number of initiatives towards providing safe drinking water in rural areas, water related health problems seem to persist in a significant way.

Some of the reasons identified in the delta regions of Andhra Pradesh include: i) poor quality of raw water at source (lack of source management); ii) power shortages resulting in mixing of treated and untreated water (lack of awareness and control over local management); iii) poor condition and maintenance of

SSFs (absence of management capacities among the GPs); iv) scarcity of funds with the GPs (financial); and v) lack of storage capacities and improper handling practices by the poor at the household level.

The situation is no different even in the case of defluoridation plants installed in six districts. Institutional (people's participation, awareness, etc.), financial and technical problems are identified as major reasons for the failure (PRED, 2007). Alternative mechanisms such as provision of surface water, rainwater harvesting and distribution of household defluoridation filters are being explored. While the adoption of household defluoridation filters failed to take off<sup>6</sup>, other two mechanisms (surface water provision and rainwater harvesting) need strong institutional backup.

There is growing evidence that some of the public initiatives involving private parties are effective in addressing the water quality issues in the rural areas. During the mid 2000s, some NGOs such as Byrraju Foundation, Water Health International, Naandi Foundation, Center for Water and Sanitation (CWS), Smaat Aqua, etc., established water treatment plants in different parts of the state. These NGOs worked in collaboration with technology providers like Water Health International and TATA Projects for developing technologies at one end and with the communities and PRIs for establishing and the running the

plants on the other end. Some of the technologies adopted in the state are:

- Roof water harvesting methods promoted by both Government of Andhra Pradesh and some NGOs
- Household defluoridation methods promoted by some NGOs as well as Government of Andhra Pradesh
- Private enterprisers selling water in rural areas particularly in coastal districts and Nalgonda
- Water treatment plants with ultra violet (UV) and reverse osmosis (RO) technology with public private participation
- Micro filter technologies promoted by some of the organizations to the government and other agencies

Though different technologies were adopted by different agencies to mitigate water quality problems in the state, water treatment plants with RO coupled with UV technology which can treat both chemical and bacteriological contamination have gained momentum. The capital cost ranges from Rs. 3.5 lakh upwards depending on the type of civil structures opted by the villages/ agencies.

Funds are provided by different agencies such as NGOs, communities, philanthropists, politicians for setting up of water treatment plants. It is made clear

<sup>5</sup> These filters are distributed to the households for filtering drinking water at the individual household level.

<sup>6</sup> The active aluminium filter needs thorough cleaning every two weeks, which the households find difficult to maintain.

that the communities/ GPs share part of the capital cost in addition to providing space and raw water for treatment.

The participation of Global Partnership for Output-Based Assistance (GPOBA) provided assistance worth US\$ 1 million to Naandi Foundation to set up water treatment plants to improve access to safe water for the poor.

Water treated in the treatment plants is supplied through jerry cans of 10-20 litre capacity at fixed point, i.e., near the treatment plants or sometimes different sale points. The water tariff is Rs. 2-3 for a 20 litre can if supplied at the treatment plant. If the water is supplied at the door step, an

additional charge of Rs. 1-2 is charged per can towards the transportation cost depending on the distance. Some of the local unemployed youth are engaged in transportation of water cans to supply at the door step.

Water quality tests are carried out by the agencies established at the plants, using private laboratories, on a regular basis and the results are displayed near the treatment plants for the public.

Some rapid studies by different agencies have revealed that the penetration level varies from 30- 90 percent depending on the extent of the water quality problems in the village. It is also indicated that there is behavioural

change among the communities where the water treatment plants are established. In many villages, people carry purified water to the work places or farmers are expected to provide purified water to the labour force they engage for any work.

Though this initiative started in a few villages in 2005, currently it is estimated that such treatment plants have been established in more than 1,000 villages in Andhra Pradesh. In addition to the NGOs, many women's SHGs and GPs have set up treatment plants. The Government of Andhra Pradesh has identified some agencies through a bidding process to expand similar initiatives to more villages throughout the state.

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# SOURCE SUSTAINABILITY





## Water Harvesting to Augment Water Resources: Traditional Technology and Communities are Part of the Solution

### Location: Alwar District, Rajasthan

Indian agriculture and rural life are today heavily dependent on ground water. Approximately 80 percent of the total water resources withdrawn are utilized for agriculture. Further lowering of ground water tables can seriously threaten India's hard-earned food security at a time when India will need to produce more food to feed its growing population. In addition, whilst domestic water for drinking is

arguably the highest priority use of water, it is actually a very small consumer of water resources. In the absence of a system that safeguards the meagre quantity required for drinking water first, there is a high risk that big consumers of water will significantly deplete the water resources, depriving the drinking water sector of the small quantity that people need to drink to survive.

Solutions to ensure drinking water security, however, exist. This has been amply demonstrated by the successful experience of local communities in Alwar District in Rajasthan, supported by the NGO Tarun Bharat Sangh (TBS) and its founder Mr. Rajendra Singh<sup>7</sup>. It is possible to harvest and augment water resources through the construction of small water harvesting structures called *Johads* and the implementation

<sup>7</sup> Mr. Rajendra Singh, Tarun Bharat Sangh, Tarun Ashram, Bhikampura, District Alwar, Rajasthan, India ; [www.tarunbharatsangh.org](http://www.tarunbharatsangh.org) ; [info@tarunbharatsangh.org](mailto:info@tarunbharatsangh.org)

of local water governance. Since 1985, 8,600 *Johads* have been built in 1,086 villages. This has resulted in the rise in water levels in the shallow aquifer, increase in the area under single and double crops, increase in forest cover and drinking water supply security.

The water collected in a *Johad* during monsoon penetrates into the sub-soil. This recharges the ground water and improves the soil moisture in vast areas, mostly downstream. The ground water can be drawn from traditional

open wells, built and maintained by the villagers themselves, without any input from outside. As the percolation process takes some time, depending on the soil, depth of water, etc., during this temporary period (sometimes several months), the water in the *Johad* is directly used for irrigation, drinking water by animals, and other domestic purposes.

The other advantage of this structure is that it checks soil erosion, mitigates floods, and

ensures water availability in wells or boreholes used for drinking water supply and irrigation, even for several successive drought years. Also, during the dry season when the water gradually recedes in the *Johad*, the land inside the *Johad* itself becomes available for cultivation. This land periodically receives silt and moisture, and that allows crop cultivation without irrigation. So the *Johad* does not take away valuable arable land from cultivation.

After conservation, the main issue that surfaces is the management of water. TBS is a community-based organization which works on demand-side water management. The villagers have also formed an Arvari Sansad to frame rules of water use. These include the compensatory agricultural crop pattern, under which a farmer can devote only 25 percent of his land to water intensive crops while the balance must be cultivated with non water intensive crops.

Rainwater harvesting through small structures revived five rivers – Bhagani-Teldehe, Arvari, Jahajwali, Sarsa and Ruparel which had been reduced to seasonal rivers – benefiting some 250 villages in 1995. The area was subsequently declared a 'white zone' by the state government.

In agriculture-dominated villages, the change in surface water and ground water availability, especially in winter, has increased significantly. Since the Rabi crop is the main cash crop in this region, this has translated into significant



economic gains. In some villages, farmers have diversified into crops such as onion, vegetables and flowers (in some cases) due to assured water availability. This has led to an increase in agricultural income.

Communities now enjoy the benefits of sustainable drinking water supply, thanks to the revival of traditional water harvesting structures which have improved ground water recharge and, consequently, significantly increased the water table level in all wells and boreholes. A study carried out in the project area shows that the water table in wells has increased by 20 to 50 feet, and that even after severe droughts in 2003 and 2006, water levels remained sufficiently high to provide adequate water supply for the population.

The cost of structures built has been low in most cases, thus allowing village communities to be able to mobilize their contributions, accounting for about 30 percent of the capital cost. Seventy percent of the rain harvesting structures cost less than US\$ 1,000 and 10 percent more than US\$ 2,500.

*Johads* are a prime example of the ingenuity of inexpensive, simple, traditional technology that is quite remarkable in terms of recharging ground water of the semi-arid regions leading to the eradication of rural poverty itself, generation of massive rural employment and reduction in distress migration from rural areas to urban areas.

Thus the issue of water, as shown in Rajasthan, is not about scarcity but about its careful

use and about its equitable and distributed access. The paradigm of water management will have to be reworked, so that it is designed to harvest, augment and use local water resources, leading to drinking water supply security and inclusive growth at all levels. In this context, traditional community-based water management systems pave the way for identification of appropriate adaptation and mitigation strategies to address the implications of climate change on economy and ecology. The exemplary integrated water resources management interventions of communities in Alwar District show the potential adaptation and mitigation measures at local/regional level have to address the global challenges of climate change impact on water resources.

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# Source Protection to Enhance Multiple Uses of Drinking Water

## Location: Khasi Hills, Meghalaya

Rural communities in hill regions such as the North East of India are dependent largely on natural sources for drinking water. However, in recent times, natural sources such as springs have begun to dry up due to deforestation in the upper reaches of watersheds. Deforestation has been driven by a number of factors including timber trade, mining and cultivation of hills slopes. Under the International Fund for Agricultural Development (IFAD) sponsored North-Eastern Region Community Resource Management Project for Upland Areas, Spring Trap Chambers (STCs) have been promoted with the objective of protecting natural sources of drinking water.

Lands from where natural sources of drinking water, such as springs, originate are under three forms of ownership in Meghalaya: i) individuals; ii) clans; and iii) community-based organizations. The IFAD project selected lands under community-based organizations on which STCs were established. The STCs are managed by Natural Resource Management Groups (NAMGs) which focus on preservation of the environment, development of agricultural potential and address social issues such as representation of women in decision making. Women are not part of decision making in traditional institutions in the Khasi hills that are known as *Dorbors* (equivalent of village Panchayats).

IFAD supported the project from 1999 to 2008 in Meghalaya, Tripura and Manipur. In Meghalaya, project villages are organized into 19 clusters; selection of village clusters was based on criteria such as distance from roads, relative poverty, presence of community catchment lands, etc. Two STC designs have been developed by the project in consultation with PHED staff: i) design for the plains; and ii) design for hill locations.

Protection of drinking water sources that serve a population of approximately 7,12,500 has been enhanced as a result of the IFAD project. Existing rules relating to catchment protection (such as timber felling, ban on hunting and fire control) have been enforced more effectively. Multiple use of water from STCs has been emphasized (drinking water, clothes washing, livestock rearing and kitchen gardens). The average annual household economic benefits derived from the use of STCs are in range of Rs. 84,550,000 in Meghalaya alone. In addition to economic benefits derived from livestock rearing, households also derive non-economic benefits through enhanced food security provided by kitchen gardens (mustard leaves, beans and cabbage).

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## Achieving Sustainable Aquifers through Community Participation, Sciences and Demand Management

**Location: Pune, Buldhana and Aurangabad Districts, Maharashtra**

The hydro-geological features of Maharashtra (93 percent hard rock, variability in rainfall) impose limitations on ground water availability. Competing demands on ground water, particularly for agricultural purposes through indiscriminate pumping, have led to an unsustainable situation, warranting innovative solutions through community partnerships. The aquifer pilots implemented in Pune, Buldhana and Aurangabad Districts through the Jalswarajya World Bank-assisted project are a step forward in achieving sustainable aquifers through community participation.



The project took up the challenge to lead the path through piloting management of ground water at aquifer level, by motivating the village community living on certain designated aquifers, to think, plan and implement sustainable ground water management solutions. This was actively facilitated by the state agency GSDA, monitored by the DWSS Reform Support Project Management Unit (RSPMU) of the Government of Maharashtra.

Three aquifers were chosen that had reasonable challenges and diversity for ground water management, on a scientific basis, by GSDA in consultation with the community and RSPMU. Ground water recharge measures, including various management options, were planned and implemented by the community in a participatory manner taking into consideration the entire aquifer's rain water collection, run-off and storage potential. This was guided by the district units of DWSS, GSDA and support organizations.

The pilot experiment has proved that the community at aquifer level can be brought together for participatory ground water management, and therefore it has emerged as a rational tool in ensuring the sustainability of ground water to meet the needs of the village community. The additional quantity of ground water retained in the aquifer translates to an availability of about 1,690 kilolitre of water per household per year; or it can irrigate an additional area of 3,900 hectare per year, in addition to providing round-the-year drinking water security to the villagers. The pilot has also resulted in cost savings of Rs. 88 lakh per year for the Government of Maharashtra by avoiding tanker supplies to villages.

Similar pilots are being implemented in another World Bank-assisted project -- Maharashtra Water Sector Improvement Project. Based on the lessons learned, as of November 2010, the Government of Maharashtra is considering scaling up the initiative.

Sustainability of ground water resources is possible only when the village community understands the dynamics of the aquifer and learns how to manage it. Until the recent past, a village or block was considered as a unit for developmental activities. However, since these are only administrative units,

the importance of collective action for management of natural resources, such as ground water, was ignored or neglected which resulted in under- or over-utilization of such resources.

The concept of managing ground water resources at aquifer level, through community participation, was piloted for the first time in the country under the Jalswarajya project, facilitating the adoption of a holistic approach to problem solving. The pilot is interesting because of: i) its size and diversity – it covered about 60 villages, in five aquifers in the Districts of Pune, Buldhana and Aurangabad, in a total area of about 430 square kilometre, in five river basins (Godavari, Purna, Bhima, Manjra and Patalganga); ii) it brought the community together – Aquifer Water Management Associations (AWMAs) were formed amongst the villages, facilitated by the district teams and GSDA; and iii) it adopted holistic management approaches – through simple and innovative physical works with technical support from GSDA and demand management practices facilitated by the district units.

Maharashtra receives 85 percent of its precipitation from south-west monsoon from June to September. Rainfall is highly variable between years and droughts are recurrent. There is wide variation in the spatial distribution of rainfall across the state, ranging from 3,000 to 6,000 millimetre a year in the Western Ghats to 600 millimetre a year in the Eastern rain shadow/drought prone areas of the state. Ground water development and management is a major challenge because of the occurrence of heterogeneous and comparatively low water yielding hard rock formations (basalt and gneiss) comprising the main ground water bearing horizon, which occupy about 93 percent of the geographical area of the state. In addition, ground water sources in relatively small patches have been affected by sea water encroachment in the coastal areas; excessive fluoride concentrations in Nanded, Yeotmal and Chandrapur Districts; and salinity in the alluvial area.

Cultivation of crops like sugarcane, fruit, etc., which require large quantities of water in the water scarce areas, is heavily depleting ground water sources. Large numbers of bore wells/tube wells are the main source of irrigation in all the parts of the state. For

about 80 percent of the villages, ground water is the main source for domestic needs as well. About 22 percent of the total 2,316 sub-watersheds are categorized as semi-critical, critical or overexploited with declining water table trends. Though this percentage is not worrisome in itself, it is aggravated by low rainfall, high percentage of water guzzling commercial crops and an alarming and progressive deterioration of ground water and soil quality. In this context, management of ground water resources at the aquifer level through the involvement of the community seemed to be the way forward.

The objective of the aquifer management pilot component was to develop and test approaches for holistic and sustainable management of water resources with the involvement of stakeholders. The main elements of the strategy were:

- Build capacity of stakeholders in the pilot area for sustainable management of ground water resources
- Analyze the current state of ground water availability and use-patterns and their implications to source sustainability within the pilot area
- Provide information to stakeholders on ground water availability and sensitize them on the need for adoption of community-centred demand management options
- Develop and implement a sustainable ground water aquifer management model

At the state level, the pilot was coordinated by an Aquifer Management Pilot coordinator. The three districts – Pune, Buldhana and Aurangabad – formed

District Technical Committees to appraise plans and do overall monitoring of progress on behalf of the district. To provide field implementation support, Technical Support Groups (TSGs) were formed, headed by a senior geologist. The AWMAs are executive bodies at the aquifer level, formed out of VWSCs, to work on behalf of the Aquifer Water Management Sabha (AWMS) – the collective group of beneficiaries at aquifer level – which makes decisions in a participatory manner (Table 7). Support organizations and technical service providers were hired to support AWMSs/AWMAs on an ongoing basis in planning and implementing the interventions.

The process was facilitated by the district and state teams. The committees, with technical facilitation from districts, support organizations and technical service providers, have analyzed the present situation, visualized the future scenario, collectively decided and implemented the measures that would be taken to manage the ground water sustainably.

**Structural Measures:** Low-cost structural measures (with improvements suggested by GSDA) were implemented to arrest the additional available run-off, which otherwise would have been wasted. As in the main project, each community has to contribute 10 percent against the capital cost of these measures. Actually, 630 aquifer strengthening civil works (71 percent) out of a total of 891 cost less than Rs. 1 lakh, and 228 works (25 percent) cost between Rs. 1 and 5 lakh. Only 33 works (4 percent) cost more than Rs. 5 lakh. The actual civil works started during early 2009.

The supply-side interventions have been planned taking into consideration the run-off calculations in a particular aquifer. Rainfall, acreage, number of

**Table 7: Village/aquifer level institutions**

No	District	Number of Aquifers	Number of VWSCs	Number of AWMSs	Number of AWMAs
1	Aurangabad	03	30	03	01
2	Pune	01	09	01	01
3	Buldhana	01	20	01	01
	Total	05	59	05	03

dug wells and geo-morphological parameters were actually computed and considered for calculations. All existing structures have been considered along with the ongoing and proposed works under different schemes by different departments, bringing convergence so as to avoid overlapping. The recharge potential that can be accommodated in the aquifer was estimated scientifically by GSDA. Recharge measures were planned through various types of locally relevant structures, with technical improvements by GSDA, such as taking into consideration their recharge efficiency.

The thinking of the community was reflected in the number and types of recharge measures taken up. The actual site selection of the civil works was a joint exercise of the community, support organizations, technical service providers and TSG. Site selection was done based on the findings on the ground of recharge and discharge areas in the watersheds. Aquifer geo-hydro-topological features were also considered while deciding the final measures to be undertaken. The issue of sustainability of groundwater resources and the cost sharing of the interventions proposed by the community were discussed in the AWMSs.

**Demand Management Option:** At the aquifer level, non-structural measures such as change in cropping patterns, controlling and monitoring of ground water withdrawals have been conceived and implemented. The demand management was carried out by the AWMAAs with the support of AWMSs. Communities were trained by the support organizations and district teams to carry out the monitoring of rainfall with rain-gauges installed in all GPs, and pre and post monsoon water budgeting.

Although the pilot is too recent to measure its impact, the evidence is showing in the sense that communities have decided to ban sugarcane and

replace it with local crops in Pune, switch to drips / sprinklers for horticultural crop in Aurangabad and Pune, and prohibit drilling of new bore wells. They are ready for implementing the Groundwater Act.

The interventions bring in additional ground water storage of 475 hectare metre per year, an additional area of 3,900 hectare per year under irrigation, and provide round-the-year drinking water security to the villagers. This has also resulted in cost savings of Rs. 88 lakh per year for the Government of Maharashtra by avoiding tanker supplies to villages. The cost of structural measures is extremely low at Rs. 1,477 per capita.

The pilot proved to be useful and has emerged as a rational tool in ensuring the sustainability of ground water to meet various needs such as drinking, domestic, and agricultural. What is interesting and encouraging is that this model can be replicated elsewhere.

Strong support from the Government of Maharashtra and GSDA, practical implementation approaches based on experiences from the main project Jalswarajya, and continued support and follow-up are the main factors of success.

The pilot took time to kick-start, with the energies and resources of the government teams focused on the main project in the beginning. The post of coordinator was vacant for some time during implementation. Therefore, in order to expeditiously implement such interventions, dedicated teams are required all through implementation. The pilot also had included development of legal and regulatory framework that the Government of Maharashtra could put in place for scaling up ground water resource management on a sustainable basis – which probably could have been an ambitious goal to address under a pilot component, in retrospect.

**Table 8: Statement of benefit from the pilot work**

No	Particulars	Details	Districts			Total
			Aurangabad	Pune	Buldhana	
<b>I Technical details</b>						
	Area covered in sq km		178.25	95.74	159.68	433.67
	Area in hectares	1 sq km 100 ha	17,825	9,574	15,968	43,367
	Average rainfall in mm per year		630	394	795	1,819
	Total run-off in hectares meter per year	Area x rainfall	11,230	3,772	12,695	27,697
<b>II Groundwater availability (ha m)<sup>8</sup></b>						
	Availability of ground water before AWMP		410	218	354	982
	Additional availability due to AWMP		175	75	225	475
	Total available ground water after AWMP		585	293	579	1,457
<b>III Net available water from run-off [based on item I above]</b>						
	15% of total run-off (ha m)	15% of run-off	1,685	566	1,904	4,155
	80% dependability (ha m)	80% above	1,348	453	1,523	3,324
	Net available water in KL per year	1 ha m = 10,000 KL	13,480,000	4,530,000	15,230,000	33,240,000
<b>IV Benefits per head/family</b>						
	Project population in the aquifer areas	Pop 2001 x 1.5	40,371	15,626	42,238	98,235
	Gross availability of water per head (KL)/year	Total run-off <sup>9</sup> /population	2,782	2,414	3,006	2,819
	Net availability of water per head (KL)/year	Net available water <sup>10</sup> /population	334	290	361	338
	Net availability of water per family (KL)/year	1 family = 5 persons	1,670	1,450	1,805	1,690
<b>V Area that can come under irrigation based on groundwater (item II)</b>						
	Area under irrigation before AWMP (ha)		588	4,661	3,642	8,891
	Additional area after AWMP (ha)		2,000	500	1,400	3,900
	Total area (ha)		2,588	5,161	5,042	12,791

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<sup>8</sup> Water that would have percolated to ground from run-off. Based on assessments by the GSDA.<sup>9</sup> From item (I).<sup>10</sup> From item (III).

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No	Particulars	Details	Districts			Total
			Aurangabad	Pune	Buldhana	
<b>VI</b>	<b>Irrigation potential for crops (area in hectares that can be irrigated, based on groundwater (Item II))</b>					
	Jowar OR	900 KL/year	14,978	5,033	16,922	36,933
	Wheat OR	1,800 KL/year	7,489	2,517	8,461	18,467
	Cotton OR	3,300 KL/year	4,085	1,373	4,615	10,073
	Sugarcane	11,500 KL/year	1,172	394	1,324	2,890
<b>VII</b>	<b>Indirect benefits (through reduction in tanker usage)<sup>11</sup></b>					
	No. of tankers/year for last 5 years		49	54	4	107
	Expenditure on tankers (Rs. mil) in the last 5 years		37.9	3.9	2.1	43.9
	Cost saved on tankers/year (Rs. mil) since they are no longer required in the aquifer areas		7.6	0.8	0.4	8.8

KL: kilo litre; ha: hectare

**Inputs by: Deerajkumar** (IAS), Project Manager, Jalswaraja, Department of Water Supply and Sanitation, Government of Maharashtra, and **S.N.N. Raghava**, Water and Sanitation Specialist, SASDU, World Bank

<sup>11</sup> Some of the villages in the aquifer areas were being provided with water by mobile tankers in summer.

## Water Conservation – An Innovative Process

### Location: Lapodia village, Rajasthan

Lapodia literally means 'not good' in the local language. Historically, the residents of this village have been looked down upon. However, Mr. Laxman Singh's work on water conservation has earned international recognition for the village. He is not very well read, but his thinking on water conservation has transformed not only Lapodia village, but also nearby villages. The entire state was suffering from drought and water crisis, but not Lapodia. A small beginning through community participation has earned him the appreciation of the United Nations, the Government of Rajasthan and the Government of India. The Dheerubhai Ambani Memorial Trust established by Reliance has also awarded Mr. Laxman Singh for his efforts.

The story began during the Emergency; the young Laxman Singh was a student of 10th class. While visiting the village during school vacations, he was upset when he saw the condition of the village; villagers were fighting each other and entering into litigation. Laxman Singh decided

to do something for the village; he started a small school with the help of his friends where children from all walks of life could study free. His next venture was digging a pond (*talab*) along with his friends. Impressed, the rest of the villagers soon joined in. Since the *talab*, was to be used for irrigation, it was decided that one member from each household would participate in the digging work. This effort at water conservation led to a series of other activities, as a result of which there is no water crisis in Lapodia today.

There are three *talabs* in the village: Ann Sagar, Phool Sagar and Dev Sagar. Every year, during monsoon, all the *talabs* fill up to the brim. As a result, all hand pumps and tube wells are recharged and the community gets good quality water round the year. All nearby villages suffer from problems of salinity except Lapodia.

Laxman Singh's efforts have paid rich dividends in other villages also. He is also working in the nearby village, Nagar. His effort in

Shail Sagar village has succeeded. The local *talab* is full up to the brim, the wells are recharged and local residents are excited. Good quality water is available at a mere depth of 50 feet.

In 1987, Laxman Singh came up with the idea that people should put as much water back as possible into the ground, to ensure sustainability. He devised a new technique called Chouka System for ground water recharge. After years of experimentation, this technique has now become effective. In this technique, small rectangular dykes with entry and exit points, are constructed. The rectangular dykes are called Choukas. The slope inside the Chouka is such that a maximum of 9 inches of water stands in it, which ensures moisture in the soil round the year. When after years of hard work, people saw the results of the Chouka System, they realized that all the effort was worth it. The trees inside the Chouka grow very fast, the ground water is recharged and there is no dearth of water for drinking purposes. The Choukas are



constructed in pasture land and people have voluntarily removed encroachment from thousand of acres of pasture land. They have sowed different varieties of grass which has resulted in adequate fodder production for animals. Even during drought, Lapodia produces milk worth lakhs of rupees.

Today, thousands of people have joined Laxman Singh in his work. Ram Karan Gujar has planted 2,000 trees spending from his own pocket, motivated by Laxman Singh's work. All encroachments have been voluntarily removed by the people from catchment areas of *talabs*. Every year, the Gram Vikas Nav Yuvak Mandal of Lapodia headed by Laxman Singh holds a *pad-yatra* (rally) to create awareness on water conservation. In 1994, the Government of Rajasthan recognized Laxman Singh's efforts and provided financial support. The Chouka System and Laxman Singh have received accolades and appreciation from the Governments of Rajasthan and India as well as eminent environmental experts and private organizations. Laxman Singh's experiment with crop seeds and organic agriculture are continuing. He has also developed a wildlife sanctuary near the village, and the villagers have taken an oath to protect animal life.

## What is the Chouka Technique

Gram Vikas Nav Yuvak Mandal, Lapodia, with the help of several international organizations

developed the Chouka System for water conservation, to develop pasture land. The technology was first employed in a small area and results were studied. The Chouka System was scaled up, after confirmation of positive results. The salient features of Chouka System are:

- It is a purely indigenous and natural technique for pasture land development
- The maximum benefit with minimum expenditure is accrued
- Moisture is retained in the entire pasture land
- Rainwater is harvested for a definite period
- Water is stored in 10 percent area for ground water recharge
- It is a good technique for fodder production
- A 9 inch water column is maintained in the Chouka for 10 to 30 days
- All Choukas are interconnected and water flows from one to another and ultimately the overflow falls into a *talab*
- Local flora is grown in the pasture land
- The entire pasture land is converted into different zones of moisture content
- Different varieties of fodder are grown based on different moisture contents

## Chouka Construction

- First of all, pasture land is measured
- The configuration of Choukas is finalized based on slope of pasture land and direction of flow of water. The overflow should fall into a rivulet or a pond.

- A layout drawing of Choukas is prepared
- Micro planning inside the Chouka is done
- The main wall of the Chouka is constructed between two highest points on the downstream side to arrest flow of water
- The height of the wall is 0.5 to 0.75 metre. The walls are made up of local sand excavated from inside Choukas
- In the main wall, a small passage for exit of water is provided
- The length and breadth of the Chouka is constructed in such a manner that the height of water within the Chouka should not increase beyond 9 inches
- A rivulet or pond is constructed at the end of the pasture land where the overflow from the Choukas is collected
- Local *babool*, *ker*, *khejari* seeds are sprinkled on the Chouka walls
- Different varieties of grass are grown inside the Choukas

## Impact of Chouka System on Pasture Land

- As a result of the Chouka System, social mobilization has taken place and encroachments removed from pasture land
- Due to construction of the Choukas, the entire pasture land is divided into zones of different moisture content
- Due to retention of rainwater in 10 percent of the area, an increase in ground water level in the entire village has taken place

**Inputs by:** Communication and Capacity Development Unit, Rajasthan



## Community Managed Demand-side Ground Water Management

### Location: Andhra Pradesh

Realizing the critical link between food production and ground water use, a number of NGOs, research institutes and national and international programs have been working on optional paradigms that would encourage and sensitize farmers toward

moderating their water demand. This involves education and awareness building around key aspects of ground water, its utilization and conservation. The process includes active involvement of local communities in data collection, capacity

building and improved management of the available ground water resources.

Andhra Pradesh Farmer Managed Groundwater Systems<sup>12</sup> (APFAMGS) project has demonstrated that an enabling

<sup>12</sup> Reference : Andhra Pradesh Farmer Managed Groundwater System Project –Project Document <http://www.apfamgs.org/Default.aspx>  
 Evaluation of FAO cooperation with India, Andhra Pradesh Farmer Managed Groundwater Systems (APFAMGS - GCP/IND/175/NE <http://www.apfamgs.org/upload/PDF/GCPIND175NET-APFAMGS-eva-final.pdf>  
 Technology and knowledge for gender equity and justice [http://www.apfamgs.org/upload/PDF/CP532006\\_40031.pdf](http://www.apfamgs.org/upload/PDF/CP532006_40031.pdf)  
 The Trail of Change, Villagers View point on APFAMGS intervention, September-2006 [http://www.apfamgs.org/upload/pdf/RE502006\\_40035.pdf](http://www.apfamgs.org/upload/pdf/RE502006_40035.pdf)  
 Deep Wells and Prudence, Towards Pragmatic Action for addressing groundwater Overexploitation in India. [http://www.apfamgs.org/upload/PDF/world\\_bank\\_rep.pdf](http://www.apfamgs.org/upload/PDF/world_bank_rep.pdf)

strategy could support farmers in reflecting on key issues and help them generate appropriate knowledge to be used in regulating ground water use. Reflection and self regulation encourage opportunities for internalization and sustainability.

In seven drought prone districts of Andhra Pradesh, farmers residing in 638 habitations, spread over 400 GPs, have voluntarily taken a number of steps to reduce ground water pumping to address the problem of ground water depletion. The APFAMGS project is a partnership with farmers for implementing the Demand Side Groundwater Management (DSMG) concept.

An important component of the project has been self-evolving inclusive institutions, which anchor the program and activities at the ground level. Groundwater Monitoring Committees (GMCs) at the habitation level and their federation Hydrological Unit Networks (HUNs) offer an institutional platform to the farmers to collectively reflect, plan and implement the programs. The participation of farmers has not been in a physical sense alone, it has acknowledged and valued their creative potential and knowledge and has facilitated their knowledge and innovation surge. This has followed a careful and consistent process of facilitation including helping the farmers in assessing, analyzing and planning different activities related to ground water and livelihoods – sustainable agriculture. Adopting an experiential learning process,

using a non-formal pedagogical format, has helped the farmers appreciate the scientific nuances of ground water and sustainable agriculture. An important impact has been the appreciation of farmers' knowledge by the state agencies which have reciprocated with physical, financial and technological support. The APFAMGS project is implemented by nine NGOs coming together as a network under a nodal NGO, supported by technical consultants offering necessary technical facilitation. The prominent anchors are habitation level institutions – GMCs and the aquifer level federation HUN. The local institutions work closely with PRIs and other SHGs, and community based organizations are coalition partners of the project for promoting project objectives.

APFAMGS is an initiative designed to stimulate farmers' innovation in the assessment and analysis of ground water, and fine tune initiatives to optimize water based livelihoods. The knowledge has been used to help the farmers and other vulnerable communities deal with the depleting ground water and its effect on agriculture. The project uses community institutions to take responsibility for assessing ground water availability for a micro unit, and use the understanding to plan ground water resources sustainably for their agriculture and livelihood pattern. The project, sponsored by the Food and Agriculture Organization (FAO), has : i) offered local solutions in managing ground water distress; ii) reduced



ground water pumping along with an increase in wealth creation; iii) enhanced recharge initiatives and consequent rise in water level; and iv) diversified the cropping system matching with availability of water.

The APFAMGS model works on the theory of behavioral change facilitated through new learnings leading to new reflexes. The project has taken advantage of the changing demographic profile of the country to tap the large number of young adults (men and women) with higher levels of aspirations to work collectively for acquiring new learnings. The strategy has been to bring upfront the issues related to ground water distress, engage them at an intellectual plane and challenge them to look for local solutions to ensure sustainability of the ground water resource.

For the first time, the issue of water is not compartmentalized on the basis of individual farmers, habitations, villages, but looked at comprehensively at the micro-basin level with all competing



aids. Much of the learning makes use of explicit knowledge into their understanding of the world-view. Complementary to this form of learning are the field visits, short-term and long-term experiments, field workshops and exhibitions of the models from the neighbouring areas.

Institutions have been promoted as the ideal platform to look beyond individual concerns and thus exclude selfish interest of a few. Genuine institutions represent the collective views while dissenting voices are also duly acknowledged. A multi layer inclusive institution that is vertically integrated has been built into the project. The GMCs has been conceived as a village level institution of the men and women farmers. Several GMCs within a given hydrological boundary join together to form a HUN. The institutions provide a platform for freewheeling discussions, receive local solutions that are original, not bound by any conventions, as they say rooted to the soil.

interests brought to the table and the needs prioritized logically. No outside solutions are presented, but local home grown ideas debated, considered and new inputs provided largely through field exposures and interaction with those who have adopted them.

The knowledge, capacity and skills of the farmers are built around several steps including observations, measurements,

recording, classification, documentation, analysis, exchange of information, making hypothesis, testing the hypothesis in the farmers' fields, further experiments and observations. Overall, the effort has been to ensure that there is no attempt to dilute the science just because it is handled by the community. The transfer of information happens through face-to-face communication using voice, body language supported by training

As part of knowledge building, locally generated data are used to raise the level of awareness on common issues related to ground water distress at individual farm level as well as on the habitation and drainage unit level. This triggers a process of internalization of the data and sets into motion discussions at various levels and formation of opinions on the cause and the effects. The impact of ground water development gathered as

data are deliberated round the year culminating in a Crop Water Budgeting (CWB) workshop prior to the cropping season to assess the best crop combination that can be taken up in the entire micro basin level. Based on the understanding, the farmers adopt suitable modifications in their agricultural practices that can lead to significant reductions in annual ground water use.

The decision on crop changes is voluntary and no advice is provided by the project. The emphasis is on improving the water use efficiency (less water for more productivity). The project does not advocate changes in crops being grown traditionally or for commercial gain. The project respects the farmer's traditional knowledge and wisdom to be able to take most appropriate decisions. Institutions act as pressure groups to advocate change in cropping, use of sustainable agricultural practices and water saving technologies. The government along with the banks provides the necessary support for investments on technologies related to water savings.

A 160 percent change in the cropping system is already



being witnessed. Initially, the number of crops in the project area was only 14 and now has been diversified to 32. Crop diversification has been largely in favour of low water consuming and low risk crops. High water consuming crops like paddy, sugarcane, banana, turmeric, and mulberry continue to be grown but with substantially reduced irrigation (ranging from 20-60 percent). Food security and improved nutrition have never been compromised while changing the cropping systems. The farmers have worked out a number of ways to reduce ground water pumping through changes in cropping, crop diversification, improved water use efficiency, improved pump efficiency, regulated construction of new wells and revived abandoned wells as recharge structures. Thus the new approach addresses the complex issue of ground water over pumping by articulating the community's interests while not targeting individual farmers.

Governance as dictated by local institutions has helped achieve sustainable ground water development by avoiding local conflicts and territorial dissensions. The most critical factor of governance is the knowledge to understand and appreciate the problem in all its complexity and create the required ownership/responsibility in the attitude of the different stakeholders.

The APFAMGS project continues to inspire funding agencies, governments and agro-based industries to adopt the

institution-led, knowledge-driven approaches in the area of natural resource management.

Institutions under the project have contributed significantly in initiating practices for sustainable management of ground water by treating ground water as a common property resource. Institutions have ensured ground water users make efforts to understand the nature of ground water occurrence, cycle, and limitations in its availability.

Institutions promoted farmers in data collection (rainfall, water levels, well yields), calculating ground water recharge from monsoonal rainfall, and estimating their annual water use based on planned cropping patterns, thereby building their understanding of the dynamics and status of ground water in the local aquifers.

Farmer data collection also facilitates access to information about water-saving techniques, improved agricultural practices, and ways to regulate and manage farmers' own demand for water. The project does not offer any incentives in the form of cash or subsidies to the farmers: the hypothesis is that access to scientific data and knowledge has enabled farmers to work unitedly in making appropriate choices and decisions regarding agricultural practices and use of ground water resources.

Independent project evaluation indicates that, in a majority of the project areas, the interventions



have succeeded in building a link between water availability and water use for agriculture. The core message of the project, that ground water abstraction over the long term needs to be aligned with water availability, is taking hold. This is suggested by the emerging positive correlation between water availability and water use in 48 out of the 58 project hydrological units.

APFAMGS project design does not call for sacrifices in profitability to reduce water use. Survey results show that project area farmers have consistently improved their profitability, with the net value of outputs nearly doubling during the project period, with inferior and more erratic results in similar non-project areas. In terms of cumulative water abstractions, 42 percent of the hydrological units have consistently reduced the ground water draft over the three years of project operation, while 51 percent have reduced the draft intermittently, and only

7 percent have witnessed an increase in ground water draft during this period. This impact is unprecedented, in terms of reductions actually being realized in ground water draft, and in terms of the geographic extent of this impact, covering dozens of aquifers, hundreds of communities, and approximate outreach of one million farmers.

APFAMGS has succeeded in establishing strong community processes by formally engaging all ground water users and using traditional and well-established vehicles of community mobilization. The project is rooted in a strong participatory, capacity-building, and gender sensitive approach. Another significant design feature of APFAMGS is that it engages the farmers around a crucial element of information that is vital for planning agricultural operations.

The project has been successful in meeting its challenges and

expected results were largely achieved. Farmers understand the seasonal occurrence and distribution of ground water in their habitations and in hydrological units as a whole and are able to estimate seasonal recharge, draft and balance. Farmers are capable of collecting and recording rainfall and associated ground water data. They have mastered the concept of ground water as a common property resource and are willing to manage it for the collective benefit. This was achieved through strong focus and investment on capacity building and through the process of demystification of science, without compromising on the basic scientific principles of sustainable management. This had a strong empowering effect on participants.

The project works on the supply side of the ground water resource through artificial ground water recharge structures to improve ground water availability. The model can be usefully replicated in similar environmental conditions under any type of intervention. Farmer Water Schools (FWSs) are a platform for ground water farmers, men and women, that facilitate experiential learning of different cultivation techniques and cropping patterns linked to the use of the ground water resource. This was achieved through intensive capacity building and progressive development of the Farmer Field School (FFS) concept into the FWS, building on the principles of non formal education.

A key element in the FWS is the CWB session at the start of the Rabi season, particularly as a decision-making tool for farm families to adopt alternative agricultural practices, suiting the availability of ground water. This innovation to the FFS approach is a key decision-making tool also at community level and can be considered an important element in increased social and natural capital. It is also important in light of future expansion and up-scaling of the FWS approach.

In addition, training on low external input agriculture, inputs from the bio-agents production centre, documentation of best agricultural practices and Farmer Training Teams, all led to reduction of external inputs, with beneficial consequences on the environment and health of the rural population.

The local institutions and platforms set up for common

decision-making at the level of the hydrological unit are thriving bodies that can prove very beneficial for their members and the wider population. There is good evidence that social capital was created and developed at the different levels.

Prospects for environmental, social, institutional and technical sustainability of the project's achievements and results are high. Economic sustainability of the innovations proposed will depend, to a large extent, on national and international food and energy price policies; nevertheless, farmers should be equipped with knowledge and decision making tools that allow them to cope with external threats to a good extent.

Finally, the APFAMGS approach offers a good paradigm for funding agencies and federal/

state agencies working in the area of ground water management. Local governance of ground water by the ground water users themselves brings together all the different stakeholders, strengthens local institutions, makes the hydro-geological information fully accessible, considerably reduces the transaction costs, promotes the concept of demand side management as a viable option, simplifies the tasks of government departments in playing the facilitation role of providing knowledge, skills and capacities. Experience shows that promoting local ground water regulation is not difficult, neither costly nor sensitive and can reach the necessary scale in the shortest time. The APFAMGS concept can be safely adopted for sustainable management of ground water in different parts of the world subjected to large scale over-exploitation.

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## Renovation of Traditional Water Bodies (Oorani) to Sustain Access to Drinking Water for Rural Communities

### Location: Tamil Nadu

The Government of Tamil Nadu has been giving great importance to the rural drinking water sector by allocating substantial funds and other resources aimed at improved access to safe and sustainable drinking water supply to rural communities. Most rural drinking water supply schemes are ground water based and ground water bodies are under severe stress due to over exploitation. Also, the sustainability of the schemes are at stake due to source failure/depletion of sources, poor O&M, non-availability of the timely power supply for pumping, and water quality problems like salinity, fluoride, etc.

Most traditional water supply systems have been abandoned/are unattended by the local communities for various reasons after the emergence of pumping technology and rural electrification. The increase in demand for water by the different sectors like irrigation, industry and urbanization is the major challenge to be addressed immediately. The Government of Tamil Nadu has given priority to rainwater harvesting and made it mandatory in the entire state. Rejuvenation of tanks, ponds and other water bodies was undertaken by the government under various schemes such as employment generation, and drought relief programs to capture rainwater wherever it falls, and use it locally.

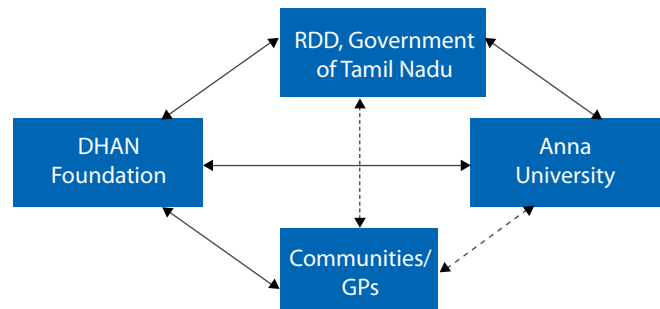
Under the aegis of rainwater harvesting through rejuvenation of traditional water bodies, the Department of Rural Development, Government of Tamil Nadu, during 2002-03, evolved a strategy for supplementing water for drinking and other needs of the rural communities through initiating a pilot project on developing the *Ooranis* (traditional village ponds) with appropriate technical interventions and community action. The program was designed in partnership with other professional organization consisting of NGOs, technical institutions and the communities. Partners have clear roles and responsibilities based on their expertise. The major stakeholders/partners are shown in Figure 6.

The Department of Rural Development is the nodal department at the state level, responsible for providing funds, policy support, and preparation of estimates through field level officials in consultation with, and based on the inputs provided by, the other partners/experts, overall monitoring and coordination. The Dhan Foundation is responsible for selection of *Ooranis* based on set principles, community consultation and mobilization, securing community contributions/share through cash/labour/materials, capacity building, documentation of lessons, follow-up on O&M, and feeding lessons for replication. The Centre for Water Resources, Anna University, is responsible for hydraulic studies, catchments assessments and technical advice related to water resources, treatments, etc.

The Centre for Environmental Studies is responsible for technical advice related to environmental aspects including pollution control measures, water quality issues including water quality monitoring. Communities and GPs are responsible for extending full support to the project including the capital cost sharing of 15 percent through cash/labour/material, participation in planning, implementation and O&M.

To oversee the pilot project, the Rural Development Department, Government of Tamil Nadu, formed a task force consisting of representatives from the major partner organizations. Initially, 10 *Ooranis* from Kancheepuram (low ground water) and Ramanathapuram (saline effected district) were

**Figure 6: Major stakeholders/partners**



selected for the pilot. Detailed planning was undertaken by all partners before taking up the actual renovation of the water bodies.

Major steps involved in the entire process are: i) formation of the task force; ii) identification of the *Ooranis* for rejuvenation; iii) planning including the surveys/research/baseline studies by the group of experts; iv) community mobilization, consultation, capacity building and awareness creation; v) designing and cost estimations and resource/fund mobilization; vi) implementation and O&M; v) and monitoring/follow-up and documentation.

The main technical aspects involved in the development of the *Ooranis* are:

- The catchment area of the *Oorani* is identified and checked for sufficient run-off
- The *Oorani* is deepened/desilted by scooping the top soil to improve the storage capacity
- The inlet channel that allows water to the existing *Oorani* is cleaned up, thereby avoiding any silt deposit carried to the *Oorani*
- The filter media arrangement using slow sand filters is installed inside the *Oorani* to filter turbid water
- A hand pump is installed outside the *Oorani* for the community to fetch clear drinking water
- Fencing is provided to avoid people directly entering and also from local pollution
- The filter media provided ensures good quality of drinking water

Rejuvenation of all *Ooranis* in the pilot project is completed and handed over to the communities for O&M. The project has ensured clean water for the communities throughout the year with minimum O&M cost being borne completely by the communities. The project carries out the monitoring of water quality, inflow of water in the pond, loss of water including evaporation losses, seepage losses and human consumption.

Communities/GPs from different districts have started making demands for the scheme. The project builds partnerships and ownership among the communities. In addition to increased access to sustainable water supply, the project provides employment opportunities for the local communities during its implementation

The Government of Tamil Nadu has expanded the program of developing *Ooranis* through the Tamil Nadu Water Supply and Drainage (TWAD) Board. These activities are undertaken/executed under different program such as the Pradhan Mantri Gramodaya Yojana, the Accelerated Rural Water Supply Programme (ARWSP). The National Bank for Agriculture and Rural Development (NABARD) has also provided financial assistance. So far, 511 *Ooranis* have been completed. The *Ooranis* are supplementary to the existing drinking water sources and serve as standalone sources. Tests indicate that quality of water, by and large, is of good quality. The Government of Tamil Nadu has decided to expand the program to the entire state wherever water quality and quantity problems are severe.

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# WASTE WATER MANAGEMENT







## Combining Water Supply and Sewerage and Recycling of Waste Water for Irrigation: An Interesting Example

**Location: Hulakoti village, Gagad District, Karnataka**

Under the Jal Nirmal project, Hulakoti is the only village in Karnataka that has adopted an underground drainage sewerage system along with the water supply scheme. The population of the village is about 12,000 with 2,478 households and 1,290 water connections, 25 stand posts, and 1,600 sewerage connections. Water is available two or three hours per day.

The water supply and sewerage system, completed in 2006, is managed by the VWSC with 24 technical staff. A unique aspect of this VWSC is that it has four engineers and a doctor among its members, who have been involved with the project since inception.

The villagers took a decision that toilets would be compulsory in all houses, shops and buildings

constructed after the inception of the project. In addition, a plea to stop the practice of open defecation was made through the Shramadaan program. Various capacity building interventions on implementation and management of the water supply schemes and promotion of social activities were organized. Today, 1,920 households have toilets and the village has six community latrines.

The sewerage project was implemented at a cost of Rs. 3,18,71,000. The community contributed Rs. 35 lakh for the sewerage project. The GP President, members, VWSC members, village heads, and representatives of women's organizations went from door to door to collect the funds. At various stages of the project, owners of earth-moving machinery cooperated by lending the services of their machines for free.

The sewerage system is made of 1,920 connections, a main pipeline 7 kilometers long consisting of HDPE and PVC pipes, 42 kilometre long stoneware and RCC pipes, three drainage zones and one final treatment and disposal site. Waste water flows through these pipes into two open oxidation ponds with a capacity of 35 lakh litres and is then pumped into the clear water tank. It is estimated that about 50 percent of the daily 1,300 m<sup>3</sup> of waste water produced is collected.

Initially, it was suggested that the treated water be let out into a pit next to the clear water tank.

However, the engineers advised the VWSC that the water could be reused. Currently, farmers pump this water into tankers for use in irrigation. The next step, under progress, is to lay down pipes to the adjacent fields for irrigation and charge a nominal fee (Rs.150 per acre per year) to farmers.

Under the scheme, 1,490 individual household toilets have been constructed. Personal, family and community hygiene has been substantially enhanced. Twenty public stand posts have been constructed; and seven schools, including a private school, have been provided with drinking water supply, and parks have been constructed in five schools, which promotes environmental awareness and hygiene among school children.

The VWSC prepares a budget and presents it at the Grama Sabha. Water taxes are collected and deposited in the maintenance account to pay for expenditures. The charges are fixed: for households Rs. 60 per month; for public access points Rs. 30 per month and for commercial supply points Rs.100 per month.

Education institutions and hospitals are not required to pay for water. In 2006, the water tax was Rs. 10 per month per family; however, to cover expenses (ward staff salary, electricity bill and maintenance works), two tax increases took place in 2008 and 2010. There is no regular charge for the sewerage system, except a one-time connection fee of Rs. 500. However, the VWSC is financially in a poor shape and has Rs. 80 lakh of electricity bills pending.

Due to the Jal Nirmal project, Hulakoti, which has achieved all targets to qualify it for the Nirmal Gram Puraskar (NGP or clean village award), is now a clean and beautiful village. The community has given up the habit of dumping garbage and waste in public spaces, waste water from sewage is being effectively utilized for irrigation, incidences of malaria and diarrhoea have reduced, and parks established under the auspices of the GP and Jala Nirmal project have contributed to a clean and green environment. The sewerage project has also contributed to making the people 'water literate'.

**Inputs by:** Karnataka Rural Water Supply and Sanitation Agency, Jal Nirmal Project, and **Suryanarayan Satish**, Social Development Specialist, World Bank

# COMMUNICATION FOR WATER



The history of organized development communication in India can be traced to rural radio broadcasts in the 1940s. Independent India's earliest organized experiments in development communication started with community development projects initiated by the Government of India in the 1950s. The government, guided by socialistic ideals of its constitution and the first generation of politicians, started massive developmental programs throughout the country. While field publicity was given due importance for person-to-person communication because the level of literacy was very low in rural areas, radio played an equally important role in reaching messages to the masses. Universities and other educational institutions – especially the agricultural universities, through their extension networks – and international organizations under the United Nations umbrella carried the development communications banner further.

Development communication in India, a country of sub-continental proportions, has acquired many connotations. On one end of the spectrum are the tools and techniques locally applied by charitable and not-for-profit organizations with very close inter-personal relations among the communicators and, on the other end, is the generic, top down communication emanating from the government.

The need for development communication continues since a large percentage of the population lives in rural areas and depends directly on agriculture. Poverty is reducing as a percentage of the population but a large number of people still live in destitution. They need government support in different forms. Therefore, communication from the government remains highly relevant. In addition to the traditional ways, a new form of communication is being tried by the Government of India to support its developmental activities, though on a limited scale. Called Public Information Campaigns, public shows are organized in remote areas where information on social and developmental schemes is given, seminars and workshops are held, villagers and their children are engaged in competitions, messages are given through entertainment shows. In addition, government and corporate organizations involved in rural businesses display their wares and services in stalls lining the main exhibition area. This approach brings together various implementing agencies and service/ goods providers while the information providers encourage the visitors to make the best use of various schemes and services available. Some state governments have also adopted this model to take their development schemes to the masses.

Strategic communication is a comprehensive and holistic concept. Today, the value-addition of communication to enhance sustainability of rural development programs is well recognized. There is also an increasing awareness that both internal and external communication should be carefully planned, implemented, and monitored and evaluated.

Overall, the approach to strategic communications varies and there is confusion about its various components and how it is strategic. Most people use the term IEC or media or worse, public relations, to describe communications. Many believe that communication activities need to be implemented only during the life cycle of the projects, from identification and formulation, to implementation, monitoring and evaluation. Communication is more than disseminating information and knowledge, it is also about fostering social awareness and facilitating dialogue. It is about contributing to building a shared understanding that can lead to change.

It does not add costs to the project cycle, at least not in the long run, but rather it reduces the costs of useless, often unplanned, communication activities and, most importantly, ensures that the project is designed with the consensus of a majority of stakeholders, that its goals are shared, and that its implementation is successful. Interesting examples from India are captured in the following pages.



## Rural Water Supply and Sanitation Project

### Location: Punjab

Punjab is one of the more prosperous states of India. However, the ground realities in terms of social development are quite different – some 30 percent of the villages still do not have access to basic drinking water service. About 60 percent households in Punjab are dependent on unsafe private drinking water sources. With high O&M costs faced by the DWSS and low O&M cost recovery from users, the water supply systems are becoming unsustainable; charged septic tank effluent flowing in open drains has degraded the environmental conditions in the villages and poses a serious health hazard. The current institutional, operational and financing arrangements present constraints and challenges in achieving service improvements or ensuring long-term sustainability in providing safe drinking water to the rural masses.



The International Development Agency (IDA)-assisted Punjab Rural Water Supply and Sanitation Project (PRWSSP) aims to overcome these hurdles by focusing on providing rural households in the state with access to safe and adequate drinking water supply throughout the year. The project is decentralizing and empowering the villagers to manage and operate their own water supply schemes so that they can tailor it to meet their needs.

## Project Communication

Very early in the life of the PRWSSP, the state project management team recognized the importance of communication in its effective implementation, especially in creating a demand for the scheme amongst rural communities. The designing of the communication strategy involved an iterative process encompassing: i) conducting a detailed needs assessment study; ii) extensive planning between the state project management team and the district management teams; iii) development and pre-testing of materials developed within the project; iv) effective implementation of the agreed communication plan; v) regular monitoring and evaluation; and vi) feedback being integrated into the agreed communication plan, thus making the entire communication process a 'living and in-progress' cycle of reassessment and refinement. As the project is people-centric in terms of villagers contributing towards the scheme, being an integral part of the planning, technology selection (type of scheme), procurement (bid invitation, award), construction and O&M management of all new water supply schemes, interpersonal communication and capacity building are a major component of the outreach program developed and supported by the DWSS.

To support these activities, extensive behaviour change communication materials have been developed by the project such as flipcharts, flyers,

booklets, and posters linked to each stage of the project's life cycle.

An integral part of the communication strategy is the water testing kit that has been extremely successful as a trigger to enter the community and initiate dialogue on the need for safe quality drinking water in the village. Once the district teams have gained entry into the village, the process of consensus building and establishing the long-term vision starts with the villagers, for them to agree to owning and operating their own water scheme within a clear timeframe. Through interpersonal communication, use of mass media, and capacity building, the entire village comes to a consensus and understands the advantage of subscribing to the scheme and the kind of commitment it requires from their end. This process culminates with the villagers garnering the contributory amount and the formation of a committee of people willing to take the lead in moving the village towards safe drinking water and helping run it in a sustainable manner by negotiating the frequency of water supply, maintaining the accounts, raising bills timely, collecting bills, holding non-payers accountable, supervising and managing the pump operator, ensuring that the electricity bill is paid on time and, last but not the least, sensitizing people on the need and importance of water conservation. This committee is headed by the Sarpanch and is inclusive of representation from the weakest members of society including women.

In keeping with the need for transparency, the state management team has created a website that hosts all project related information; has mandated the need for disclosure walls that clearly articulate the date of commissioning of the scheme, names of the members of the water supply committee, amount contributed by the village, monthly billing, monthly expenditure, credit in the bank post expenditure, name of the pump operator, etc., and put in place a 24x7 complaint redressal helpline for its customers.

# Engaging the Community

**Location: Rajasthan, Gujarat**

## **Aapni Yojana<sup>13</sup>**

Aapni Yojna is a rural water-supply project covering about 20,000 square kilometre in three districts of northern Rajasthan, viz., Churu, Hanumangarh and Jhunjhunu. The project is co-funded by the Government of Germany through its development bank, KfW. It covers a population of about 9 lakh in 370 villages and two towns, at a cost of about Rs. 426 crore. The bulk of this investment is dedicated to the technical works implemented by the Project Management Cell, a special unit of the PHED of Rajasthan. The project's main objective is to improve the health status and living conditions of the target population. Sustainable supply is ensured from the Indira Gandhi Canal, as ground water is insufficient and saline.

To ensure sustainability and enhancement of the benefits, the concept of community participation was used in a drinking water project for the first time in the history of the state. A consortium of five leading NGOs, led by the Indian Institute of Health Management and Research, implemented the community participation approach using a variety of tools such as brochures and flyers, door-to-door campaign, village-level consultations, school meetings, puppetry and folk media. A Water and Health Committee manages the water distribution system in each village. The community was motivated through awareness building for payment of bills, water conservation, equal and fair distribution to all villages, health education measures and sanitation measures. As women were the main beneficiaries of improved water supply and also the principal target group for health education, women's participation was the key element across all these activities. The implications of ownership are that the community had the right to decide on planning, designing, implementing, monitoring, operating and maintaining the installations of the system within its village.

## **WASMO, Gujarat<sup>14</sup>**

The Mission of Water and Sanitation Management Organization, Gujarat, is "working towards drinking water security and habitat improvement by empowering communities to manage their local water sources, drinking water supply and environmental sanitation". In meeting this end, it employs the services of NGOs or support agencies to carry out community outreach, build social capital and help the community plan its water supply schemes in a sustainable manner – socially, environmentally, and financially. Selected on the basis of existing relationships in the target villages so that they enjoy greater trust and efficacy among the communities, each NGO team, comprising eight members, is responsible for around 40-50 villages. The facilitation by the NGOs has been the key to success of rural water initiatives in Gujarat, in addition to the enabling environment created by the state government and WASMO. Most NGOs gradually build support and constituency for the water reforms and then introduce the formation of Pani Samitis (Water and Sanitation Committees) and water schemes using a variety of social mobilization and communication tools. Some of these tools are brochures, posters, door-to-door campaign, village-level meetings, focus on involvement of women, and films.

Each village forms a Pani Samiti, comprising 10-20 members representing different castes and sections in the village. It is chaired either by the Sarpanch or the ward Panch. This Samiti is the executor of all drinking water projects and receives funds directly from WASMO; the community contributes 10 percent or more of the total cost. All procurement, labour and material, is done directly by the Pani Samiti. Most villages have implemented water delivery systems that provide a private household connection to each family. Some villages provide 24x7 supply. Most villages keep a buffer storage of seven to 10 days to ensure drinking water even if pumps or bulk supply fails. There is a user fee charged by the Pani Samiti, which is used for paying bulk water charges and O&M costs. Strong emphasis has been laid in the communication tools on personal hygiene and sanitation; schools students are a prime focus of such communication.

<sup>13</sup> Reference : [www.aapniyojana.org](http://www.aapniyojana.org)

<sup>14</sup> Reference : [www.wasmo.org](http://www.wasmo.org)



## Successful Model of Public Private Partnership in Communications

### Location: Kerala

Palathulli-Jalasureksha 2010 (*Palathulli* – ‘many-a-drop’, *Jalasureksha* – ‘water security’) was a joint communications campaign (road show) organized by the Communication and Capacity Development Unit (CCDU) of the Water Resources Department, Malayala Manorama, a media house in the state and UNICEF, for propagating the message of water security.

Kerala, arguably one of the most rain-rich states in the country, is facing a decline in the availability and quality of potable water. The state registers one of the highest per capita consumption of potable water in the country. Sand mining in rivers and watersheds is killing the rivers and creating several environmental problems. The wells in Kerala run dry during summer and there is an acute shortage in the availability of pure water. All 44 rivers in Kerala are highly polluted due to inflow of untreated domestic and industrial waste and agriculture runoff. Most industries are located near the thickly populated riversides, often near cities and towns. Wide-spread bacteriological contamination of fecal origin in sources of public drinking water supplies (traditional open dug wells, bore wells and surface sources) is a matter of grave concern. Studies show that the quality of drinking water supplies in the state clearly indicates high level of bacterial contamination. This poses a serious risk to public health. To address the issue of scarcity of potable water and degrading water quality, a massive drive was conceived to capitalize on the awareness that was created in earlier years by various governmental and non-governmental campaigns. Influencing the masses for a sustained behavioural change was the critical challenge.

Despite spurts of activities, there still exists ignorance on the subject of water conservation and water quality management among the people. In this context, *Palathulli*, a project on water conservation by *Malayala Manorama*, and *Jalasureksha*, a project on water quality management by the Department of Water Resources, were integrated to leverage the strengths of both projects and to develop the campaign 'Palathulli-Jalasureksha'.

*Malayala Manorama*, the largest circulated and the largest read regional language newspaper in the country, also has leadership presence in television, radio, online and print media with a host of media titles. *Manorama* had launched the *Palathulli* project in 2004, an awareness and capacity building campaign to face societal challenges related to water. It resulted in a new paradigm of conservation of fresh water rivers and water sources and, most importantly, rainwater harvesting. The project was focused on rainwater harvesting and was immensely successful. The project won many awards like the UNESCO IPDC International Prize for Rural Communication in 2006 and the Indira Gandhi Environmental Prize in 2007.

The Department of Water Resources, Government of Kerala, launched *Jalasureksha*, a water security program to address the water related problems. The main objective of this program was to assure water security for all in a sustainable manner through

various programs initiated by the government and implemented through people's participation. The core of this program is to combine the efforts of all the line departments and relevant organizations and implement the water security plans under the auspices of people's representatives. Provision is also made for the required IEC and human resource development (HRD) activities so as to ensure active public involvement which is invariably a primary requisite for the success of such an endeavour. The CCDU Kerala is implementing the state-wide IEC and HRD activities through various projects.

The objective was to capitalize on the awareness already created and induce a behavioural change. The theme of the message was 'Pure Water, Pure Environment' giving the concerns on water quality a holistic environmental approach. Such a messages and learning should ideally be cultivated in people's mind from a very young age. A massive drive with local emphasize was achieved through a road show covering the entire state of Kerala. Since 'catching them young' was the idea, the strategy was to target schools and interact with as many students as possible. The 20-day long road show jointly managed by *Malayala Manorama* and CCDU ran across both urban and rural centres across all 14 districts in Kerala. Each day, three schools and one public place were selected as the venues for the road show to visit.

**Activities:** A van was fabricated to look like a typical house in Kerala. The activities staged on and in front of the vehicle included folk songs, magic shows, spot games for the students, water quality testing lab and resource person interaction, distribution of water quality testing kits to schools, *Palathulli-Jalasureksha* pledge cards/stickers for distribution and a giant droplet mascot.

**Folk songs:** A renowned troupe of 10 artistes conveyed messages on the need for protecting our water sources and maintaining the purity of water, through melodic folk songs. The traditional art of folk songs not only aroused interest but also made an emotional connect with the crowd. The songs covered themes like Kerala rivers, pure water and pure environment.

**Magic show:** The various magic tricks performed by a renowned magician induced curiosity and conveyed the message effectively. After each item, the magician explained the message to the audience. Each item was developed based on the theme of water quality, domestic waste management, sanitation planning, water borne diseases, rivers of Kerala, etc.

**Spot games for the students:** The compere asked questions related to the theme of water to the students gathered at each location. Prizes were given to correct answers.

**Water testing lab and resource person interaction:** A resource

person from CCDU interacted with the crowd for 10 minutes. At each school, around 10 water samples were collected and, using the kit, quality testing was demonstrated to the Chemistry teacher and a few senior students. During this live demonstration, the resource person explained the importance of confirming the quality of water.



**Water quality testing kit and contest kit distribution:** Each school was handed over a water quality testing kit after the live demonstration on how to use it. Along with this, a contest kit was also given. The contest announced by CCDU was a report preparation contest wherein the schools were asked to prepare a report using the water quality testing kit provided to the school. The best reports would be given prize money by the Government of Kerala.

**Pledge stickers and leaflet distribution:** An attractive sticker with a simple message on the campaign theme was distributed to the school students. Along with this, informative leaflets were distributed to the audience.

**Giant droplet mascot:** A giant droplet was the mascot of the road show. Popularly named 'Grandpa Raindrop', the mascot entertained the students with a dance.

Over 50 schools and 20 public places hosted the road show activity as part of this campaign. Schools with a headcount of

over 2,000 students each were selected. The program at public places was witnessed by a crowd of spectators at each location. The response from the schools was tremendous. The road show was received with lively enthusiasm by the young students. The keen interest showed by the attentive audience was encouraging for the organizers. The school authorities expressed appreciation of the content and quality of the road show.

Attention and interest was sustained by high profile cross media coverage. *Malayala Manorama* newspaper covered the road show at all venues in the respective district pages with photographs. Manorama News television channel covered the road show in the local news segment corresponding to each location. Radio Mango FM station from the Manorama Group gave radio jockey bytes announcing the arrival of the road show to the locality. The Manorama Online portal developed a special mini site on the activities and documented the photographs and videos on a regular basis.

The key factor behind the success of this campaign was the teamwork and the synergy that could be achieved out of this public private partnership. UNICEF's association enhanced the credibility of the project. Manorama Group provided the event management expertise and cross media editorial coverage for the program. The Department of Water Resources provided the resource persons – chemists and engineers from Kerala Water Authority and CCDU for interacting with students and also the water quality testing kits and literature for distribution.

*Palathulli- Jalasureksha* is a great example of a successful model of public private partnership. The role of the government in facilitating the program and the role of the media house in responsible communication went hand in hand. The results achieved by such a partnership, investing in educating the young citizens of the country and triggering a behavioural change, will bear fruits and stand the test of time.

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# STATE LEVEL REFORMS



# Towards a Uniform Approach for Decentralized Service Delivery

## Location: Maharashtra

Despite sizeable investments over the 1980s and 1990s in the rural water and sanitation sector in Maharashtra, many citizens still remained without access to safe and adequate water and sanitation. On the other hand, there was a financial crisis where resources were limited and needs were many. This situation prompted the Government of Maharashtra to undertake governance reforms in the sector in the year 2000.

Maharashtra is located in Western India and has a total population of about 97 million as per the last census of 2001. Out of this, 56 million (58 percent) population resides in rural and 41 million (42 percent) in urban areas. The state has 35 districts. Two of the districts are urban (Mumbai

and Mumbai suburban) while the remaining 33 are rural. For administrative purposes, the state is divided into six revenue divisions.<sup>15</sup> The rural population resides in 24,000 GPs, further sub-divided into 40,785 villages and around 45,500 habitations.

The Government of Maharashtra rural water sector reforms included the implementation of a uniform approach across the state, irrespective of source of funding, where: i) local governments led the process of need identification, designs, execution and O&M in full consultation with residents; ii) VWSCs are the vehicle to assist local governments in the process; iii) the village should contribute 10 percent of capital cost and agree to pay for all

O&M costs (including power) through appropriate user fees; iv) the District government provides technical support to the villages and also supervises quality of the process and works; v) the centralized PHED has been restructured to play a role of technical consultants to villages; and vi) the introduction of competitive rewards based on performance indicators for the local governments.

All these reforms led to a drastic shift from the traditional top-down approach to a bottom-up approach across the state with appropriate institutional structures to support the process.

The changes in roles and responsibilities before and after reforms are shown in Table 9.

<sup>15</sup> Konkan, Pune, Nashik, Aurangabad, Nagpur and Amravati.

**Table 9: Changes in roles and responsibilities before and after reforms**

Project Cycle Activities	Gram Panchayat <sup>16</sup>	Block Panchayat	Zila Panchayat	PHED <sup>17</sup>
<b>Plan, design &amp; execution of water supply infrastructure</b>				
Water supply needs identification	❖			*
Community mobilization	❖			
Design of scheme	❖	❖	❖	
Single village	❖			*
Multi-village	❖		❖	*
Contracting	❖			*
Funds routing	❖		❖	*
Supervision during construction				
Single village	❖			*
Multi-village			❖	*
Water quality testing	❖	❖	❖	*
<b>O&amp;M responsibility</b>				
Single village	❖			*
Multi-village	❖		❖	*
Water tariff finalization				
In village water distribution	❖			*
Bulk water supply			❖	*
Water tariff payment collection				
In village water distribution	❖		❖	
Bulk water supply				*
<b>Monitoring and grievance redressal</b>				
Capacity building of GPs			❖	
Monitoring	❖	❖	❖	*

❖ Post-reforms \* Pre-reforms

Based on these reforms, the World Bank financed a rural water and sanitation project in the state from 2002-09. The project has

been implemented in about 3,021 villages in 26 districts across the state, covering about 8.9 million rural citizens (1,162,606

households). A recently concluded report of this project indicates the following improvements due to the approach.

<sup>16</sup> India has adopted a three tier decentralized rural governance structure and assigned different roles and responsibilities to the three tiers. The nature of the organizations and their roles vary from state to state. The GP is the lowest tier of elected government, the Block Panchayat is the second highest tier and the Zila Panchayat is the district level elected government.

<sup>17</sup> The PHED is the state level centralized engineering unit that has been created in the 1970s in most states to design, execute and manage water supply schemes in both villages and cities.

**Table 10: Improvements due to the project**

Indicator	Baseline Situation 2002	Current Situation 2010
% of GPs where water schemes are fully functional and are delivering potable water to the households as per Govt. of Maharashtra criteria <sup>18</sup>	N/A	2,294 (where water supply commissioned) 76%
% of households using sanitation facilities in project villages	19% (220,895)	77% 898,351
% of GPs where 100% ODF status has been achieved	0%	61% (1848)
No. of GPs where full community contribution for capital has been achieved	0	3,022
% of GPs holding a minimum of 6 Gram Sabhas <sup>19</sup> per year, to make decisions on planning, implementation and O&M of RWSS	0%	93% <sup>20</sup> (2,810)
% participation of women in the Gram Sabha meetings, across all GPs	5%	53%

## Key Lessons

- Decentralization is part of the larger governance structure and needs political commitment, appropriate policy environment and institutional structures
- While decentralizing, it is important to define the roles and responsibility of centralized institutions (like the PHEDs) and also undertake necessary restructuring of the centralized agency
- While decentralization is seen as giving a large part of the roles and responsibilities to lowest tiers of government or communities, there is a need to define support from higher tiers of government
- Competitions, peer-learning are good approaches to capacity building of local governments

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<sup>18</sup> To be reachable within 1.6 km distance, 30 m vertical distance.

<sup>19</sup> Gram Sabha is village assembly to make decisions concerning village development or other local issues.

<sup>20</sup> Last assessed in March 2008.

# Uttarakhand Rural Water Supply and Sanitation Project: A Flag-bearer of the Sector Wide Approach

## Location: Uttarakhand

The pilot phase of the rural water supply and sanitation project implemented in Uttar Pradesh and Uttarakhand (popularly known as Swajal Project) during 1996-2003 became a sector model in India. Demonstrated success of the Swajal Pilot Project encouraged the Government of Uttarakhand to scale it up for improved coverage in the state, adopting a sector-wide approach. The scaled up project, now called the Uttarakhand Rural Water Supply and Sanitation Project ('Global First' rural water supply and sanitation project), is unique on several counts. Concepts such as decentralization, partnership, community management, effective demand, gender analysis and cost recovery are deeply engrained in the project principles adhering to the 73rd constitutional amendment of the Indian Constitution.

The project covers the entire rural Uttarakhand and is facilitated by the Department of Drinking Water, Government of Uttarakhand and executed by three agencies namely Uttarakhand Peyjal Nigam (UJN), Uttarakhand Jal Sansthan (UJS) and Project Management Unit (Swajal). IDA-World Bank, Government of India, Government of Uttarakhand and rural beneficiary communities jointly fund the project. The project has a total budget of US\$ 224 million of

which the IDA credit is limited to a maximum of US\$ 120 million. The project commenced operations in November 2006 and will conclude in June 2012.

This case study attempts to: i) describe the project in brief; ii) identify some unique characteristics of the project; iii) share experiences and good practices under the project, including their applicability and efficacy in improving sustainable service for the rural communities; and iv) detail lessons learnt for better working and planning with communities.

The delivery of sustainable rural water supply and sanitation service is an issue of considerable concern among policy planners and water sector managers of the country. The case study is intended for managers and planners who are concerned with the challenging problem of how to deliver sustainable water supply and sanitation services in the rural areas. Evidence exists to support the fact that sustainable delivery of water supply and sanitation services encompasses not only technical issues, but also managerial, social, financial and institutional.

The current project design is such that it moves away from the target-based, supply-driven model to a demand-based

approach where users get the service they want and are willing to pay for it across the rural area of the state, i.e., across the sector. The basic principles for reform in the rural water supply and sanitation service sector include community participation in the planning, implementation, O&M for the scheme of its choice, and the changing role of the government from that of a service provider to a facilitator.

The unique features of the project have benefited/are benefiting rural communities in several ways. Admittedly, the culture of dependence on outsiders for a basic necessity like water supply has been considerably reduced by the empowered User Water Supply and Sanitation Committees (UWSSCs) regarding quality, quantity, service level and system reliability of the water supply scheme. The benefits accrued to communities due to sustainable O&M of the water supply scheme by the VWSC include: i) reduction in coping cost as well as more availability of household space due to elimination of storing water in larger containers; ii) elimination of travel time and travel cost in lodging no-water complaints, making payment of bills/getting corrections in wrong bills and getting sanction of new water connection; iii) improvement in Mean Time Between Failure

(MTBF) due to better quality of repairs and strict control/supervision by the community; and iv), most importantly, reduced bureaucracy.

Water scarcity in hilly regions is a major issue being faced by the state. Data from existing water supply schemes indicated that nearly 30 percent of the schemes suffered from a decrease in the availability of water, especially during the summer months, because of depletion of water sources. This also caused some of the villagers to spend considerable amount of time collecting water for domestic use, averaging one to three hours per day; even more time is spent in hilly locations. The problem was aggravated by water supply systems which had outlived their design life, and inadequate O&M.

It is widely recognized that supply-driven rural water supply and sanitation service delivery does not adequately serve the requirements of user communities as they are often located at sites without consideration of community needs or preference. Planning of rural water supply and sanitation services also takes place without due attention to resource availability or quality, and the schemes are rarely financially viable. The end result is a government-dominated and target-driven service that has become unsustainable.

The current project significantly differs from previous efforts to supply water. The tenets of the current project include: i)

a community-led participatory program which aimed to provide drinking water facilities in rural areas with minimum provision of 40 lpcd; ii) adoption of a demand-responsive, adaptable approach along with community participation based on empowerment of villagers to ensure their full participation in the project through a decision making role in the choice of the drinking water scheme, planning, design, implementation, control of finances and management arrangements; iii) full ownership of drinking water assets with UWSSCs; (iv) communities have the powers to plan, implement, operate, maintain and manage all water supply and sanitation schemes; v) partial capital cost sharing either in cash or kind including labour or both, 100 percent responsibility of O&M by the users; vi) an integrated service delivery mechanism; vii) taking up of conservation measures through rainwater harvesting and ground water recharge systems for sustained drinking water supply; and viii) shifting the role of government from direct service delivery to that of planning, policy formulation, monitoring and evaluation, and partial financial support.

The project's development objective is to improve the effectiveness of rural water supply and sanitation services through decentralization and increased role of PRIs and involvement of local communities in the state. The project is also aimed at bringing associated benefits, including improved health resulting from reduced water-

borne diseases, environmental sustainability through protection and management of water source catchment areas, and time savings in fetching water, especially for women. The project envisages upgrading no or partial coverage of water supply to full coverage with sustainable service, benefiting at least 1.2 million people, or 20 percent of the rural population. The project will also improve sanitation in about 30 percent of rural communities, to be declared ODF.

Recognizing the need for scaling up reforms, the Government of Uttarakhand issued its rural water supply and sanitation sector policy. The key elements of the policy included: i) decentralized service delivery through devolution of administrative, executive, and financial powers to the three-tier PRI institutions; ii) establishment of the State Water and Sanitation Mission (SWSM) and District Water and Sanitation Missions (DWSMs), to oversee the policy and planning for the sector; and iii) adoption of an integrated approach to service delivery, linking water supply, sanitation, health and hygiene, catchment-area conservation, and community-development initiatives.

Proactiveness of top political leadership and committed bureaucracy, willingness to implement reforms at the senior level and a broad consensus of priorities created momentum and legitimacy to drive the sector wide approach (SWAp) program. The progress of SWAp has been

made an integral part of Annual Confidential Reports.

### **Introduction of uniform computerized accounting system:**

It was recognized that the timely reimbursement of project cost is dependent on timely preparation of the consolidated financial statement. Therefore, a computerized accounting system having an 'account code classification system' was operationalized in all implementing agency offices.

### **Adequate change management:**

Appropriate change management efforts to shift the mindset of the sector institutions from service provider to a facilitator were whole-heartedly taken up by engaging reputed training institutes.

**Manuals** such as operations, procurement, financial management and technical for implementation of the project were prepared and agreed with the World Bank before embarking on actual implementation.

**IEC:** The project printed booklets, leaflets, and posters that provided messages on the project, including use of toilets, health and hygiene aspects. A documentary film depicting detailed processes

for implementation of the project was prepared.

This case study does not highlight the case of a particular water supply scheme but dwells on essential features of the project as a whole.

The project is being executed by three line agencies: Project Management Unit Swajal, UJS and UJN. SWSM and DWSM oversee the activities of three line agencies at the state and district level. All decisions for planning, design, implementation and maintenance are decentralized at the district and village level. The village UWSSC under the GP is fully responsible for the intra-village scheme design, procurement, implementation and management. UJS and UJN are responsible for bulk water supply under multi-village schemes.

Support organizations are contracted for community development and technical support to the UWSSCs. They are contracted by the district implementing agency, based on a district specific short list of applicants, as per procurement guidelines. The project mobilizes households for group action through the UWSSC, a sub-

committee of the GP. The composition of the UWSSC is interesting as rural women constitute 30 percent, with an equal number from SC and ST households. Communities have shown tremendous interest and enthusiasm in shouldering responsibilities, including procurement and financial management activities.

The total water sector investment committed is US\$ 224 million for the SWAp. Partners for the SWAp pool (US\$ 224 million) include Government of India (31 percent), Government of Uttarakhand (67 percent); and the User Communities (3 percent) financial share. The IDA will reimburse the Government of Uttarakhand share of SWAp basket up to US\$ 120 Million, against an annually varying reimbursement pattern, agreed in the Project Appraisal Document. The three sub-components and percentage share by the Government of Uttarakhand are given in Table 11.

The following project cycle is followed for detailed planning, implementation and O&M:

**Project cycle for single village schemes:** Each scheme cycle includes four phases, including

**Table 11: Component-wise SWAp budget – share of the Government of Uttarakhand**

SWAp Program Components		Total Budget Million \$	GoU share %	% IDA Reimbursement
A	RWSS Development	5.02	5.02	100%
B	RWSS Infrastructure Investments	196.78	103.40	53%
C	Program Management Support and M&E	22.09	11.60	52%
	Total	224.00	120.00	54%

*RWSS: Rural Water Supply and Sanitation; GoU: Government of Uttarakhand*

pre-planning (two months), planning (three to six months), implementation (six to 18 months), and O&M phase (four months). The duration of each phase depends on the scheme size, technology type and the time it takes to mobilize the communities.

**(a) Pre-planning phase:** Major outputs of the pre-planning phase include: i) selection of support organizations; and ii) collection of baseline data; and iii) selection of GP/habitation. Since the GP is not a homogenous unit, most of the information is collected from each habitation of the GP to understand the access of different socio-economic groups to water and sanitation facilities.

**(b) Planning phase:** This phase includes: i) mobilization of communities, participatory planning, and use of SARAR tools, problem investigation, analysis and solving; ii) formation of UWSSC; iii) selection of water supply and sanitation technology by the users in community-wide meetings; iv) capacity building on community development, health, feasibility and design of water supply schemes, catchment area protection, accounting, etc., for support organization/GP/UWSSCs members; v) preparation of detailed project reports and community action plan for each UWSSC; vi) collecting upfront cash and O&M community contribution for water supply, sanitation, and catchment area protection works; and vii) involvement of women

and marginalized sections of community in the entire planning phase.

**(c) Implementation phase:** The outputs of this phase include: i) preparation of implementation phase proposal, construction of water supply schemes, environmental sanitation works and catchment area protection works by GP/UWSSC through community engineers contracted out by District Implementing Agency (DIA); ii) independent third party construction supervision by the Service Agency and facilitation and monitoring by DIA, contracted out by SWSM; iii) collecting balance cash/labour and O&M community contribution for water supply, sanitation, and catchment area protection works; iv) training on community development, health, women's development initiatives, book keeping, O&M (technical, institutional, financial), etc., for GP/UWSSC members; and v) preparation of the implementation phase completion reports.

**(d) O&M phase:** DIA provides technical assistance to the UWSSCs after commissioning of the water supply schemes to place the O&M system in order. Training at the GP/UWSSC level is conducted by DIA. The O&M system comprises the technical, financial, and the institutional systems. After establishing O&M system and completing all the activities stipulated in the agreement, the DIA formally exits from the GP. Thereafter, the scheme's maintenance continues

to be carried out by the UWSSC. However, the sector agencies continue to monitor and support the GPs on O&M issues, including large repairs, which cannot be undertaken at the GP level.

## Support Organizations and Service Agencies

NGOs and community-based organizations are involved in the sector program as a link between the beneficiary communities and the district implementing agencies. Acting as catalysts in the process, they are involved in the scheme cycle activities in motivating and mobilizing the communities and building their capacities towards their envisaged roles and responsibilities in the management of their water and sanitation schemes.

The challenges for the project were to develop a system which embodies the philosophy of the demand-responsive approach, and provides an alternative to supply-driven service delivery mechanism. The challenges for the implementing agency were to act as a facilitator and co-financer (to provide assistance at appropriate time and ensure capital cost sharing by the community), as a monitor (process and progress) and as an agency to ensure the standards of construction, accounts and community development activities.

The innovations and interventions at various levels are discussed in following paragraphs. Appropriate change management

efforts to shift the mindset of the sector institutions from service provider to facilitator were wholeheartedly taken up by engaging reputed training institutes. Steps had to be initiated for focusing on O&M aspects for the sustainability of schemes in addition to the training programs on the design and implementation of rural water and sanitation schemes. How and where to interact with district level formal institutions had to be focused on during capacity building in order to cover the eventualities of major repair works. The Project Appraisal Document and Operations Manual provide that the SWAp principles be followed for all new investments. It was recognized that in 'exceptional situations' the principles of 'demand' responsive community participation may not be practical. Examples of such exceptional situations include: damages due to natural calamities, damages due to road construction activities, water supply schemes for tourists en route pilgrimage sites; and emergencies such as floods, drought, epidemics, etc. The policy exceptions were sought from the World Bank.

The Sixth Implementation Support Mission, April, 2010,

of the World Bank in its Aide-Memoire has given the project rating shown in Table 12.

The project is being implemented by following uniform policies and institutional arrangements across the state. *Schemes covering more than 1,800 habitations have already laid a solid foundation for the SWAp program in Uttarakhand.* The decentralized institutional arrangements, processes and procedures are established and fully operational in all the 13 districts. The GPs through UWSSCs are fully responsible for Single Village Scheme (SVS) and intra-village Multi Village Scheme (MVS). The sector institutions are responsible for bulk water supply under the MVS. The water supply schemes are integrated with catchment area programs, household and village environmental sanitation programs, solid waste management and health and hygiene awareness promotion programs, in order to maximize water supply and health benefits to the communities. Compared to the pre-project household coverage of sanitary latrines at 21 percent, the existing project coverage has gone up to 71 percent, a difference of 50 percent achievement as a result of the

project efforts and the Centre sponsored Total Sanitation Campaign. The NGP for clean villages has been received by 25 percent GPs (418 GPs) against the target of 15 percent GPs.

While independent monitoring and social audits are in-built in the project design, the implementing agencies have started signing-off, providing quality assurance for the completed schemes. Also, continuous supervision has been introduced during the O&M stage to ensure technical and financial support to the GPs.

The district schedule of rates for various engineering items/works/materials (local and non local) are jointly prepared by all the three implementing agencies, based on the existing analysis of rates and are approved by the DWSSM. This schedule of rates is updated on a yearly basis or as and when needed. Thus there is a single set of schedule of rates for each district and for all the implementing agencies.

The culture of dependence on outsiders for a basic necessity like water is showing a diminishing trend leading to a positive indication of Gram Swarajya (village self rule),

**Table 12: World Bank project rating**

India, Uttaranchal RWSS (Project ID: P083187; Loan/Credit No.: 42320)

Key Project Data		Current Ratings and Flags	
Effectiveness Date	11/30/2006	Development Objectives	Satisfactory
Closing Date	06/30/2012	Implementation Progress	Moderately Satisfactory
Project Age	3.4 years	Problem Flags	None
% Disbursed	21		

in other words, 'community pride and community control'. Robust monitoring is followed to monitor processes, inputs, outputs and outcomes, including indicators of change under the project. Governance and accountability measures have been adopted as an integral part of the project design and implementation. The Swajal Project Management Unit has consecutively received the Right to Information (RTI) award 2009 and 2010 for transparency and good governance practices, which include independent quality checks, community monitoring, grievance redressal measures, social audits, robust monitoring and evaluation, and sector-wide information system, for information disclosure and tracking progress of the schemes in all phases of the project.

**Capacity building of all stakeholders:** Capacity building of all stakeholders was essential for effective and efficient implementation of the project. Therefore, a comprehensive capacity building plan was developed and included detailed and programmed training modules for: i) SWSM and Program Management Unit; ii) DWSSMs and District Program Management Units; iii) change management and community-development skills for sector institutions; iv) general training activities for PRIs; and v) training of support organizations and support agencies. Special training programs have been developed and implemented through the local training

institutions to sensitize the state, district and village stakeholders and functionaries regarding the project. These programs include modules on planning and implementation of SVS and MVS, environmental and sanitation hygiene awareness programs and practices, financial and procurement management practices, etc.

**IEC:** The project has printed booklets, leaflets and posters that provide messages on the project, including health and hygiene, Total Sanitation Campaign, technology options for sanitation, use of toilets, good practice case studies, informal education, along with roles and responsibilities at the state, district and village levels. IEC activities, mainly to promote the decentralization agenda and SWAp program, have been carried out through workshops, cross-visits, competitions, IEC stalls, television programs, etc. A couple of short documentary films have been prepared on the good practices currently being implemented under the project.

**Governance and accountability processes adopted:** Independent reviews are an integral part of the project processes, including concurrent monitoring during the scheme planning phase, third party construction quality checks, technical audits, social audits and grievance redressal measures during the scheme implementation phase. The project clearly defines the roles and responsibilities of the beneficiary communities and

community-based organizations, NGOs, independent reviewers, PRIs, SWSM and the implementing agencies.

### **PRI and community**

**mobilization:** The project has made a commendable effort in identifying, prioritizing and selecting GPs/villages/habitations for intervention. Subsequently, households in the selected habitations have been mobilized into UWSSCs, sub-committees of the GP, which have proved to be an effective vehicle of community participation. The support organizations have contributed significantly towards mobilizing as well as capacitating the local communities. User surveys confirm full acceptance and satisfaction by the communities for water supply and sanitation schemes implemented under the project. Since it was recognized that the support organizations would play the key role in achieving effective community participation, efforts were made to ensure that they would be selected and trained in an appropriate manner.

**Social audit committee:** This committee is constituted in each water supply scheme. The Social Audit Committee performs the following functions: i) ensures that all the committees follow the Procurement Manual; ii) reports any violation or deviation of rules to GP; iii) monitors the adherence of project principles and rules in selection of beneficiaries, implementation of sub projects and all decisions of UWSSC.

**Grievance redressal mechanism:**

The project provides for complete decentralization in the pre-planning, planning, procurement, construction and O&M of water supply schemes at grassroot levels where decisions are taken by the concerned UWSSC with assistance of the GP and facilitation by the support organization and DIA.

**Grievance redressal at**

**UWSSC level:** On receipt of a grievance, the UWSSC convenes a community wide meeting and it is put up before the members of the UWSSC and the community. This process is facilitated by DIA and the representatives of the support organization and the GP. It is noteworthy to mention here that 146 out of total 154 grievances relating to various categories are already attended to the satisfaction of the complainant since the inception of the project.

All steps are being taken during design, implementation and maintenance stages to ensure sustainability of schemes. The project is currently on-going and a periodic review will be carried out to monitor sustainability. The project has designed a Sustainability Evaluation Exercise to assess the sustainability of completed schemes which are more than one year old. The Indian Institute

of Public Administration has been engaged to conduct the independent study on sustainability perspectives. The study would be completed by March 2011.

This project has been a trend setter in the rural water supply and sanitation sector for adopting a sector wide approach. The effective and efficient functioning of implementing agencies has reinforced the hypothesis that proper orientation and training, a mix of skills, experience and gender can work in tandem to achieve positive results. It has been proved that the partnership between village communities, NGOs and the government, where the government takes the role of facilitation and co-financing, has worked successfully. The project has demonstrated that the communities can efficiently and effectively handle dispute resolutions, material procurement, financial transactions and record/book keeping in a satisfactory manner, when properly trained. Catchment area protection works and water supply scheme construction works should be implemented simultaneously so that the sustainability of the tapped water source can be monitored during the project period itself.

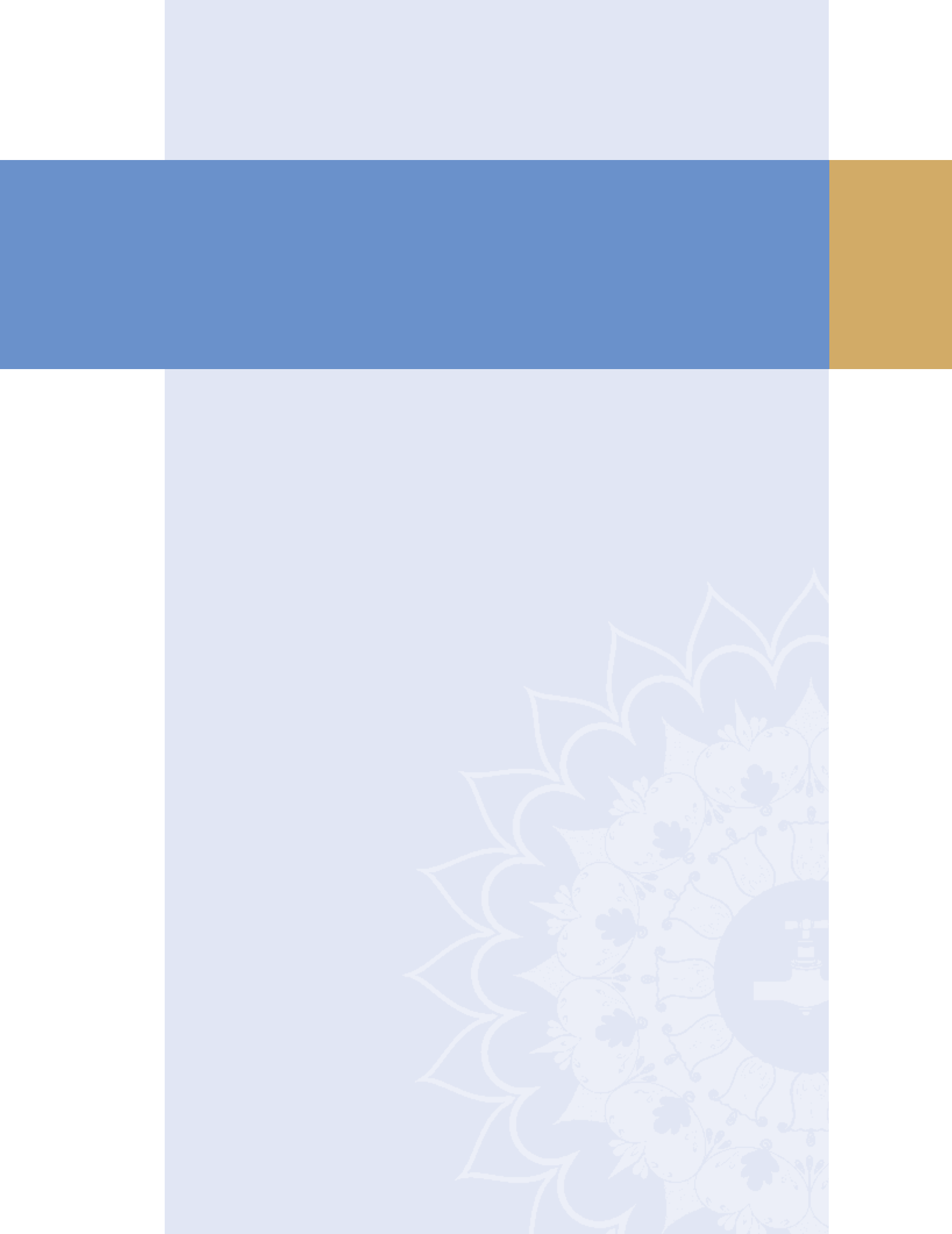
The project has largely demonstrated that as long as a demand-responsive approach is adopted, communities are willing to contribute towards capital cost and plan, implement, operate and maintain their own schemes. The project has demonstrated that an alternative delivery system vis-à-vis the present top down government-dominated system is not only desirable but also feasible in the sector. The capacity of the communities and the NGOs has been upgraded to such a degree that the methodology of the project can be successfully carried over to other development areas. A gender balance approach is important to ensure that both women and men have the same opportunities to influence and control the new services and share their benefits. Observation study tours and exposure visits have been found to be an effective tool in creating necessary awareness and in changing the mindset of policy makers. The possibility of misappropriating and misusing the funds is minimal if transparency at each stage is adhered to and monitored. Irrespective of the source of funding, there should be a uniform policy regarding capital cost sharing as well as O&M. Otherwise the current systems are unsustainable.

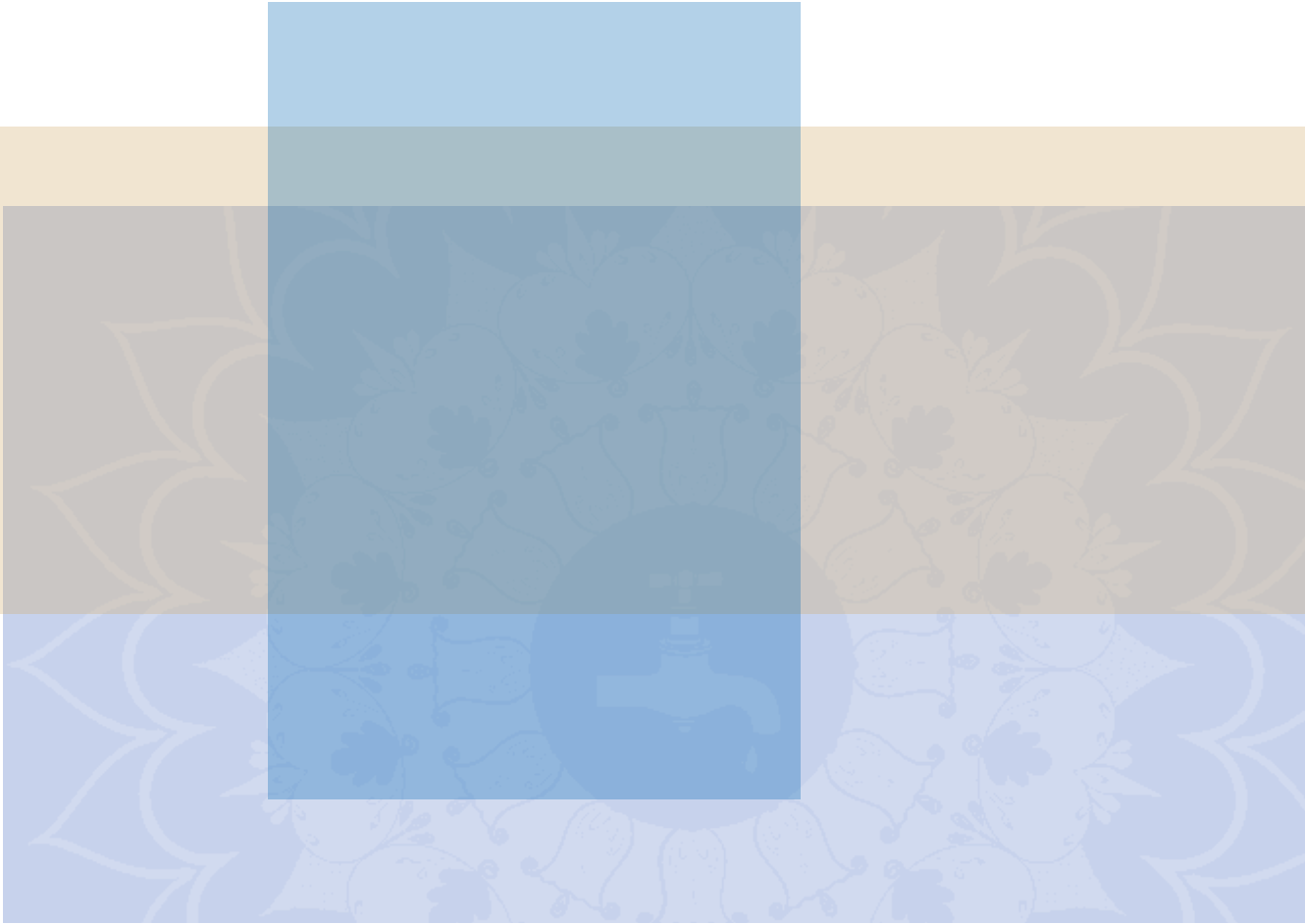
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