Workshop on 'Traditional water management and sanitation in Gujarat'

Professor Anil Gupta welcomed all the participants for the workshop on **'Traditional water management and sanitation in Gujarat'** organized at IIM campus on 31st December 2010. He gave a brief about the aim of organizing this workshop. He emphasized upon the need of conserving every single drop of water and conveyed the message by an interesting two thousand years old Zen story.

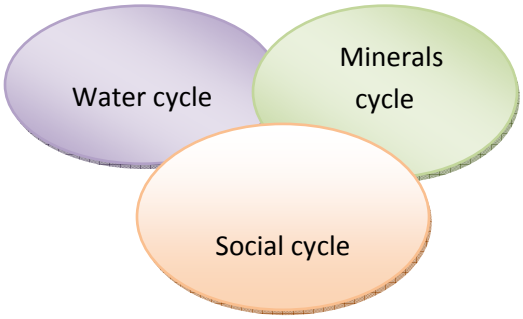
> *A monk was known to teach in a very subtle manner. He had many disciples and he tried to teach them individually according to their sensibilities. One day, a particular disciple started to argue with him about the need for conservation. The monk asked him to bring a glass of water. The disciple brought the water. When monk had taken the water, the disciple took the empty glass, and on the way back to the kitchen, threw away the remaining droplets in the glass by inverting the glass a few times. The monk saw him doing that. He called him back and asked as to what had the disciple actually done.*
>
> *The disciple said, "Nothing, I just brought the glass of water as you advised and then took the empty glass back". The monk asked, "Is that all try to remember everything". The disciple narrated the entire sequence of steps he took to bring the water and then added, "While taking the glass back, I threw away just a few drops of water".*
>
> *The monk said, "What! Just…."*
>
> *Thus, Professor* emphatically stressed upon not a single drop of water to be wasted.

As the whole world is facing natural calamities like cyclone, snowfall etc., so if ever there is going to be a 3rd world war then it will surely be for drinking water. Therefore, it is of utmost importance to sensitize the community for proper handling of each drop of water. It is truly said **"WATER IS LIFE".**

- He also gave reference of our first Agricultural minister Sh. Kanehaya Lal Munshi, who had written a book (1952) on importance of cleanliness in our life, ***'Gospel of dirty Hands'*** and prepared a team of social workers called as ***'Bhoo-Sena"*** to create awareness for hygiene among the people .
- He emphasized on starting a movement for sanitation.
- Quality of water should be improved (in perspective of minerals nutrition availability). 43% children are suffering from malnutrition due to unavailability of micronutrients in such a developed state of India.
- To clean the storage area for controlling bacteriological (*E. coli etc.)* growth in it.
- Better sanitation should then convert into better health.

After this he explained the 3 circles of concern viz., circle of minerals, circle of water, and circle of life. All the three are interconnected. The prosperity ratio is dependent on the three circles. If the soil is filled with appropriate minerals in adequate quantum, then the water will be of good quality. And if soil and water are of good quality then automatically the circle of life expands. So, it is equally important to

sensitize rural community to adapt different measures to increase the circle of life by emphasizing on water and soil.



Prof gave the example of British Council of Medicine, where they found out the reasons for the increase of life span of human being from 36 years to 80 years. And they discovered four major reasons for this, which were as follows:

1) Antibiotics
2) Vaccination
3) Surgery
4) Cleanliness

The four things which increased the life expectancy of a person from 36 to 80.

Shri R.K. Sama, Project Director, WASMO-Gandhinagar expressed his anxiety regarding three facets which when resolved can suffice the water needs up to some extent. They are:-

1) Proper management of water and cleanliness at the places of hand pumps
2) Cleanliness of structures especially for storage purpose on regular basis
3) The structures should be covered with the lid to avoid contamination of drinking water

Mr. Sama had given the example that in 1926, Mahatma Gandhi started the sanitation movement because for the last 1600 years when the society was divided in four categories i.e. *Brahmin, Kshtriya, Vaishya and Shudra, the lowly work of cleaning (sanitation) was assigned to Shudras while the other varnas considered themselves above it*. By starting this movement, Gandhiji wanted to change that age old perception and keeping one's premises clean is everyone's duty and has nothing to do with any particular caste.

He also explained the main objective of WASMO- "**Building partnerships and working together"** by giving certain examples. In one such example, he described how during his visit to Patan area in a village around 3-4 years back, he noted that the area where Valmikis resided was the cleanest block of the village. A few noted elderly villagers who accompanied him also realized this and vowed to improve the sanitation conditions in their blocks also.

Mr. Sama also criticized the use of RO- water purifiers in the houses as it depletes certain essential minerals which are available in water. He stated that this way, we are curing one thing but we may be inviting certain unknown diseases and considered the whole propaganda to be triggered by MNC's for their own profits. He compared the Narmada river water rich in essential nutrients with 'Amruta'.

The village representatives of various districts were then asked to represent their innovation. They are as follows:-

➔ ***Jepar village of Surendranagar district: -*** Being the last village of RWSS, it was always deprived of regular water supply. Facing scarcity round the year enforced the village leaders to take some tangible steps to resolve the constraint. Meanwhile, the visit of CEO, WASMO-Gandhinagar showed them a way to make their dreams come true. After WASMO's consent to implement the in-village water supply system in Jepar village, the *Pani Samiti* formulated some rules and regulations for smooth functioning of the whole system right from the initial stage. Some of them are:-

1)*Pani Samiti* member has to contribute first then collect from rest of the village.
2)*Pani Samiti* charges only a small amount of Rs.50 per month or Rs. 600 per year, while for every new connection the amount charged is Rs.1000.
3)Regular *Pani Samiti* meetings
4)Work distribution regarding inspection of ongoing works
5)Water distribution to each household on equity basis

(a)

(b)

(c)

(d)

Photos: (a). Water storage tank, (b). Construction work going on, (c). Under ground chamber and (d). Water supply pump house.

After execution of physical works, the village marched towards attainment of 24x7 water supply system. Initially, this nutshell was hard to break. But due to the strong determination of the Pani Samiti members, the impossible became possible. After overcoming number of hurdles, the village finally established a regular 24x7 water supply system on equity basis. The result obtained by this innovation set an example to motivate other villages. The village is practicing the motto of "Conserve energy, conserve water"

➔ ***Nani Rajsthali village of Bhavnagar district: -*** Nani Rajsthali village of Bhavnagar district implemented and executed the physical works pertaining to in-village water supply system under WASMO program. The village was getting water through Mahi RWSS regularly, until one day the technical fault in the main pipeline enforced the village community to opt for some other alternative. As feasibility of local source was meager, the *Sarpanch* thought of getting water from the pond which was located 2 kms away from the village. But direct usage of pond water is not advisable as it possess high turbidity. But the hurdle didn't stop their determination. Continuous brain storming resulted into an innovation. The Sarpanch approached WASMO with his innovation which was welcomed by the management.

(a)

(b)

(c)

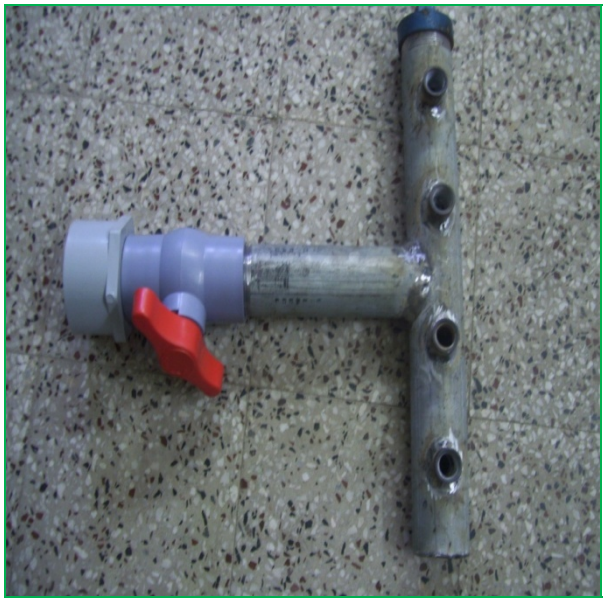
(d)

Photos: (a). Natural water storage pond, (b & c). Artificial pond for water treatment and (d). Water tank.

As per the same, the overall system was executed and accordingly the water from the pond was lifted by pumping system and through pipeline it reaches to a collection pit of 25x25 mt which was excavated by the *Pani Samiti* especially for filter purpose. The total expenditure of excavation amounted to Rs. 45,000. The water collected in this pit passes through different layers of small and big stones and pebbles. After this the water passes into the well and from here the

water is supplied to the whole village through pumping. This way, the village developed a new sustainable source.

➔ ***Bagdu village of Junagadh district: -*** The topography of Bagdu village is like an inverted saucer which does not permit water distribution to all the houses on equity basis. Some of the houses are on very high terrain and vice versa. The village is having Individual water supply system and is getting water from the bore well located in the outskirts of the village. But as the pipeline was old and was requiring frequent operation and maintenance, the need to develop a whole sustainable system arise. Meanwhile, the introduction of SRS program under WASMO showed them a way to achieve their objective.



(a)

(b)

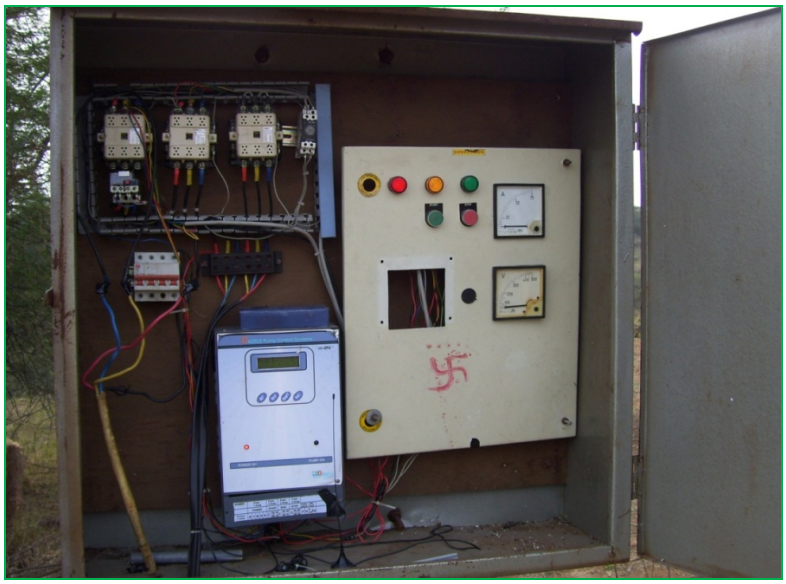
(c)

Photos: (a). Closer view of T shape stand system, (b). Fix valve-Stand system installed near the wall and (c). Innovator Jaintibhai with T- stand system.

Under this, they developed a "Fix valve-Stand system" to overcome the obstacle of water distribution system in an undulating terrain. At each lane, the system is fixed based on the number of households. For fifteen days, the pressure is adjusted through valve and as soon as it calibrates the system is concreted so that no one can cause any damage. The maximum no. of households is 8 on any line. There are 150 such valve systems. The overall cost incurred behind this system was 265000/- Through this system the village was able to save Rs. 100000/- on monthly basis. In this way, the whole cost incurred was compensated within three months. One of the main features of their innovation was a T-shaped stand with four inbuilt connection holes which can be increased by attaching extendable connection holes on both sides of stand. The total expenditure incurred for each such T-stand is Rs. 1700. The advantage of this system is that no illegal connections can be taken and also the *Panchayat* has the regulatory system which generates water tariff on regular basis.

➔ ***Salatpur village of Sabarkanta district: -*** The drinking water source of Salatpur village of Sabarkanta district is located nearly 6.5 kms away from the village water head works. The pump operation and the valve system operation were difficult to handle. Above all the power availability, salary to operator was intricate problems to overcome. These hurdles enforced the village panchayat to opt for innovative method for operation of in-village water supply system through mobile technology. The following are the features of this system:-

- ✓ Mobile technology
  - ➦ GSM based wireless control
  - ➦ pump operation through SMS
- ✓ Monitoring
  - ➦ Status reporting
  - ➦ Schedule Programming
  - ➦ Power avilability
- ✓ Security
  - ➦ Password Protection
  - ➦ Dry run protection
- ✓ Operational ease
  - ➦ Minimum cost (Free SMS)
  - ➦ Effective Communication
  - ➦ Resource conservation
  - ➦ Anywhere anytime



(a) (b)

Photos: (a). Mobile phone operated motor pump switch board and (b). Mobile phone used for operating motor pump.

The benefits of this automation are as follows:-

- Mobile handset based operation, Transparancy, Security
- Water and Power efficiency, Emergency operation
- Pump Protection, Motivation, Low Costs – Investment, Running, Support
- Network and Collabration Opportunity, Strengthening of Institution

A conducive environment facilitated the implementation of this innovative idea. The main lessons learnt from this innovation are:

- The water cycle can be used as an effective tool to engage community participation while addressing water service problems in local settings;
- Institutional support is required for innovation to
  - ✓ seek starting up funding,
  - ✓ support efforts at local level; and
- The application of social capital principles in planning and implementing innovative activities is important to gain support from the community.

➔ ***Parjau village,Taluka Abdasa, District Kachchh:-*** ***This is an important case*** *study of an innovative method of artificial recharging by arresting rainwater in plain terrain. An area of about 80 sq. km is situated between Parjau Lala Vingaber and Sindhoti Moti of Abdasa taluka is known as Koniyar area having good ground water potential* and thus is the water supply source of villages Naliya, Jakhau and Parjau as well as a regional water supply scheme of 11 villages of Abdasa taluka. Nearly 70 tube wells for agriculture purpose are operated by the farmers for constant withdrawal.

➔ This Koniyara area is basically a flat terrain area having gentle slope towards the sea with no hillocks or banks for construction of structures like check dams/percolation tanks.The ground

water level is at a depth of 90 meters. The villagers decided to take some tangible steps towards conservation of rain water flowing endlessly towards sea.

A detailed field survey was carried out by CMSU – Bhuj team, ISA - KFFFDT and villagers from Parjau area. After survey four places were identified from where maximum rain water can be trapped for recharging. *They had initially planned to construct five flow barriers almost of inverted v shape (two each in first and third row and one in middle row) to check the water flowing uselessly into the Arabian Sea. But at present four of them are in working condition.* Artificial percolation ponds called recharge pits each having capacity of 7500 cum was constructed in each barrier. For recharging deep cited aquifers, recharge bore having depth of 100 mts is provided in each pit costing around Rs. 67,000-1, 00,000. R.C.C pipes have been lowered as per strata to form a vertical channel for rain water percolation. A filter chamber having 5 mts diameter and depth 1 mt has been constructed surrounding recharge bore. Black trap metal has been filled in chamber as filter media.

(a) (b)

(c)

Photos: (a). Recharging bore well, (b). Water barricade and (c). Water barricade under construction.

➔ **Impact of the structures**

Source of 3 individual villages and R.W.S.S. covering 11 villages will get benefit of recharging.

As sources are situated near coastal region hence it will help in lowering the TDS content.

Some area of land of Koniyara area falls in forest area hence availability of drinking water for wild animals.

Ramp has been provided in each pit, so that livestock or any wild animal if enters for drinking water, can easily come out.

A direction for rain water recharging has been shown to villages which can be replicated by surrounding villages. Works are completed before onset of monsoon. All 4 recharge pits got overflowed and again got emptied twice. Pit no. 3 and 4 got refilled thrice.

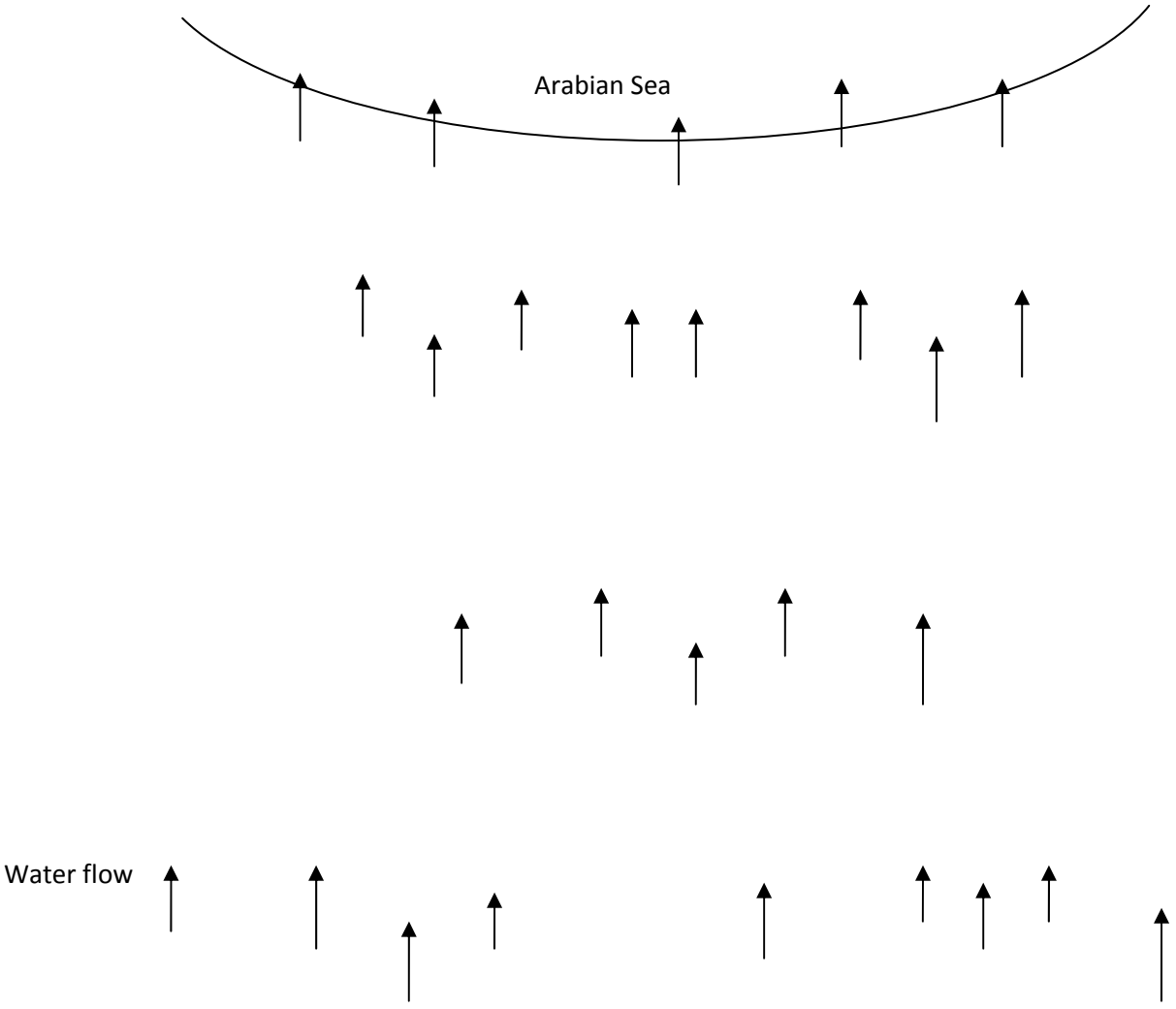


Diagram: Pre- intervention

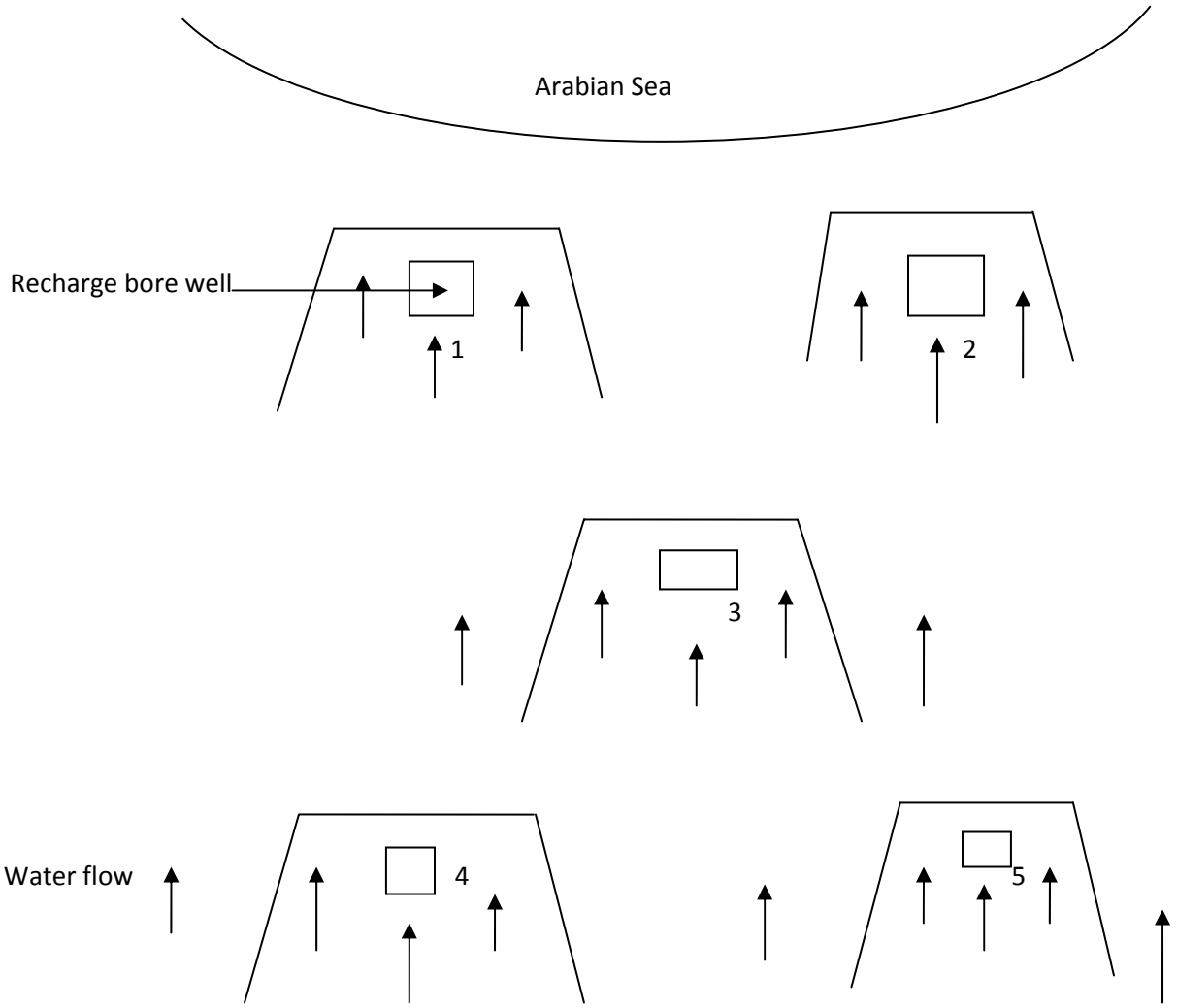


Diagram: Post intervention

➔ **Cost – benefit ratio**

Est. Cost of construction of Pit (4. nos) :- Rs. 11, 98,600/-
Est. Cost of Construction of bore (4. nos):- Rs. 5, 62,000/-
Total : - Rs. 17, 60,000/-
Actual Expenditure of work :-Rs.14, 70,000/-
Total volume of water recharged through pits
Total storage capacity (4 pits) – 30,000 cum
Considering 2 times filling - 60,000 cum
Volume of water recharged through bores – 38,000 cum
Total volume recharged - 98,000 cum
Cost/benefit ratio – 15 which is slightly higher but looking to the indirect benefit it can be justified.

➔ ***Dabkhal village,Taluka Kaparda, District Valsad:-***The *Sarpanch of this village presented an interesting case study of an innovative gravity* based *water supply system.* The villagers used to take water from an open well or hand pump but these sources were not enough to meet their water requirement during the summer. They used to go on the hill to fetch water from a little natural spring. Under WASMO's IWDPT scheme, people of Thorats faliya developed an open well of size 5 meter dia x 12 meter deep at the site of existing natural spring. *Pani Samitis* & people of Thorat faliya did work under the guidance of DHRUVA (BAIF) and CMSU team and successfully created gravity based water supply system.

It was not an easy task for the members of *Pani Samiti* and people of Thorat faliya. It is not possible to take machines for removing stones and debris on the hill hence people themselves did excavation of open well and had removed all the stones.

Today people of Thorat faliya are getting pure drinking water at their doorsteps by gravity based pipe water supply system.

Period when it was developed and social groups developing /using it:

Thorat faliya was visited by the team of CMSU during Oct-Nov -2006. People of Throat Faliya narrated that they used to take water by creating man made *"kuchha"* channel. People confidently expressed that there is a perennial source of water on the hill in the form of natural spring. Water can be availed by developing an open well at the site of natural spring and creating gravity based water supply scheme. CMSU team had decided to develop an open well and gravity system. During June-2007, the construction of well and other components (420 mtr HDPE Pipe + 4 Nos.of stand posts) were completed by the *Pani Samiti*.

It is very easy to operate & maintain this scheme.

Technological components: Gravity scheme

(Thorat Faliya, Dabkhal Village)

R E C A P I T U L A T I O N SHEET		
		SOR 2005-2006
Sr. No.	**Name of Component**	**Amount Rs**
	[A] Water Supply Scheme[Community Works]	
1	Construction of open well 5 X 12 mt	186110.00
2	Filter Chamber size 0.45x0.45m	480.00
3	RCC SUMP-10,000 lit	25000.00

4	Distribution system 63/6-HDPE-420 mt	71600.00
5	Stand Posts - 3 no's	9030.00
6	RCC Cattle trough-1 No.	29910.00
	Sub Total A	**322130.00**
	SAY RS.	**322130.00**

Scale of application:

Presently people of Thorat faliya are using this technology. There are many other villages where schemes on this application will be prepared. Following are the details of gravity based schemes to be taken up by CMSU in program villages.

Sr.No	Taluka	Name of the Village	Habitation	Present status
1	Kaparada	Narvad	Khadki	Only repairing of gravity system. Scheme approved.
2	Kaparada	Narvad	Nilungi	Scheme approved
3	Kaparada	Narvad	Palsundha	Scheme approved
4	Kaparada	Kolvera	Khutachimali	Scheme approved
5	Vansda	Ghodmal	Upla faliya	Scheme approved
6	Vansda	Mankuniya	Khora	Scheme approved
7	Vansda	Kandha	Khadakpani	Scheme approved
8	Kaparada	Vavar	Chinchpada, kunda Faliya	Scheme approved

Key rationale of the technological system:

- Eco friendly low cost system
- Does not require electricity
- Easy to operate by village people
- Application of local knowledge with science
- Easy Operation & Maintenance

➔ ***Kashipura village of Vadodara district: -"****One should try to learn from other's mistakes"*. This axiom was not only adapted by the village of Kashipura, but also put into practice. The construction of valve chambers below GL for zoning of water distribution system was causing a few problems such as accumulation of water during monsoon, cleaning of chambers *etc.* To overcome the above said hurdles, the villagers decided to construct the valve chambers above GL (Ground level). In this way they were able to overcome the hurdles and showed a way to other villages.

(a) (b)

Photos: (a & b). Valve chambers

➔ ***Khajuriya village of Jamnagar district:*** - The location of the source forced the village people to adapt the usage of non-conventional energy instead of electricity. Also due to frequent power failures and pump operation, regular water supply system on equity basis was not accessible. The villagers contributed 10% of the capital cost of the Solar pumping system and the remaining expenditure was bore by WASMO. But compared to the cost benefit ratio, they have realized that they have opted for the right thing. The solar panel was mounted on top of the pump house. Around 80,000 liters capacity sump is filled half by solar pumping right from morning to evening. With the help of this system, the tap connected is 100% in this village of nearly 250 households. The primary schools and *anganwadi* is also connected with this scheme. O&M charges of Rs. 50/ per connection is regularly collected.

(a)

(b)

(c)

(d)

Fig. (a). Solar Panel is mounted on the top of Pump house, (b). Solar submersible pump is installed here, (c). Water storage tank and (d). Solar operated pump system switch.

Salient features of scheme

- Daily Water requirement : 119000 liter per day
- Source : Open well and bore well
- Connectivity : Connected with Narmada HW
- Components : ESR, Sump, PH, pipeline and cattle troughs, RRWHS in school, Deepening of Pond, Pumping machinery at sump
- Cost of the scheme completed : Rs. 20,26,460.00
- Contribution collected : Rs. 2,28,000.00
- Additional work done : Solar pump installation for pumping water from local source.
- Cost of the solar pump : Rs. 5,75,000.00

About solar Pump

- Solar Photovoltaic model (Array capacity) : 1360 wp
- Solar panel : 80 w
- No of solar panels : 17
- Pump type and capacity : A submersible pump of 0.75 HP
- Maximum total head : 22 m dynamic head
- Out put :35000 liter per day
- Life time :10 years
- Installation date :1.11.2008
- Time : 2 years

Cost economics of solar pumping

Item	Conventional pump	Solar pump
BHP	5 HP	0.75 HP
KW per hour	4 KWH	0
Hours of pumping	4	12
Cost of energy	4*4*5= Rs 80 per day	0
Subsidy on energy by govt.	4*4*3 = Rs 48 per day	0
Capital investment	225000 FQ of GEB +35000 pumping m/c cost = Rs 260000/-	Rs 576000
Cost of energy per year	= 128*365 = Rs 46720	0
Recovery of Capital in years	May not be estimated	= 76000/46720 Apprx 12 years
Cost recovered till date	- Rs 93000.00	Rs 93000/-

➔ ***Shinay village of Kachchh district:*** - The issue of collection and the safe disposal of domestic waste have therefore been as important as that of providing the safe drinking water. The 80 % of water is converted in the waste water, which needs very careful handling. More than 100 villages have adopted the sewerage system in their villages, where the waste water is collected through sewerage system and is disposed off away from the village in an open *nallah* or riverbeds. The problem of pollution was transferred from one location to other location. The disposal of un-treated waste in open caused the mosquito breeding besides causing a foul smell in surrounding areas. In few cases the un-treated waste water was being used for agricultural purpose.

The conventional waste water treatment system is costly as it requires large initial capital investment and maintenance is highly sophisticated and can not be afforded by small to medium towns and villages. It is especially costly in case of rural waste water with its limited flow. Treatment of Waste water treatment by DEWATS principal was found to be most suitable for rural areas. It also fulfills the discharge standards prescribed by Pollution Control Board. It

tolerates the inflow fluctuation and requires minimum maintenance. The **Pantiya village** has implemented the following at their village level:-

- ✓ 10% contribution by PS
- ✓ Treated water is to be used for agriculture purpose in waste land of *Gram* Panchayat & is a source of income for Village.
- ✓ Gram Panchayat had used the treated water for irrigation in waste land 4.5 Acre of Gram Panchayat & taken one crop of Ground nuts (3.6 Tone) amounting to Rs.1.0 Lac. They are planning to take Rabi crop of Black seed

(a) (b)

(c) (d)

Photos: (a). Construction of waste water treatment plant, (b). View of waste water treatment plant, (c). Trickling aeration and filtration and (d). Effluent after final treatment BOD = 30 ppm (Results 20 days after commissioning)

In the same way, the **Shinay village** of Kachchh district has implemented the following:-

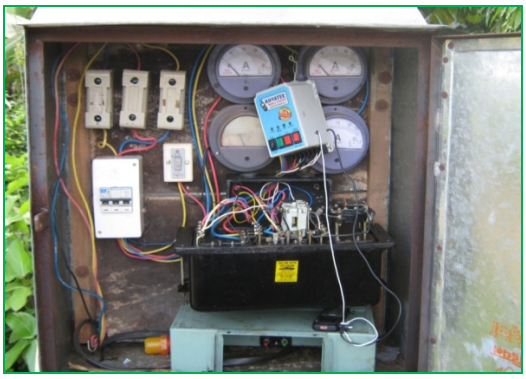
- ✓ This village is developing like a town & we can also say as a semi town due to growth of industries near by village.
- ✓ STP of 200 cum/Day Cap. -2 nos were proposed & completed for two different outlets of sewerage as per topography of the Village.
- ✓ Gram Panchayat has sold the treated water from STP no.1 @ Rs.1.20 lacs per year including maintenance cost of STP & they are further planning to sell the treated water from STP no.2 to society developers for Gardening & Tree Plantation purpose.

The advantage of this system is that the waste water could also be used up to its maximum limit. DEWATS system of treatment is suitable for institutions, small towns, villages, societies and hospitals. It requires comparatively very less land and effluent can be directly used for agriculture purpose after three treatments as per CPCB norms. It can be used for gardening after 5 treatments as per CPCB norms

- ***Motakokania village of Vadodara District:*** - The village is having a pond which was full of weeds and thorns. The *Sarpanch* of this village was making coal from this BAVAD (wild plants) for which he was suspended. A village representative took a lead to eradicate this nuisance from the village level. He gathered all the villagers and briefed them that the village is facing high TDS problem and water scarcity due to the non-use of the pond. He had to take different measures to convince the village community and after series of meetings, they came forward to clean the whole pond area. The catchment area was developed with the help of JCB. All of them took lunch on the pond bund.

  This way, the pond area was developed and after monsoon, the pond was overflowed. The villagers witnessed the drastic reduction in TDS (from 1800 to 600ppm) and also had the water security. UNITY has proven that impossible things can be attained to make it possible.

- ***Kurel village of Navsari District:*** - Sh. Mineshbhai Patel of Kurel, *Sarpanch* and *Pani Samiti Pramukh* presented an innovative idea of cell-phone operated pumping machinery. The village inhabited by 376 households has 2 wells, 3 tube wells, 3 hand pumps and 1 R.O. plant as its existing drinking water infrastructure located nearby the bank of river Purna about 2 kms from the village. The pump operation was difficult to handle. Above all the geographical distance, threat of wild creatures, frequent power failure, salary to operator and restarting of pump after power failure by operator were intricate problems to overcome. These hurdles enforced the village *Panchayat* to opt for innovative method for operation of in-village water supply system through mobile technology. The approved cost of this water sanitation system is Rs. 4.75 lacs out of which community contribution is Rs. 0.48 lacs. Additional cost is Rs.2500/ for cell phone cables. The following are the features of this system:-
  - *Connection of pumping machinery with source (TW) as well as cell-phones.*
  - *By dialing password through cell-phone, pumping machinery gets started automatically.*
  - *At the time of water supply, machinery will be operated through cell-phone from village itself.*




Photos: Innovative cell phone Operating System

The main benefits of this innovative system are:

- *Optimum usage of resources*
- *Cell-phone auto charge*
- *Very convenient in rainy season and bad weather*
- *Reduction in transportation and time saving.*

  The water supply with this system started on 01-12-2008. The water tariff collected is Rs.200/ per family per year.

➔ ***Dharmpur village of Kaparada Taluka*** The village is located on a very undulating terrain and as it is on the hilly region, water availability was always a problem. To overcome this they approached WASMO. Under the *Swajaldhara* program, it was decided that the natural spring available can be utilized as a source. Therefore, a well was constructed by digging the land around the spring by villagers themselves. *Shramdan* was done by people in construction of various components. The stones mined from this were utilized in constructing a check dam for water recharging purpose. After this a pipeline was laid through which water was distributed to the households of the village. Due to the high pressure, it was decided to put a control chamber. In this way, the villagers got water right at their doorstep through local wisdom. They even covered the storage tank with fishing net to protect the storage water and do regular chlorination by slow pot method. They also use chlorine tablets and hypo solution for water purification.

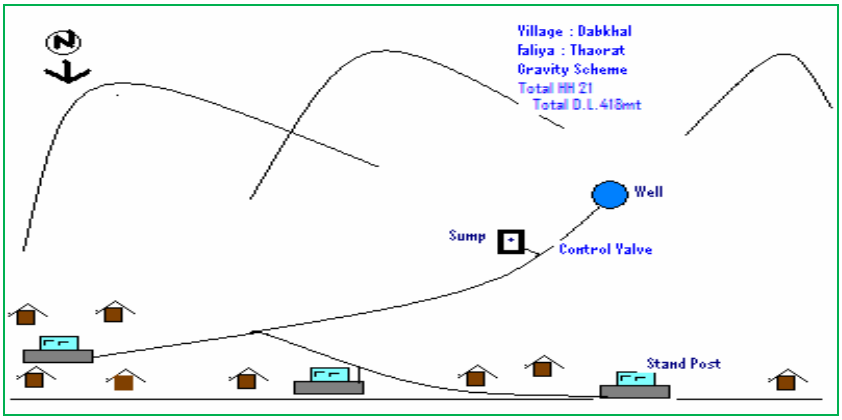

(a) (b)

(c)

(d)

(e)

(f)



(g)

Fig. (a & b). Existing [illegible] Spring based source, (c, d & e) *Sh*[illegible] [illegible] by People in construction of various components, (f). Top of storage tank covered with fishing net and (f). Village layout.

Main features of this innovative system:

- Eco-friendly low cost system.
- Does not require electricity
- Easy to operate by villagers
- Application of local wisdom with science
- Easy operation and maintenance

After series of presentations, Shri R. K. Sama suggested that WASMO can develop new methods of IEC material and also can utilize the media to sensitize the community regarding various issues related to water and sanitation aspects. Prof. Anil Gupta showed his willingness to work on it. After this the summing up session was carried, out of which the following are the results:-

- **Water Supply – How to increase?**
    1) Assuring water quality at user end
    2) Water meter
    3) Assurance of water quantity on right time
    4) Management in water supply
    5) Providing Service in water supply
    6) Maintenance of pressure
    7) Transparency in account keeping
    8) Formulation of rules and regulations
    9) Maintenance of local sources
    10) Distribution of water as per the availability of the water
    11) Dual water supply system – Drinking and domestic purpose
    12) Underground water storage system

- **Cleanliness around water sources**
    1) Cleanliness of local sources before monsoon season
    2) Safe disposal of waste water system
    3) Cleanliness around the chambers
    4) Drainage system around hand pumps should be standardized and institutionalized
    5) Cleanliness of sumps

- **Decrease in water demand**
    1) Use of tap cover which reduces water wastage
    2) Fine on leakages
    3) Reconnection charges – Initially notice should be given and if no improvement then disconnection should be done. Rs. 500/- as reconnection charges.
    4) Less usage of water during sanitation
    5) Research should be done on low cost sanitation units to reduce usage of water
    6) Promotion of eco sanitation units.
    7) Direct pumping can conserve electricity as well as water

- **Innovative steps used in mobilizing the community**
    1) Research on the data base available with WASMO
    2) To create awareness by new methods
    3) Post cards should be provided to the pump operator for water quality surveillance
    4) Identification of local sources through GPS system.
    5) Usage of new technologies in water supply system – Ex:- usage of mobiles in operating the pump and informing the whole village
    6) Usage of lid on sumps – compulsory
    7) Boards should be placed displaying that the people of this village are not concerned about their children
    8) Reduction in diseases due to WASMO scheme – case study of such villages should be used as a tool for motivating other villages through media.
    9) Two villages of each district can be awarded for maintenance of cleanliness. This should be promoted through media.
    10) Godhra, Shirva, Avania, Ratnapar are the villages from where the doctors have left their practice due to the drastic reduction in diseases.

11) The cattle have developed the taste of WASMO water and they have become reluctant for raw water

After this the workshop ended with a vote of thanks to all the participants and an assurance to meet once again to achieve new milestones.