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ACCRONYMS

AE	Assistant Engineer
AIIHPH	All India Institute of Hygiene and Public Health
ARWSP	Accelerated Rural Water Supply Programme
BARC	Bhabha Atomic Research Centre
BIS	Bureau of Indian Standards
BSA	Basic Shiksha Adhikari
CBO	Community Based Organisation
CDO	Chief Development Officer
CE	Chief Engineer
CGM- F&A	Chief General Manager Finance & Account
CGWB	Central Ground Water Board
CPCB	Central Pollution Control Board
DDPI	Deputy Director of Public Institution
DDWS	Department of Drinking Water Supply
DBP	Disinfection by products
DLHS	District Level Household and Facility Survey
DGS&D	Directorate General of Supply & Disposal
DM	District Magistrate
EE	Executive Engineer
FC	Faecal Coliform
FE	Iron
FGD	Focus Group Discussion
GOI	Govt. of India
GPs	Gram Panchayats
HFA	Health For All
HLTC	High Level Technical Committee
IDI	In-Depth Interview
IEC	Information, Education and Communication
IMMT	Institute of Mineral and Material Technology
ITRC	Industrial Toxicological Research Institute
JE	Junior Engineer
LPH	Liters per hour
MD	Managing Director
MDGs	Millennium Development Goals
MF	Microfiltration
MIS	Management Information System
MNP	Minimum Needs Programme
MoRD	Ministry of Rural Development
MoU	Memorandum of Understanding
MP	Madhya Pradesh
NABL	National Accreditation Board for Testing and Calibration Laboratories
NF	Nano Filtration
NC	Not Covered

NDWM	National Drinking Water Mission
NRDWQMSP	National Rural Drinking Water Quality Monitoring and Surveillance Programme
NGO	Non Governmental Organisation
O & M	Operation and Maintenance
OPEPA	Orissa Primary Education Programme Authority
PC	Partially Covered
PHED	Public Health & Engineering Department
PRIs	Panchayati Raj Institutions
PTA	Parents Teachers Associations
RO	Reverse Osmosis
RDPR	Rural Development and Panchayati Raj Department
RFP	Request for Proposal
RGNDWM	Rajiv Gandhi National Drinking Water Mission
RWS	Rural water supply
RWS&S	Rural water supply and sanitation
SAWPS	Stand Alone Water Purification Systems
SC	Schedule Caste
SDMC	School Development and Monitoring Committee
SEM	Self Employed Mechanic
SHGs	Self Help Groups
SMC	School Management Committee
SSA	Sarva Shiksha Abhiyan
SSIS	Semi-Structured Interview Schedule
ST	Schedule Tribes
TM	Technology Mission
TLM	Teaching Learning Material
ToR	Terms of Reference
TSC	Total Sanitation Campaign
TU	Turbidity
UF	Ultrafiltration
UNICEF	United Nation International Children's Emergency Fund
UP	Uttar Pradesh
UTs	Union Territories
UV	Ultra Violet
VEC	Village Education Committee
VWSC	Village Water and Sanitation Committees
WASH	Water Sanitation and Hygiene
WASMO	Water and Sanitation Management Organization
WES	World Education Service
WHO	World Health Organisation

EXECUTIVE SUMMARY

Despite being proclaimed as “indispensable for leading a life in human dignity" by the United Nations, The Right to Water, remains a distant dream for millions of people world over. The grim reality is that more than one in six people worldwide - 894 million - don't have access to even basic minimum requirement of safe freshwater. In India too providing access to clean drinking water sources and ensuring assured drinking water supply has been a major developmental challenge since Independence. The task has become more daunting with the passage of time given the steady decrease in the per capita availability of water in the country from 5,300 cubic metres (cu.m) per person per year in 1955 to 1,625 cubic metres in 2010 (Source: Ministry of Water Resources, March 11, 2011). The latest figures of District Level Household and Facility Survey – 3 (DLHS – 3) collected by the Ministry of Health & Family Welfare shows that 80% of the population in rural areas have access to improved i.e. safe drinking water sources. About 12% have drinking water piped into their dwelling and a further 16% get water from public taps. While according to NSS Report No. 535: Housing Condition and Amenities in India: July 2008 – June 2009, In India out of 1.65 million rural habitations in the country, 1.19 million (72%) had sufficient quantity of potable drinking water while 0.46 million (28%) are the habitations with insufficient quantity of potable drinking water.

When it comes to the drinking water supply to schools students, a substantial increase in water supply facilities has been observed in the country; still the problem of insufficient or unsafe water supply and hand washing facilities persists. As India has one of the largest numbers of school going children, especially in rural areas (as per the NFHS 3 -2006, about 81 percent of the children in the primary age group of 6-10 are attending schools in rural areas), the issue needs immediate attention.

According to the 7th National Education Survey, MoHRD-GoI, there are about 7.66 lakh (0.766 million) rural schools, both primary and upper primary with over 8 crore (80 million) school-going children of which 76.9 percent schools have water supply.

To tackle this problem the Department of Drinking Water Supply, Govt. of India started Jalmani programme during 2008-09 which aimed to install Simple Stand Alone Water Purification Systems (SAWPS) in rural schools to enable school children to have access to safe and clean water.

1.0 JALMANI PROGRAMME

The ‘Mission Statement’ of the Jalmani programme states ‘to provide value and quality addition to the ongoing Rural Drinking Water Supply Programme.

Jalmani Scheme

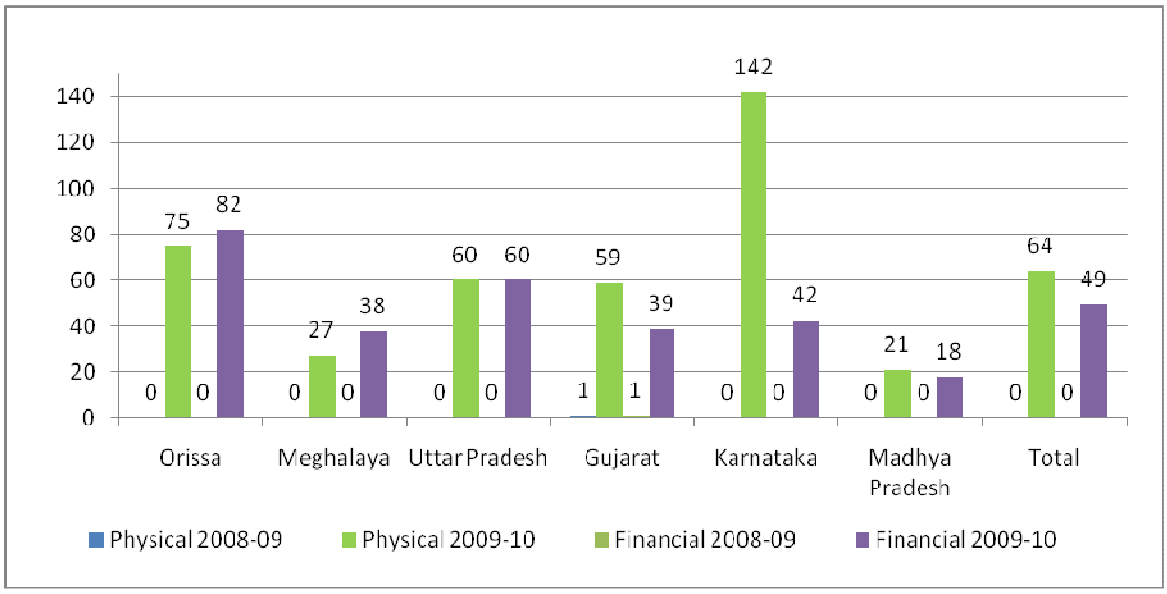
- 100% centrally sponsored programme
- Focus on bacteriological contamination and turbidity
- 3 liter/ day potable water for children and teachers
- 56,929 schools were covered against a target of 1,94,418 upto March 2011
- Rs 5043.89 lakh (11.33 million USD) was utilised against the received amount of Rs 7441.63 lakh (16.72 million USD) upto March 2011
- 2011-12 target is another 40,000 SAWPS installation

1.1 Physical and financial performance in six sampled states upto March 2010

In almost six states the Jalmani programme was initiated in 2009-2010 except Gujarat. During the year 2009-10, against the targeted 30,175 SAWPS in the six sample states, the actual installation was of 19,305 (approx. 64%). Karnataka had highest achievement where 3685 SAWPS were installed against the target of 2600 (approx.142%) and the lowest target was achieved by Madhya Pradesh where 570 SAWPS were installed against the target of 2734 (21%).

The utilisation of funds was approx. 49% overall and noticeably the utilisation in Orissa was 82% (highest among sample states) and in Madhya Pradesh 18% funds were utilised till March 2010 which were lowest among the sample states.

Figure 1: State wise physical and financial progress status till March 2010 (in percentage)



Source: Assessment of Jalmani Programme (SAWPS) by CMS in Six Sample States

1.2 Implementation status

In Meghalaya and Madhya Pradesh, Public Health and Engineering Department (PHED) and in Uttar Pradesh, Jal Nigam is implementing the Jalmani programme. Rural Development and Panchayati Raj Department (RDPR) in Karnataka, Rural Water Supply & Sanitation (RWS&S) in Orissa while Water and Sanitation Management Organisation (WASMO) in Gujarat are implementing the programme. In most of the sample states Jalmani started during 2009-10 except for Meghalaya, Gujarat and Uttar Pradesh where it was initiated in 2008-09. Except Madhya Pradesh (26% districts are covered under Jalmani scheme) almost all the districts in the sample states are covered under Jalmani programme till March 2010.

Table 1: Details of implementation mechanism for Jalmani scheme in sample states

Sl. No	States	Name of implementing department	Year of implementation	Total districts	Total Jalmani districts	Percentage of districts covered
1.	Gujarat	Water and Sanitation Management Organisation (WASMO)	2008-09	25	24	96
2.	Karnataka	Rural Development and Panchayati Raj Department (RDPR)	2009-10	30	29	97
3.	Madhya Pradesh	Public Health and Engineering Department (PHED)	2009-10	50	13	26
4.	Meghalaya	Public Health and Engineering Department (PHED)	2008-09	7	7	100
5.	Orissa	Rural Water Supply & Sanitation (RWS&S)	2009-10	30	29	97
6.	Uttar Pradesh	Jal Nigam	2008-09	70	70	100
	Total			**212**	**172**	**81**

2.0 THE ASSESSMENT STUDY: OBJECTIVES

The Department of Drinking Water Supply, Govt. of India started Jalmani programme during 2008-09. Before scaling up the programme, the DDWS requested UNICEF support to evaluate the success and gaps of the Jalmani programme. The objectives of this study are:

- To ascertain the performance of the programme in the field
- To ensure that the intended benefits are being realised
- To ensure the long-term sustainability of the programme

3.0 SAMPLING FRAMEWORK

The study was undertaken in 320 schools (1.6% of the total installed upto March 31, 2010) spread across 20 districts and six states. To assess the functionality, usage, accessibility and sustainability of the SAWPS the study time period was from **April 2008 to March 2010.**

3.1 Selections of States, Districts and Blocks

The states for the assessment were proposed by UNICEF. The logic behind the selection of states was to get a broad view of the scenario. So, one state each from six geographic regions (north, south, east, west, central and north east) was selected.

The final districts were selected by using the percentile method - keeping 50th percentile as base for selection of the districts. The percentage of SAWPS installed against target has been taken as the basis for calculation of the percentile. In total CMS Environment covered 20 districts which are approximately 12% of all the districts across the selected six states where Jalmani programme was initiated.

Total blocks where SAWPS were installed till March 2010 were organised in descending order on the basis of their SCs/ STs population and out of that 50% blocks were covered. Further out of the selected blocks 50% blocks were those having maximum population of SC/ ST and remaining 50% blocks were shortlisted randomly.

In the shortlisted blocks schools were selected randomly and equally distributed in each selected blocks.

Table 2: Selected districts and schools

Sl. No	States	Total number of SAWPS districts till March 31, 2010	Number of selected districts	Districts' Name	Number of Schools
1	Gujarat	24	03	Vadodara, Sabar Kantha and Kheda	48
2	Karnataka	29	04	Chickkballapur, Dharwad, Chitradurga and Raichur	64
3	Madhya Pradesh	13	03	Dhar, Alirajpur and Narsinghpur	48
4	Meghalaya	07	02	Jaintia Hills and Ri Bhoiz	32
5	Orissa	29	03	Angul, Ganjam and Cuttack	48
6	Uttar Pradesh	70	05	Ghaziabad, Chandauli, Balrampur, Farookhabad and Barabanki	80
Grand Total		**172**	**20**		**320**

Note: 16 schools were selected per district

4.0 METHODOLOGY AND FIELD WORK

Both qualitative and quantitative approach was undertaken for the study. The team conducted desk research to get an overview on Jalmani scheme and also collected information from respective states and districts on blocks, habitations and schools where SAWPS were installed.

CMS Environment team conducted preliminary visits in Meghalaya and Uttar Pradesh (January 17-19, 2011). The preliminary visit helped in developing further understanding about the scheme and contributed in reframing and enriching the methodology and the tools. CMS Environment developed nine different types of semi structured research tools for (i) School principal/ teacher representative; (ii) Grass root workers; (iii) PRI head; (iv) Panchayat level committee - VWSC/SMC/Jalmani Committee/Others; (v) Suppliers/ manufacturers (vi) District/state concerned officials and (vii) School children - focus group discussion guidelines. The tools were pre-tested in Dhar, Madhya Pradesh and Raichur, Karnataka and based on the pre-testing experience research tools were finalised and further translated in four languages.

The raw and treated water quality testing was conducted through Jal TARA kits on parameters like turbidity, iron and faecal coliform.

The field work was completed in a month time and it was conducted simultaneously across the sample states from Feb 21, 2011. The below mentioned table provides the complete details about the sample size covered;

Table 3: Respondent-wise sample size

State	School Teacher	PRI Member	Grass root Workers	Committee Member	State/ District Officials	Suppliers/ Manufactures	Total
Gujarat	48	48	47	39	4	2	188
Karnataka	64	64	59	47	5	3	242
Madhya Pradesh	48	48	17	32	4	1	150
Meghalaya	32	32	4	26	3	0	93
Orissa	48	48	47	61	4	1	209
Uttar Pradesh	80	73	13	17	6	2	191
Total	**320**	**313**	**183**	**222**	**26**	**9**	**1073**

5.0 KEY FINDINGS AND ANALYSIS

5.1 Procurement Process

Different states have followed different pattern for selecting the suppliers for installing and providing O & M services for SAWPS. Gujarat, Karnataka, Madhya Pradesh and Uttar Pradesh followed the tendering route. On the other hand, Meghalaya and Orissa engaged the civil contractors (no reputed and experienced suppliers/ manufactures) to install the filters. In Gujarat 50% payment to suppliers was made after installation and remaining 50% in five years @ 10% per year. In Karnataka 75% payment was made to the suppliers after installation and remaining 25% on satisfactory O & M performance over 5 years (4th year- 15% and 5th year- 10%). In Madhya Pradesh also 75% payment was made to the suppliers after installation and remaining 25% in five years @ 5% per year

5.2 Technology Selection Process

All the sample states have selected the SAWPS technology from the technologies recommended by HLTC. Half of the states have preferred the manual driven technologies except for Gujarat, Karnataka and Meghalaya. In Gujarat UV filter and RO (both technologies were eclectically driven) were used while Karnataka adopted both electrically (UV filter) and manual (ultra filter and household filter) technologies. Similarly Meghalaya has also preferred both technologies i.e. Aquaguard (electrically driven) and Ion Exchange and Terafil (manually driven). Orissa, Madhya Pradesh and Uttar Pradesh have followed only manually driven SAWPS technologies.

Table 4: SAWPS Technology installed in the sample states with cost

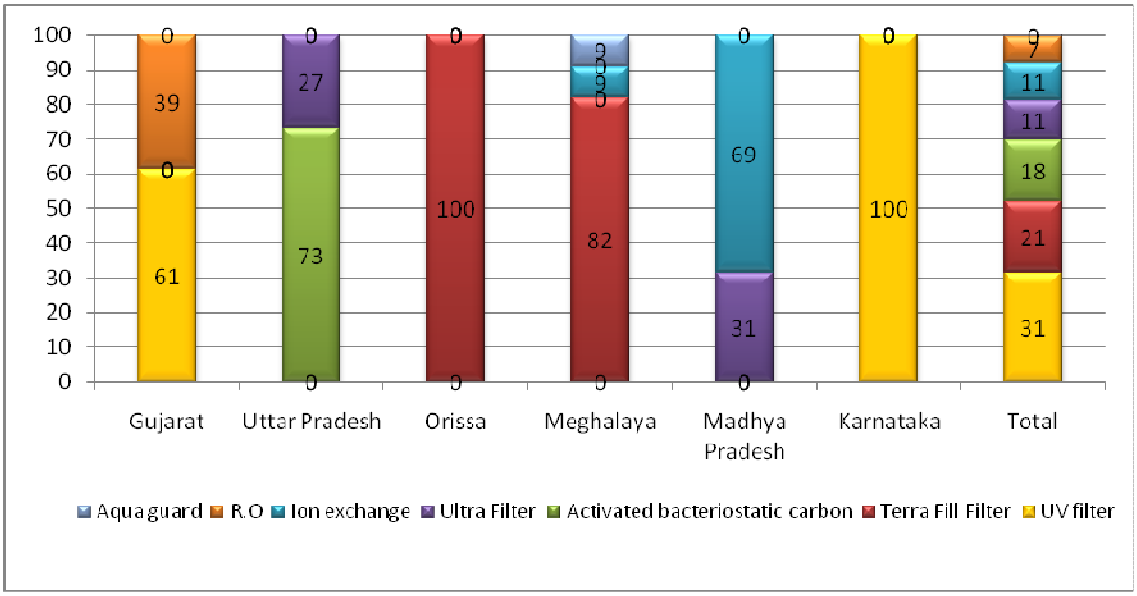
Sl. No	States	SAWPS Technology	Total Cost of SAWPS (including O & M cost) in INR
1	Gujarat	Ultra Violet Radiation (UV) 100 LPH (With power supply)	7100
		Ultra Violet Radiation (UV) 250 LPH (With power supply)	9000
		Reverse Osmosis (RO)	67,290
2	Karnataka	Category 1 - UV (electricity driven)	10,950
		Category 2 - Ultra filtration (without electricity)	9650
		Category 3 – Household filter	1900
3	Meghalaya	Aqua guard	12,000
		Ion exchange	18,250
		Terafil filter	29,330 - 29,940
4	Orissa	Terafil filter	20,000/-

Sl. No	States	SAWPS Technology	Total Cost of SAWPS (including O & M cost) in INR
5	Uttar Pradesh	Bacteriostatic activated carbon	17,500
		Terafil water filter Being installed in the current financial year (2010-2011)	10,900
		Ultra Filter	16,500
6	Madhya Pradesh	Ion Exchange	19,626
		Ultra Filter	31,642

Note: Technology cost ranged from INR 1900 to INR 67290 due to design and transportation

Technologies installed in sample schools: In the sample, UV filter technology was used in majority (31%) of schools, followed by terafil filter (21%) and activated bacteriostatic carbon (18%). Ultra filter and ion exchange technologies were provided in 11% of sample schools. RO was installed only in 7% of the sample schools (Gujarat) and UV technology was installed in Karnataka. Ultra filter technology was used only in Uttar Pradesh and Madhya Pradesh and Ion exchange was supplied in Meghalaya and Madhya Pradesh. In all sample schools of Orissa Terafil technology was installed.

Figure 2: Type of technologies installed in sample schools (in percentage)



5.3 School Selection Process

In Gujarat, education department provided the list of schools with information on type of water supply (piped or hand pump), strength of the school etc. to the implementing agency. In Karnataka also the education department was entrusted with the responsibilities of selecting schools where SAWPS to be installed. The list was prepared by Deputy Director of Public Institution (DDPI) and after getting approval in meeting of the executive body at district level it was forwarded to Rural Development and Panchayati Raj (RDPR) department for installation of SAWPS.

In Meghalaya, Public Health and Engineering Department (PHED) itself selected the schools where SAWPS to be installed from the schools list provided by the Education Department. School selection process was based on the criteria of availability of water through piped water supply facility within the school campus. In Orissa, Orissa Primary Education Programme Authority (OPEPA) supplied the list of schools to the Chief Engineer at state level. State had made the selection and given target to the respective districts for installation of SAWPS. Schools with

piped water supply were given preference in the selection. In Uttar Pradesh, Jal Nigam itself selected the schools where SAWPS to be installed from the list provided by Basic Shiksha Adhikari (BSA).

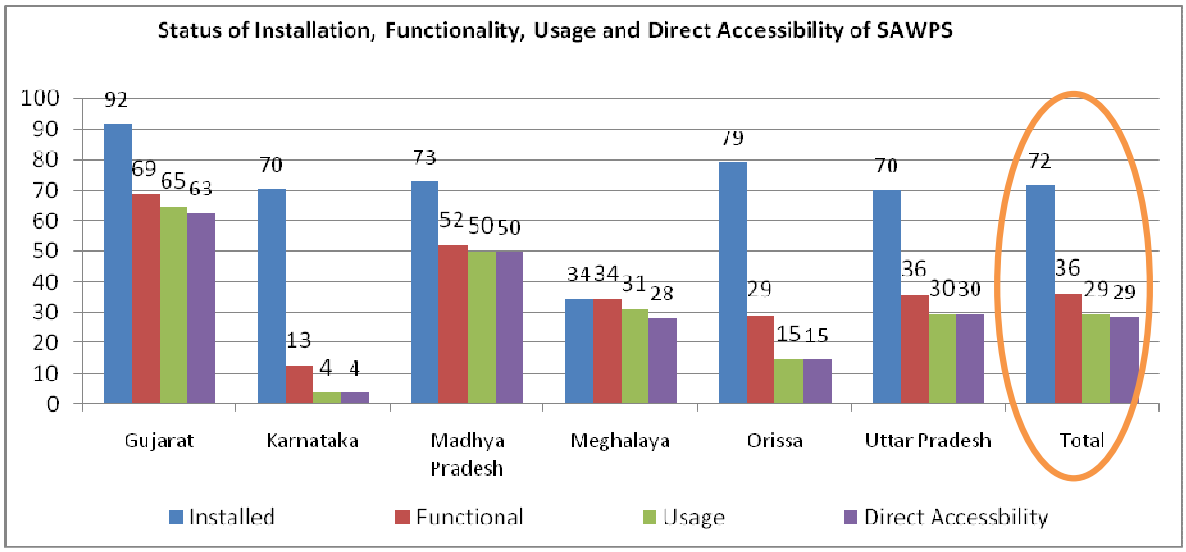
5.4 Significantly Low Functionality and Usage Of SAWPS (Supply, Installation, Functionality, Usage and Accessibility)

The sample survey reveals that out of 320 schools visited, the SAWPS were supplied in only 314 schools (98%) and in six schools SAWPS were not supplied despite the schools' names given in the physical progress list provided by the implementing agency. Similarly the SAWPS were installed in 229 schools (72%) and were functional only in 116 schools (36%) of the overall sample. The usage status of SAWPS was found to the extent of 29% (94 schools) in the overall sample schools. Direct accessibility of SAWPS was in 92 schools. The below mentioned table and graph will present the state and district wise status of SAWPS installation, functionality, usage and accessibility. Huge gap of 59% was observed in installation and usage of SAWPS in sample schools.

Table 5: District wise SAWPS installation, functionality, usage and accessibility status (in nos.)

State	District	No. of schools	No. of schools where filters delivered	No. of schools where filters installed	No. of schools where filters functional	No. of schools where filters are in use	No. of schools where used filters are directly accessible
Gujarat	Kheda	16	16	14	8	8	8
	Sabar Kantha	16	16	15	12	12	12
	Vadodara	16	16	15	13	11	10
Sub total		**48**	**48**	**44**	**33**	**31**	**30**
Meghalaya	Jaintia Hills	16	16	5	5	4	4
	Ri Bhoi	16	16	6	6	6	5
Sub total		**32**	**32**	**11**	**11**	**10**	**9**
Madhya Pradesh	Alirajpur	16	14	10	2	0	0
	Dhar	16	16	14	4	2	2
	Narsinghpur	16	16	11	8	5	5
Sub total		**48**	**46**	**35**	**14**	**7**	**7**
Karnataka	Chickkballapur	16	15	10	5	5	5
	Chitradurga	16	16	12	4	4	4
	Dharwad	16	16	12	8	8	8
	Raichur	16	16	11	6	2	2
Sub total		**64**	**63**	**45**	**23**	**19**	**19**
Orissa	Cuttack	16	16	15	12	11	11
	Angul	16	16	13	6	6	6
	Ganjam	16	13	10	7	7	7
Sub total		**48**	**45**	**38**	**25**	**24**	**24**
Uttar Pradesh	Chandauli	16	16	13	2	2	2
	Ghaziabad	16	16	15	8	1	1
	Balrampur	16	16	11	0	0	0
	Barabanki	16	16	12	0	0	0
	Farookhabad	16	16	5	0	0	0
Sub total		**80**	**80**	**56**	**10**	**3**	**3**
State Total		**320**	**314**	**229**	**116**	**94**	**92**

Figure 3: State wise SAWPS installation, functionality, usage and accessibility status on overall sample (in percentage)



Reasons for SAWPS non-installation, dysfunctionality and non-usage: The reasons reported for SAWPS not being installed included poor performance of suppliers especially in Karnataka. In some schools it was dumped by the suppliers, while in some cases there were incomplete sites at the time of installation. A majority (33%) of the SAWPS were dysfunctional due to accessories broken/ missing, followed by technical problem in the filter (14%), improper connection and leakage in filter/ pipeline (13% each). Nearly 14% SAWPS were also not working due to irregular power/water supply and non availability and dysfunctionality of the source water. The reasons for non usage of SAWPS include school building being under construction, frequent and long power cuts during school timings, kept under locked due to security reasons etc.

5.5 Year of Installation

Out of the total SAWPS installed most of the SAWPS (71%) were installed in the year 2010. Nearly 18% SAWPS were installed in 2009. The SAWPS found installed in year 2008 was quite negligible in the sample covered. In Uttar Pradesh in 50% schools SAWPS were installed in 2009. Overall 7% SAWAPS were installed in year 2011.

Dec 2008: Nil

Dec 2009: 18%

March 2010: 56%

Dec 2010: 71%

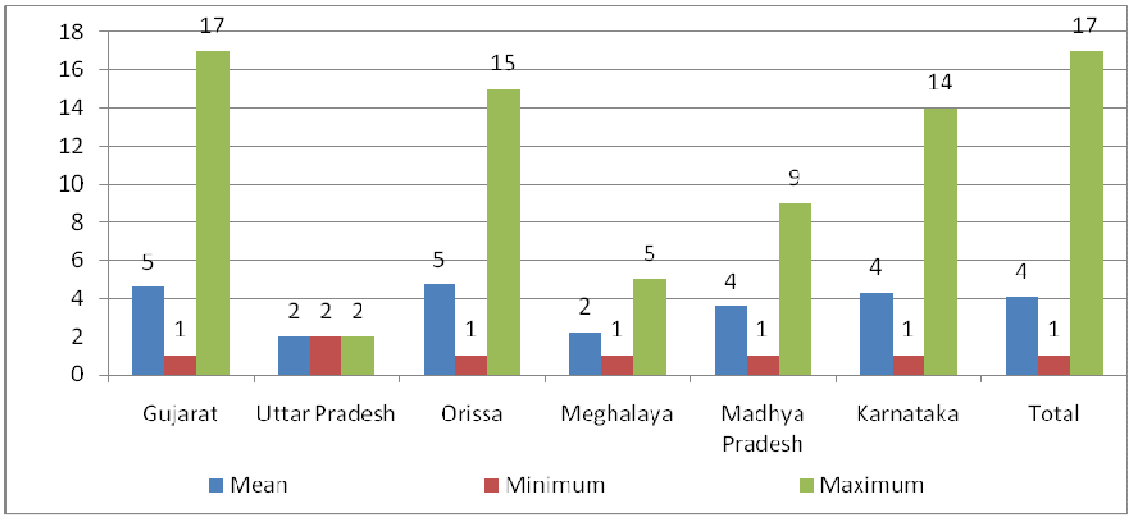
March 2011:7%

In Uttar Pradesh the list provided to CMS was for the year 2008-2010, but during the study it was found that in some schools SAWPS were getting installed now. Dhar in Madhya Pradesh was interesting case where MIS date shows physical achievement of 275 SAWPS and financial achievement of Rs 45.54 lakhs (0.10 million) till March 2010. But the actual installation of SAWPS was undertaken after March 2010 only and before that the SAWPS were only supplied to the schools.

5.6 Average Gap between Supply and Installation

The average gap between supply and installation of SAWPS was of four months. Gujarat and Orissa have the average gap of five months while Uttar Pradesh and Meghalaya have two months of gap in supply and installation of SAWPS. The maximum gap between SAWPS supply and installation was of seventeen months and minimum was one month.

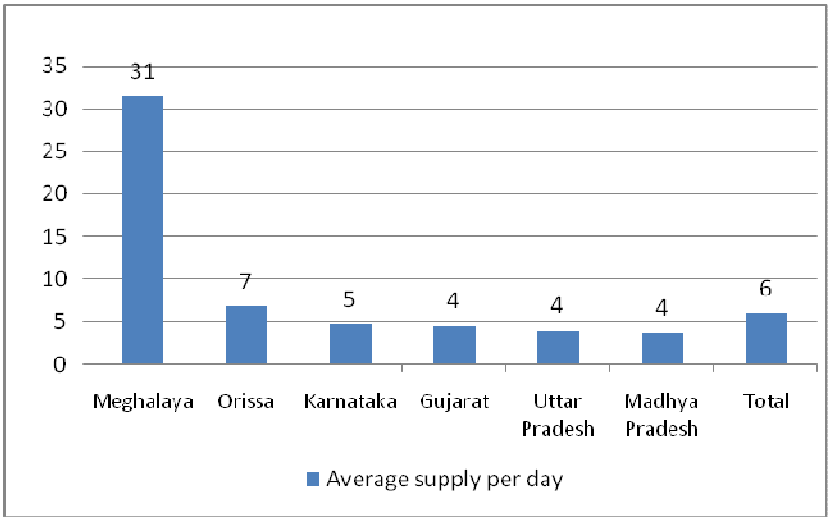
Figure 4: Between one month to seventeen months of gaps to install SAWPS (in months)



5.7 Adequacy of Filtered Water

It was observed that while selecting the SAWPS technologies all the sample states have taken into consideration the Govt. of India guidelines for providing adequate filter water to the school children (norm: 3 litres per capita/day). The average supply of SAWPS water per capita per day was around 6 litres in overall sample.

Figure 5: Average supply of SAWPS water per capita per day



5.8 Drinking Water Quality Status in the Sample States

As per the discussions with state and district officials it was concluded that Gujarat had major water contaminations of alkalinity, salinity, fluorides and bacteriological. While in Karnataka, fluorides, hardness, turbidity and bacteriological contaminations were the key issues. Iron and fluoride were the only two issues found in Madhya Pradesh. Meghalaya and Orissa had iron and bacteriological impurities. Uttar Pradesh reported iron, turbidity, arsenic, fluoride and bacteriological contaminations in the main source.

Table 6: Contaminations in raw water (reported by state and district officials)

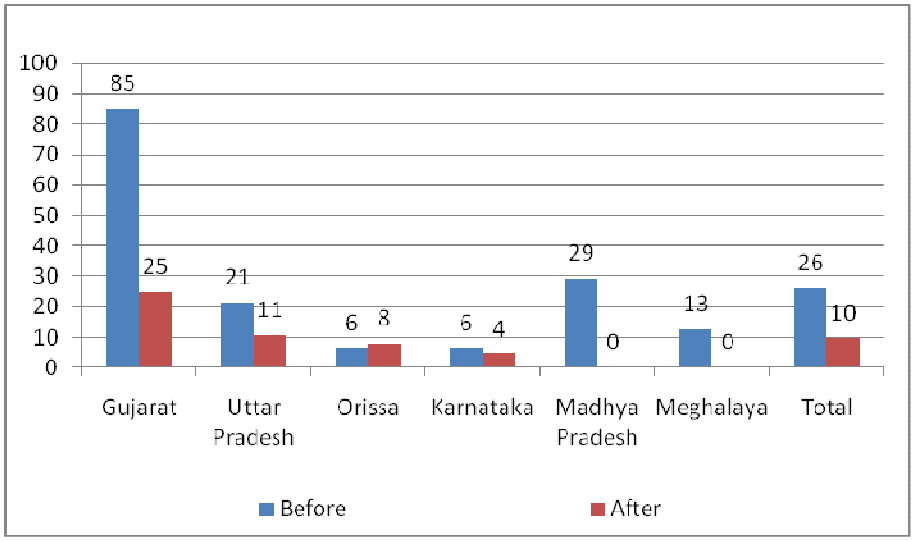
S. No	States	Contamination
1	Gujarat	Alkalinity, Salinity, Fluoride and Bacteriological
2	Karnataka	Fluoride, Hardness, Turbidity and Bacteriological
3	Madhya Pradesh	Iron and Fluoride
4	Meghalaya	Iron and Bacteriological
5	Orissa	Iron and Bacteriological
6	Uttar Pradesh	Iron, Turbidity, Arsenic ,Fluoride and Bacteriological

5.9 Water Testing Before and After Installation of SAWPS

Water testing before installation: Water testing before installation of SWAPS was reportedly conducted in 26% of the overall sample schools. In 58% schools water testing was not done before installation while in 17% schools principal/ teachers had no idea on this. In Gujarat 85% schools conducting water testing before installation followed by Madhya Pradesh (29%) and Uttar Pradesh (21%). In Orissa, 31% schools were not aware about any such testing.

Water testing after installation: The water testing after installation was done only in 10% of the schools. In Meghalaya and Madhya Pradesh no water testing was done after installation of SAWPS.

Figure 6: 74% of SAWPS installed without water testing (in percentage)



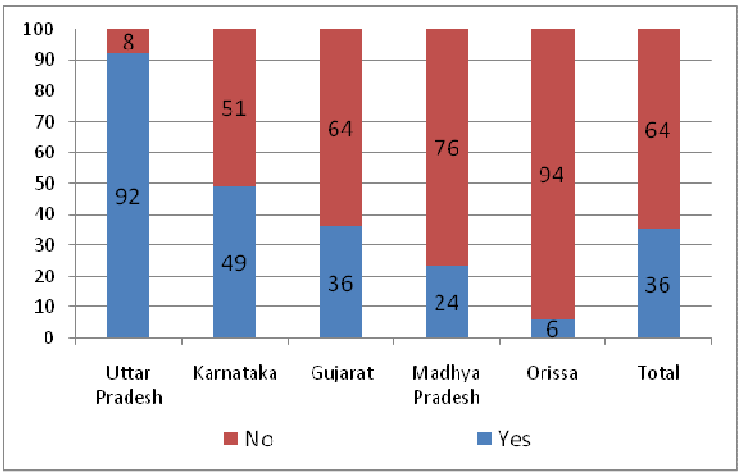
5.10 Involvement of Grassroot Workers

The grassroot workers engaged under National Rural Water Quality Monitoring and Surveillance Programme (NRDWQM&SP) are mainly Asha, Anganwadi worker, school/ science teacher, health personnel, other grass root level workers and Panchayat representatives. The associations of grass root workers with Jalmani programme have been found to be very limited in all the sample states except, to some extent in, Gujarat and Karnataka. In Orissa and Meghalaya the grass root workers were yet to be trained under NRDWQM&SP. In Orissa, from this year onwards officials are planning to provide training to five grass root workers on water testing.

In Gujarat a well structured water quality monitoring mechanism is in place for overall village water supply. The district laboratories or Pani Samiti have been doing routine water test (pre monsoon and post monsoon). The Jalmani scheme is also integrated in the existing system. 'Water Quality Coordinators' at district level have tested the water in schools before installation. The post installation water testing is done by trained school teachers on quarterly basis. They check bacteriological presence, TDS, hardness, chlorides, nitrate, and fluorides. Basic bacteriological test kits have been provided to almost all schools but kits for other tests have not been provided. The results have been shared with WASMO at district level. The teachers are often given post cards where they have to write the results and post it to WASMO district office. Cluster Resource Centres and NGOs have been creating awareness about water issues and significance of using water purification system.

In Karnataka, as reported, five grass root level workers i.e. Asha, Anganwadi worker, school/ science teacher, water man and panchayat secretary were appointed under NRDWQM&SP in each GP. They have received one day training on water testing at the district level. However in many places either they have not been given the testing kits or they themselves are not taking any interest in conducting the test especially in Chitradurga district.

Figure 7: Grass root workers reported water testing in schools (in percentage)

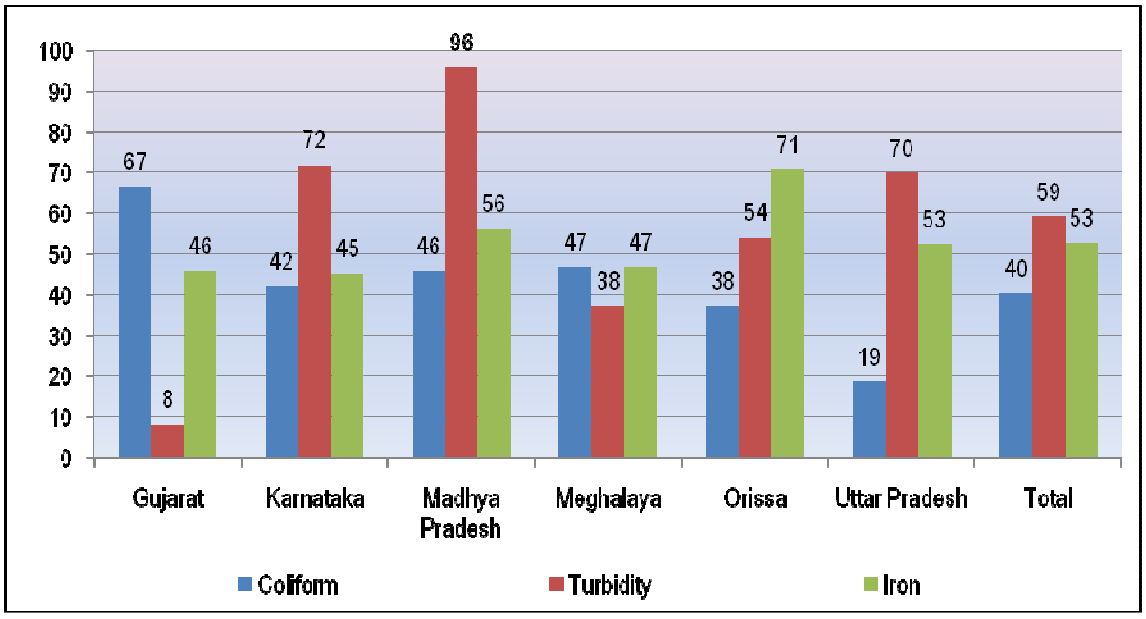


5.11 Water Quality Testing by CMS Team

As per the ToR, raw and treated water was tested to assess the potability of drinking water in sample schools. It was done on three major parameters i.e. Iron (permissible limit – 0.3 ms/l), Turbidity (permissible limit – < 10 NTU) and Faecal Coliform (present or absent) using JAL TARA water testing kits. The standard prescribed norms by the Bureau of Indian standards were followed for all the tests.

Raw water analysis of 320 schools

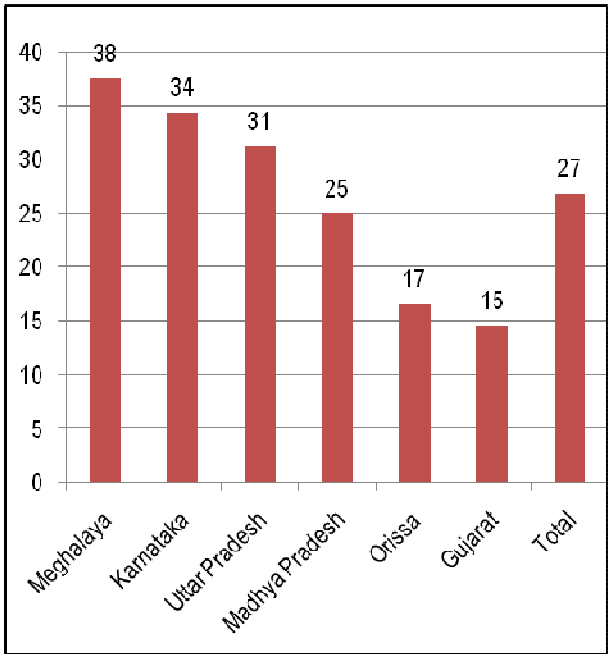
Figure 8: Presence of faecal coliform, turbidity and iron above permissible limit in all raw water sample (in percentage)



Out of the total 320 raw samples tested for water potability, faecal coliform was present in 129 (40%) samples. In Gujarat approx. 67% schools' raw water had traces of faecal coliform and in Karnataka 42% such samples were found. Similarly turbidity was above permissible limit in 190 samples (59%) and iron was above permissible limit in 53% of the raw water sample.

Contamination was not always the leading reason for SAWPS installation and in the overall raw water sample of 320, 27% (86 samples) were found without any contamination. Nearly 38% (12 out of 20) sample in Meghalaya and 15% samples in Gujarat (7 out of 41) were without any faecal coliform, turbidity and iron presence.

Figure 9: 320 schools raw water samples without any contamination (in percentage)



Comparative analysis of raw and treated water

Figure 10: Contamination above permissible limit in 116 raw water sample (in percentage)

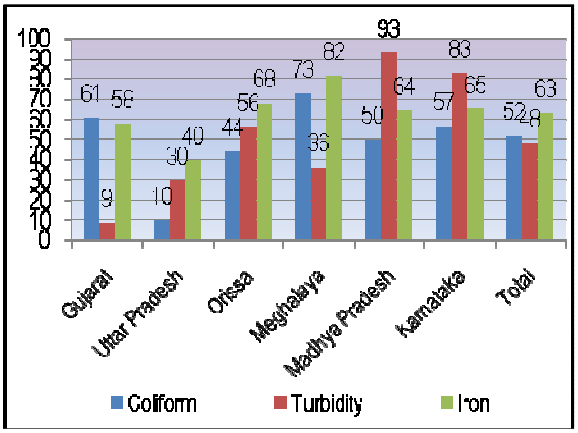
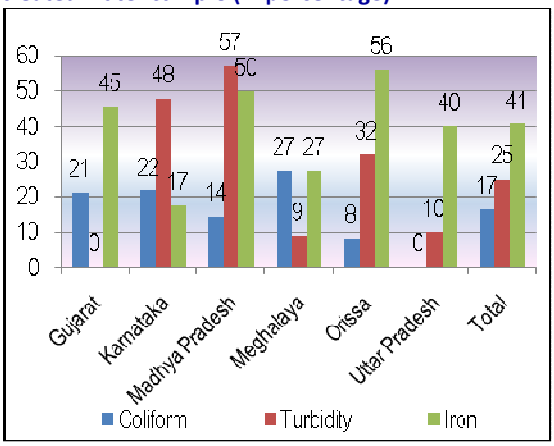


Figure 11: Contamination above permissible limit in 116 treated water sample (in percentage)



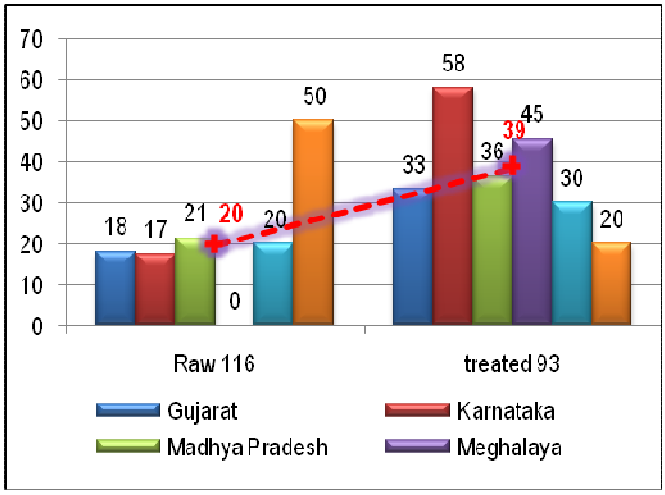
The comparative analysis of the water quality test of raw and treated water samples (116 schools where SAWPS were functional) concludes that the faecal coliform was present in 52% (60) raw water samples. 17% (20) SAWPS treated water samples were still contaminated with faecal coliform.

Similarly turbidity was above permissible limit in 48% raw water samples (56) whereas 25% (29) treated water samples continued having high turbidity. Around 63% (73) school's main source water had presence of iron above permissible limit and after treatment 41% (49) school's potable water had traces of iron above permission limit.

Table 7: Overall table about comparison between raw and treated water test results (in nos.)

State	Total sample	Raw (above permissible limit)			Treated (above permissible limit)		
		Fecal Coliform	Turbidity	Iron	Fecal Coliform	Turbidity	Iron
Gujarat	33	20	3	19	7	0	15
Karnataka	23	13	19	15	5	11	4
Meghalaya	11	8	4	9	3	1	3
Madhya Pradesh	14	7	13	9	2	8	7
Orissa	25	11	14	17	3	8	14
Uttar Pradesh	10	1	3	4	0	1	4
Total	**116**	**60**	**56**	**73**	**20**	**29**	**49**

Figure 12: Raw and treated 116 water sample without any contamination (in percentage)



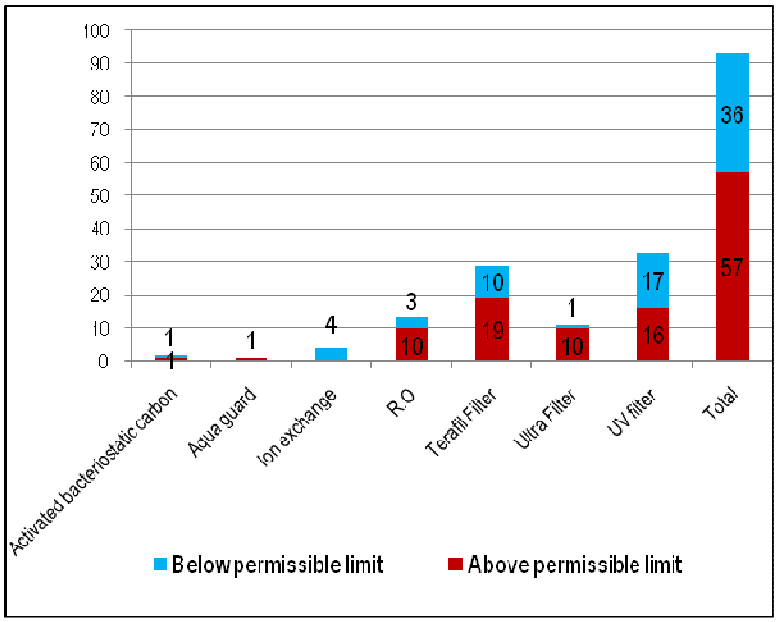
In the raw water sample of 116 schools where SAWPS were functional, 20% (23 samples) were found without any water contamination. The schools' main drinking water source in Uttar Pradesh 50%, while relatively low in Gujarat 18% and Karnataka 17% schools were without any contamination.

In the 93 SAWPS treated water samples where contamination in the respective raw water was found before treatment, 61% samples were still contaminated and 39% without any contamination. In Uttar Pradesh, Orissa and Meghalaya approx. 60-80% water samples had some or other contamination.

Table 8: Raw and treated water sample without any contamination (in nos.)

States	Raw water sample (116)	Raw water (116) without any contamination	Treated water sample	Treated Water without any contamination
Gujarat	33	6	27	9
Karnataka	23	4	19	11
Meghalaya	11	0	11	5
Madhya Pradesh	14	3	11	4
Orissa	25	5	20	6
Uttar Pradesh	10	5	5	1
Total	**116**	**23**	**93**	**36**

Figure 13: Technology wise treatment status (in nos.)



The technology wise analysis of contamination in treated water sample indicates that Ion Exchange was the only technology wherein all the four treated water samples contamination was found within permissible limit. In UV filter 17 (52%) and terafil technology 10 (34%) samples had water quality parameters within permissible limit. 90% of the water samples could not be treated by Ultra filter technology and similarly 70% in RO technology.

5.12 Role of Supplier/ Manufacturers in Sustaining SAWPS

- Out of 229 schools where SAWPS were installed, the process for handing over SAWPS was followed in only 27% of the schools. Approx 41% schools had reported of no such process followed while 32% of the schools did not have any idea about the handing over process.
- *School unaware about O &M services:* Out of the total schools where the SAWPS have been installed, 86% of the school teacher in charge/ principal were not aware that supplier has to maintain the SAWPS for five years.
- As reported by the teachers, out of the total sample schools where SAWPS were installed, 41% of the schools were given information about the routine process for opeartion of the system.
- In the sample schools where SAWPS were installed, only 28% schools were reported to be aware about contact details of the suppliers.

5.13 Role of Schools in Sustaining SAWPS

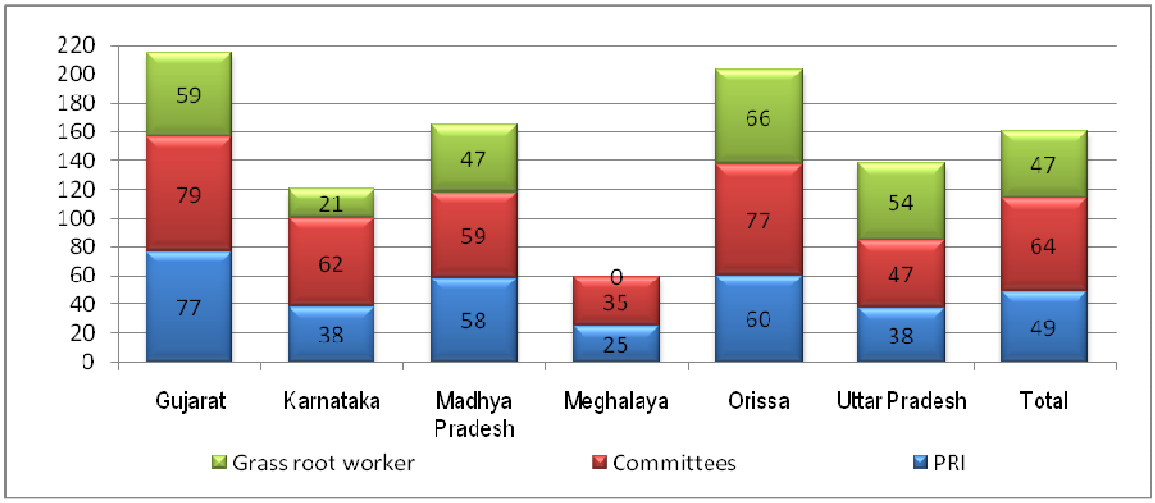
- Overall across sample states, schools have been responsible for daily upkeeping of the SAWPS. In 88% schools it was known to them that it is overall school's responsibility for daily operation of the SAWPS.
- In 41 schools (35%) out of total schools where SAWPS were functional, the school authorities reported that they are skilled enough to maintain the SAWPS.
- In nearly 42% of the total schools where SAWPS were functional, students have been given the responsibility of cleaning the water storage tank.
- Although it was also reported by the schools that teachers (48%) clean the filter/ storage tank, however based on the FGDs with children and observations that followed during the field work, it can be concluded that in almost all the schools, children are responsible for cleaning the water storage tank. Wherever required children also pump the water in the filter which takes at least 25-30 minutes in a day.

- Out of the 28 schools where the annual cost was reported, in 85% schools there was provision in the school budget to meet the running cost of the filter.

5.14 Role of PRIs and other Committees

- *Key stakeholders role is limited:* The involvement of the panchayat level committees was not found in any of the sample states except for Gujarat. In Orissa, Village Education Committees (VECs) exist but they have no role in Jalmani scheme.
- Out of the total committee members interviewed, around 64% were aware that the SAWPS were provided in the schools of their panchayats. In Gujarat and Orissa nearly 80% and 77% respectively, while in Meghalaya only about 35% of the committee members were aware about the SAWPS installation.
- In Karnataka, sample schools have School Development and Monitoring Committee (SDMC), which is responsible for overall developmental activities of the school. But it was observed in the most of the cases that neither the committee has been playing any role in Jalmani scheme nor they are aware about it.
- Village Water and Sanitation Committee (VWSC) has also been found in some of the GPs but some VWSC are not functioning well and the active ones have no role in Jalmani.
- Parents Teachers Associations (PTA) exist in all the schools visited but they have also not been playing any role in the Jalmani scheme.
- PRI in most of the states were not involved in the Jalmani scheme.
- Nearly 49% of the PRI members were aware about the SAWPS facility in the schools of their panchayat.

Figure 14: Awareness among PRIs, Committees and grass root workers about SAWPS



5.14 O & M issue

Despite it being the responsibility of the suppliers to carry out operation & maintenance of SAWPS for five years, the services were found to be lacking. In Karnataka it was found that suppliers had not visited the school after installation of SAWPS. The teachers had no information on user's manuals although some schools reported getting brief information about the SAWPS by the suppliers. In Gujarat, overall maintenance of SAWPS was handled by School Management Committee (SMC). In case of any problem with the SAWPS functioning the suppliers are called through the toll free helpline numbers to address the problem.

Cleaning of the tank has been the routine maintenance problem faced by the school authorities. In Orissa, in most of the schools, tanks were not yet cleaned after installation and school authorities were not aware of the tank cleaning process.

6.0 IMPLEMENTATION GAPS AND KEY CONCERNS

Huge gap between installation and usage: Huge gap (59%) was found between installation and usage of SAWPS.

Limited knowledge and awareness on significance of SAWPS among key stakeholders: In most of the schools it was found that students were not aware of the significance of SAWPS and they were using it as just another water source.

Selection of schools: The criteria for selection of schools varied from state to state. Contamination was not always the leading reason for SAWPS installation (27% sample schools raw water was found without any contamination).

SAWPS technology inefficiency major concern: SAWPS installed were not enough efficient in eliminating water contamination and still after treatment faecal coliform, turbidity and iron were found above permissible limit in 17%, 25% and 41% schools respectively. In overall, 39% treated water samples were found without any contamination.

Lack of communication: Lack of communication between different stakeholders was observed more or less in all the sample states especially at schools and panchayats level. Nearly 50% of them were aware of SAWPS installed in their panchayat's schools.

Suppliers' performance: Performance of suppliers is the major concern in all the sample states. At present no system exists to monitor the performance of the suppliers at any stage of installation in the sample states except to some extent in Gujarat.

Jalmani guidelines not followed

- **Village Panchayats** in most of the cases were not assigned/ have not taken the responsibility.
- **Gram Panchayats/Committees/PTAs** were not engaged in Jalmani scheme.
- **BCC Activities:** No capacity building, awareness generation or publicity activities were undertaken.
- **Certification of the technology:** No NABL accredited laboratories certification after installation

7.0 RECOMMENDATIONS AND FUTURE OUTLOOK

Reframe Jalmani guidelines: The Jalmani guidelines is required to be reframed and guidelines shall also incorporate process of school selection, school orientation, handing over of SAWPS, post installation monitoring and pre and post installation water testing.

Awareness and education: Certain percentage of the total funding shall be utilised for awareness and education on water quality in general and SAWPS in particular.

Award to suppliers: 5% of the total funding for awarding suppliers for excellence in O&M services.

Implementing agency shall play the role of sheet anchor for successful implementation of the Jalmani Programme. It should clearly have a structure and system in place with clear division of roles and responsibilities. The implementing agency should make provision for dedicated resource for coordination of Jalmani Programme. It shall also conduct quarterly assessment of the SAWPS schools.

Convergence of Jalmani scheme: The Jalmani programme may be converged with other schemes like SSA, ICDS, SHHE etc. The education departments shall be proactively involved in engaging schools. The convergence of Jalmani scheme with education department will facilitate collating information on schools, providing financial support in preparing site ready for installation of SAWPS and communicating to the schools about the roles and responsibilities of schools, implementing agency and suppliers.

Selection of schools: Block wise (100% schools coverage) installation of SAWPS shall be considered in phased manner in the district which will facilitate easy accessibility and monitoring of SAWPS schools/. It will bring ownership and participation of panchayat level functionaries/committees.

Selection of supplier: If possible the suppliers shall be selected at district level and besides the price offer, technical expertise and competence of the company should be considered. The implementing agency shall periodically update its database of suppliers.

Certification: Implementing agency shall make it mandatory for the suppliers to certify the product's water quality from the accredited laboratory after installation of SAWPS in schools as already mentioned in the guidelines.

O&M contract with suppliers: A mandatory O & M contract with the supplier shall be signed by the implementing agency. The toll free number shall be provided by the supplier to the schools/ SMC for addressing complaints. System shall be created to ensure that the supplier lives up to his/ her commitment as regards the installation, training and O & M.

Payment schedule: Supplier may be given 40% payment after successful installation, water testing of treated water, schools orientation and signing of handing over forms. The remaining 60% shall be released in instalments after providing satisfactory O&M services over a period of 5 years

Technology selection: Apart from iron, turbidity, faecal coliform and total coliform other contaminants (fluorides, arsenic etc) which have direct health impacts on the children shall be also considered while selecting the technology. It may also be considered that the selected technologies' spare parts will be available locally and even after five years of installation or not.

A uniform technical specification for each proposed technology should be developed by DDWS or HLTC which can be used by the implementing agency during tendering process.

Process for installation: The block level officers preferably junior engineer (JE) shall visit the proposed schools where SAWPS to be installed and based on his/ her visit report, the gaps in site readiness may be filled within the stipulated time period. The suppliers shall work in tandem with JE and schools for installation of SAWPS. Within a week of supplying the SAWPS to schools, it shall be installed.

SAWPS design: In Madhya Pradesh Ion exchange and in Uttar Pradesh ultra filter technology require lot of manual effort to fill the storage which feels burden to school authority hence not being used despite functional. Taking these issues into consideration the need for modification in SAWPS design was felt. The SAWPS design may consider on; water feeding (direct connection of SAWPS from water source to the tank), easy accessibility (4-5 taps connection outside), height of the filter taps in accordance with the average height of the students, drainage system for waste water.

Third party evaluation: There is need to ascertain that suppliers shall install the filter as per the specification given in the agreement. At present it is observed that no such mechanism is in place in the sample states except for

Gujarat. Supplier performances need constant monitoring by the third party. Supply and installation to be done only after third party evaluation

School orientation: The orientation may be organised by the supplier at panchayat level for school representatives (school principals/teacher–in charge) and panchayat functionaries can also be involved. The orientation may focus on complete knowledge of SAWPS operation, daily upkeep, O & M services including timelines and consumables to be replaced. The suppliers may also provided user manual and their contact details to schools.

Handing over process shall only be followed between schools and implementing agency. The process among supplier and school may only be of receiving the SAWPS.

Ownership and accountability: The School Management Committee (SMC) should be held accountable for the smooth functioning (daily upkeep and maintenance) of the SAWPS. The SMC shall be given a certain degree of control over the supplier by linking their payment to the feedback from the school authority.

Behavioral change communication through Interpersonal Communication, print and electronic media shall be used for visibility of the Jalmani scheme and enhancing significance of SAWPS. The school may also organise a small function to mark the inauguration of the SAWPS by involving school children, teachers, SMC and PTA members.

Water quality testing: The implementing agency may either get the testing done in its laboratories or through NABL accredited labs. The raw and treated water shall be tested on the same selected parameters to compare the test results for checking the efficiency of the filters. The results if within the permissible limit may be the key factor in releasing the payment to the suppliers. The raw water testing results shall be baselines for technology effectiveness.

Post installation regular test: At regular frequency (quarterly) testing of raw and treated water may be conducted by the school teachers. The results may shared by schools through panchayats.

Capacity building and providing kits: The teachers and other concerned stakeholders capacities may be developed for testing the water and reporting the results by organising capacity building and skills enhancement programmes at regular interval. The kits and consumables shall be also given for enabling the teachers and others to conduct the water testing for checking potability of raw and treated water.

The participation of panchayat/panchayat level committee needs to be encouraged which is presently lacking in all the sample states except for few districts in Gujarat.

MIS system: Discrepancies were found in the physical and financial progress data available on MIS. The data reported by the officials during the study and the data given in the MIS were different. Efforts must be taken to streamline the discrepancies. Further the MIS data shall also include; name of the schools where SAWPS were installed, technology used and suppliers' details, dates for supply and installation of SAWPS.

Web based monitoring system (Web Portal) shall be develop. This portal will be one single place to generate information relevant to the smooth functioning of the scheme. The system may include the water quality testing status of SAWPS schools i.e. baseline of the raw water, treated water test results post installation). This may be uploaded by the implementing agency. The proposed web based monitoring system will provide easy access to information and facilitate monitoring of suppliers performance, SWAPS status and test results.

CHAPTER 1 OVERVIEW

Providing adequate access to safe and assured drinking water supply is a big humanitarian challenge in the contemporary world. The Right to Water, proclaimed by the United Nations, is said to be "indispensable for leading a life in human dignity" and "a prerequisite for the realisation of other human rights." However, across the globe, in different geographical realms, human beings have inadequate access to potable water. According to the UN estimates each person needs 20-50 litres of safe freshwater a day to ensure their basic needs for drinking, cooking and cleaning. However more than one in six people worldwide - 894 million - doesn't have access to this amount of safe freshwater. As a result they have no other option but to use sources contaminated with disease vectors, pathogens or unacceptable levels of toxins or suspended solids. Such water is not potable or for using such water in food preparation leads to widespread acute and chronic illnesses and is a major cause of death and misery in many countries.

1.1 THE GLOBAL SCENARIO

Access to safe drink water is a basic human right, but this basic right is not being met universally. In many parts of the world, particularly sub-Saharan Africa and Oceania, lack of clean water is adversely affecting human health and development. The goal 7 of the MDGs seeks to reduce by half the proportion of people without sustainable access to safe drinking water by 2015. Though at the global level, improvements are discernible in providing access to safe drinking water. But some areas are performing better than others, highlighting a growth in regional disparities in access to safe drinking water. Europe, Latin America, the Caribbean, and much of Asia have met or are on track to meet the established targets. But in Sub-Saharan Africa and in many rural areas, there has been no progress or conditions have worsened. In sub-Saharan Africa 28% of the population does not have access to any form of sanitation and has the largest population using unimproved water sources. It is required that the global community must intensify efforts in these regions if they hope to achieve the established 2015 targets.

1.2 RURAL WATER SUPPLY IN INDIA: A BACKGROUND

The provision of clean drinking water has been given priority in the Constitution of India, with Article 47 conferring the duty of providing clean drinking water and improving public health standards to the State.

Providing access to clean drinking water sources and ensuring assured drinking water supply has been a major developmental challenge for India since Independence. The geographical enormity of the country and the prevailing non-uniformity in level of awareness, socio-economic development, education, poverty, practices and rituals makes it a daunting task to provide clean drinking water throughout the country and particularly in the rural areas. At the same time increasing population has also led to a steady decrease in the per capita availability of water in the country. While In 1955, the per capita availability was 5,300 cubic metres (cu.m) per person per year, it came down to 1,625 cubic metres as per the current population of the country in 2010 (Source: Ministry of Water Resources, March 11, 2011).

At the time of Independence the scenario was quite dismal with rural population, which constituted approx 80% of the total population, having no access to safe drinking water supply at all. The supply at that time was a provincial or a state subject and the state governments were independently pursuing their own programme to a limited extent, depending on their financial resources. The steps thus proved inadequate and ineffective. The

Bhore Committee (1946) and the Environmental Committee (1949) recommended comprehensive plans to provide water supply and sanitation on a priority basis. However no concerted efforts could be taken to implement the recommendation. It was from 1950s onwards that several measures in different phases were taken to accelerate the rural water supply. *(Details given in the box below)*

Rural Water Supply (RWS) programmes in India can be divided into several distinct phases

Early Independence (1947-1969)

1. **1949: The Environment Hygiene Committee** recommends the provision of safe water supply to cover 90 per cent of India's population in a timeframe of 40 years.
2. **1950: The Constitution of India** confers ownership of all water resources to the government, specifying it as a state subject, giving citizens the right to potable water.
3. **1969: National Rural Drinking Water Supply programme launched** with technical support from UNICEF and Rs 254.90 crore (57.28 million USD) is spent during this phase, with 1.2 million bore wells being dug and 17,000 piped water supply schemes being provided.

Transition from technology to policy (1969-1989)

1. **1972-73: Introduction of the Accelerated Rural Water Supply Programme (ARWSP)** by the Government of India to assist states and union territories to accelerate the pace of coverage of drinking water supply.
2. **1981**: India as a party to the International Drinking Water Supply and Sanitation Decade (1981- 1990) declaration sets up a National Level Apex Committee to define policies to achieve the goal of providing safe water to all villages.
3. **1986**: The National Drinking Water Mission (NDWM) is formed.
4. **1987**: Drafting of the first National Water Policy by the Ministry of Water Resources.

Restructuring phase (1989-1999)

1. 1991: NDWM is renamed the Rajiv Gandhi National Drinking Water Mission (RGNDWM).
2. 1994: The 73rd Constitutional Amendment assigns Panchayati Raj Institutions (PRIs) the responsibility of providing drinking water.
3. 1999: For ensuring sustainability of the systems, steps are initiated to institutionalise community participation in the implementation of rural drinking water supply schemes through sector reform.
4. 1994: Department of Drinking Water Supply was created to give focused attention towards attaining the goal of providing safe drinking water to all rural habitations

Sector reform ushers in a paradigm shift from the 'Government-oriented supply-driven approach' to the 'People-oriented demand-responsive approach'. The role of the government is envisaged to change from that of service provider to facilitator. Under reform, 90 per cent of the infrastructure is funded by the government, with the community contributing 10 per cent of the remaining. Sector reforms projects were introduced in 67 districts across the country on pilot basis.

1999: Total Sanitation Campaign (TSC) as a part of reform principles initiated in 1999 to ensure sanitation facilities in rural areas with broader goal to eradicate the practice of open defecation. As part of the programme, a nominal subsidy in the form of incentive is given to rural poor households for construction of toilets. TSC gives strong emphasis on Information, Education and Communication, Capacity Building and Hygiene Education for effective behaviour change with involvement of PRIs, CBOs, and NGOs.

Consolidation phase (2000 onwards)

2002: Nationwide scaling up of sector reform in the form of Swajaldhara.

2002: The National Water Policy is revised, according priority to serving villages that did not have adequate sources of safe water and to improve the level of service for villages classified as only partially covered.

2002: India commits to the Millennium Development Goals (MDG) to halve by 2015, from 1990 levels, the proportion of people without sustainable access to safe drinking water and basic sanitation.

2004: All drinking water programmes are brought under the umbrella of the RGNDWM.

2005: The Government of India launches the Bharat Nirman Programme for overall development of rural areas by strengthening housing, roads, electricity, telephone, irrigation and drinking water infrastructure.

The target is to provide drinking water to 55,069 uncovered habitations; those affected
by poor water quality and slipped back habitations based on 2003 survey, within five years.

2007: Pattern of funding under the Swajaldhara Scheme changes from the previous 90:10 central-community share to 50:50 centre-state shares. Community contribution is now optional.

Source: Drinking water quality in rural India: Issues and approaches, background paper, Water Aid, 2008

1.3 COVERAGE AND INVESTMENT IN INDIA ON RURAL WATER SUPPLY

The 2001 census reported that 68.2 per cent of households in India have access to safe drinking water. While according to NSS Report No. 535: Housing Condition and Amenities in India: July 2008 – June 2009, in India out of 1.65 million rural habitations in the country, 1.19 million (72%) had sufficient quantity of potable drinking water while 0.46 million (28%) are the habitations with insufficient quantity of potable drinking water.

The latest figures of District Level Household and Facility Survey – 3 (DLHS – 3) collected by the Ministry of Health & Family Welfare shows that 80% of the population in rural areas have access to improved i.e. safe drinking water sources. About 12% have drinking water piped into their dwelling and a further 16% get water from public taps.

The physical progress in coverage of uncovered, slipped back and quality affected habitations under NRDWP in 2009 -10 is indicated below:

Table 1.1: Physical Achievements (2007-08 to 2010-11) **(No of habitations)**

Particulars	2007-08	2008-09	2009-10	2010-11*
Uncovered	11,761	16,137	377	183
Partially Covered	74,897	1,15,322	1,19,444	68,695
Quality Affected	18,757	21,531	32,734	16,713
Total	105, 415	152,990	152,990	85,591

Source: DDWS up to February 28, 2011

However there is a growing need to address the problem of sustainability of water supply sources. The Department has accorded highest priority to 'sustainability' of drinking water sources and systems to prevent slippages. Sustainability measures like water conservation and rainwater harvesting leads to in-situ remediation of water quality and as such will have to be a priority in water supply sector. For this purpose under NRDWP, allocation will be 20% for projects to be implemented on Sector/ Reform/ Swajaldhara principles for which 100% grant-in-aid will be made available to states.

From the 1990s, there has been a considerable increase in fund outlays for rural water supply in the five year plans. Rural drinking water supply is one of the components of Bharat Nirman launched in 2005-06. Under Bharat Nirman Phase-I (2005-06 to 2008-09), funds utilised were Rs 4,098 crore (920.90 million USD) in 2005-06, Rs 4,560 crore (1024.72 million USD) in 2006-07, Rs 6,441.69 crore (1447.57 million USD) in 2007-08 and Rs 7, 299.48 crore (1640.33 million USD) in 2008-09.

11th five-year plan allocation for rural water supply is Rs 39.490 crore (8.87 million USD) DDWS water supply financial progress for financial year 2007-08 to 2009-2010 is given below:

Table 1.2: Financial Achievements (2007-08 to 2009-10) **(INR in Lakhs)**

Year	Budget Estimate	Revised Estimate	Releases
2007-08	6500.00 (14.61 million USD)	6400.00 (14.38 million USD)	6442.76 (14.48 million USD)
2008-09	7300.00 (16.40 million USD)	7300.00 (16.40 million USD)	7298.79 (16.40 million USD)
2009-10	8000.00 (17.98 million USD)	8000.00 (17.98 million USD)	5668.87 (12.74 million USD) (Till 31.12.2009)

Source: DDWS

According to the Ministry of Rural Development nearly 1.44 lakh (0.144 million) rural habitations across the country with ground-water based drinking water sources are affected by chemical contaminants like arsenic, fluoride, salinity, iron and nitrates. These habitations remain to be covered with safe drinking water supply.

Access to clean drinking water especially in rural areas remains a challenging task. While larger cities in the country have their own laboratories for testing water, institutional framework for water quality monitoring and data processing is inadequate in rural areas. A major development in this regard was the launch of National Rural Drinking Water Quality Monitoring and Surveillance Programme in February 2006 by the Government of India. This envisages institutionalisation of community participation for monitoring and surveillance of drinking water sources at the grassroots level by gram panchayats and Village Water and Sanitation Committees, followed by checking the positively tested samples at the district and state level laboratories. Under the programme, provision for water testing kits for each Gram Panchayat was made. 100% financial assistance was provided to the states for this task. With effect from April 1, 2009, the water quality monitoring and surveillance programme has been subsumed under the NRDWP and these activities are now supported from the Support Fund.

1.4 IMPROVING WATER QUALITY IN RURAL SCHOOLS

India has one of the largest numbers of school going children, especially in rural areas. As per the NFHS 3 -2006, about 81 percent of the children in the primary age group of 6-10 are attending schools in rural areas. As per the 7th National Education Survey, MoHRD-GoI, there are about 7.66 lakh (0.766 million) rural schools, both primary and upper primary with over 8 crore (80 million) school-going children of which 76.9 percent schools have water supply.

- On an average, 30 million people in rural areas suffer from sanitation related diseases.
- Five of the 10 top killer diseases of children aged 1-4 in rural areas are related to water and sanitation (Source: Central Bureau of Health Intelligence – MoHFW).
- About 3 to 4 lakh (0.3-0.4 million) children die of diarrhea annually, almost – 1000 every day.
- Typhoid, dysentery, gastroenteritis, jaundice and malaria claim the lives of over a fifth of children aged 1-14 in rural areas.
- India still has a high child mortality rate of 74 (NFHS-3) though improved over NFHS-2 which was as high as 95.
- High dropout rate, particularly among girls only 34 percent of the girls and 49 percent of the boys complete school education (Source: NFHS-3).

Source: An Inclusive Approach for School Sanitation & Hygiene Education – Strategy, norms and designs, July 2008

A substantial increase in water supply facilities has been observed in the rural schools but these often face the problem of insufficient or unsafe water supply and hand washing facilities. Due to a variety of factors, the quality of drinking water deteriorates when it actually reaches the consumption point, especially in vulnerable areas like rural schools. Under these conditions, schools and community environment tend to become unsafe places where diseases are transmitted.

To tackle this problem the Department of Drinking Water Supply, Govt. of India started Jalmani programme during 2008-09 which aimed to install Simple Stand Alone Water Purification Systems (SAWPS) in rural schools to enable school children to have access to safe and clean water. This will facilitate developing understanding, appreciation and increasing accessibility for safe and clean drinking water among rural schools.

The 'Mission Statement' of the Jalmani programme states 'to provide value and quality addition to the ongoing Rural Drinking Water Supply Programme".

1.5 JALMANI: THE CONCEPT AND ACHIEVEMENT SO FAR

Initially SAWPS were to be installed in one lakh (0.1 million) schools in the financial year 2008-09 as a value addition to the Rural Water Supply Programme. The Finance Minister, while presenting the Union Budget for 2008-09, also made an announcement for an additional allocation of Rs 200 crores (44.94 million USD) to cover approximately one lakh (0.1 million) school children with SAWPS in the schools.

Jalmani Scheme

- 100% centrally sponsored programme
- Focus on bacteriological contamination and turbidity
- 3 liter/ day potable water for children and teachers
- 56,929 schools were covered so far against a target of 1,94,418 upto March 2011
- Rs 5043.89 lakh (11.33 million USD) was utilised against the received amount of Rs 7441.63 lakh (16.72 million USD) upto March 2011
- 2011-12 target is another 40,000 SAWPS installation

To decide on technology options the Department had constituted a High Level Technical Committee (HLTC) in March 2008. This Committee was chaired by Secretary, Science and Technology with members from renowned technical institution in Government of India viz. Bureau of Indian Standards (BIS), Central Ground Water Board (CGWB), Central Pollution Control Board (CPCB), Bhabha Atomic Research Centre (BARC), Institute of Minerals and Materials Technology (IMMT), Industrial Toxicological Research Institute (ITRC), All India Institute of Hygiene and Public Health (AIIHPH), Ministry of Health and Family Welfare, Department of Science and Technology and Directorate General of Supply & Disposal (DGS&D). The HLTC is a permanent feature and meets from time to time for evaluation of technologies and this facilitates improvement in the quality and lowers the prices of the product and increase the competitiveness among the manufactures.

It was suggested that all the implementing agencies for operating this programme viz., the DDWS and other related Ministries, the District Authorities, the PRIs and grass root level organisations must work closely in a coordinated fashion to ensure that the basic objective of providing safe drinking water at the consumption point to the most vulnerable section of the rural society, viz. the school children are met through proper management of these systems right from the stage of procurement to the stage of usage. Guidelines have suggested that attention should be focused on ensuring proper convergence of these schemes with NRDWQM&S programme.

Before scaling up the programme, the DDWS requested UNICEF support to evaluate the success and gaps of the Jalmani programme. It was decided to assess the SAWPS installed till March 2010.

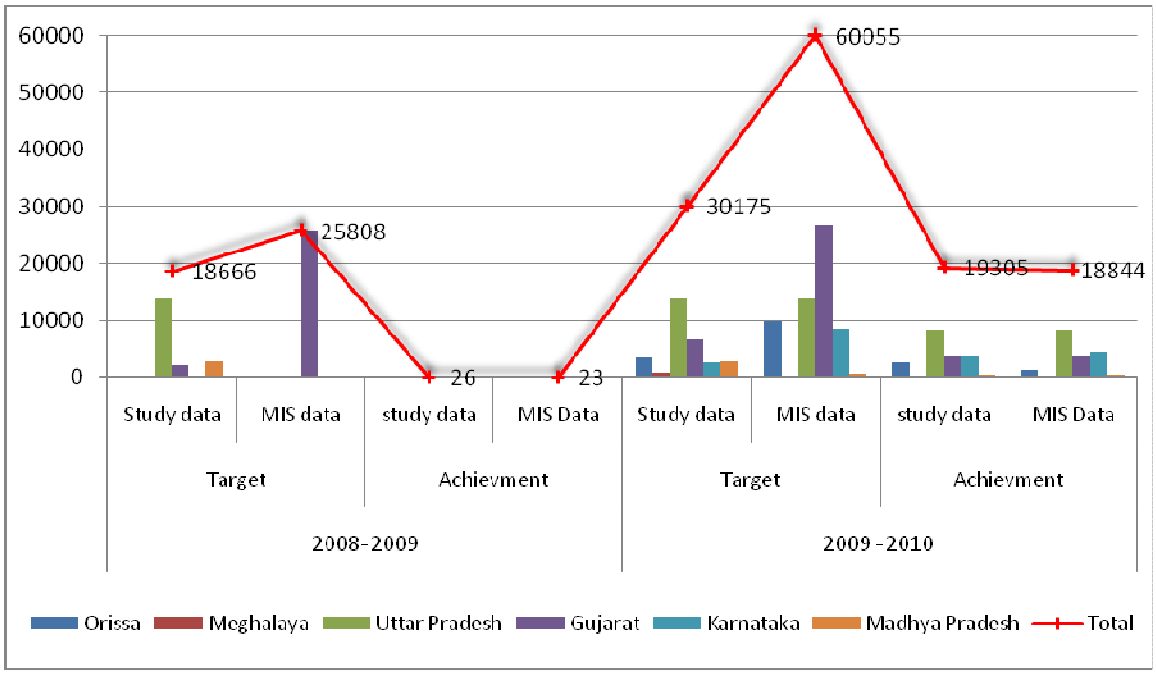
1.5.1 Physical and Financial Performance in Six Sample States (Upto March 2010)

In 2008-09 against a target of 18,666 SAWPS (MIS data – 25,808 SAWPS), only 26 SAWPS (MIS data –23 SAWPS) were installed in the six sample states. During 2009-10, a total of 19,305 SAWPS (MIS data-18,844 SAWPS) were installed while the target was 30,175 (MIS data – 60,055 SWAPS) which was approx. 64% achievement.

In the year 2008-09, the total amount received was Rs 2931 lakhs (6.59 million USD), out of which the expenditure incurred was Rs 4 lakhs (0.01 million USD). No MIS data was available for the amount received and expenditure incurred for 2008-09.

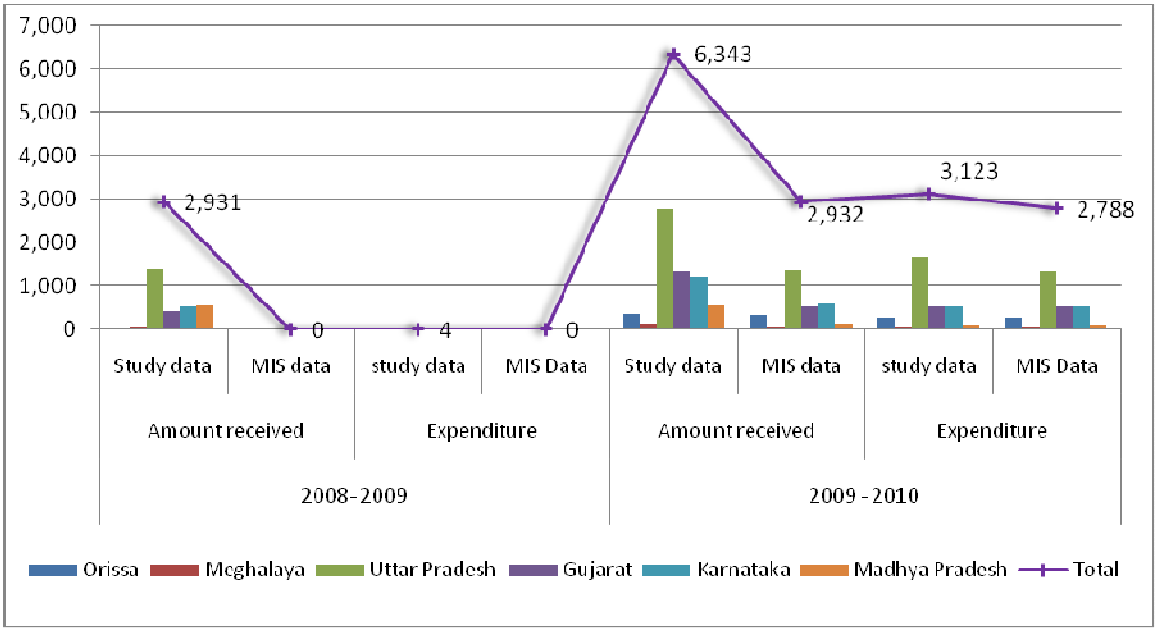
For 2009-10 the amount received and used was Rs 6343 lakhs (14.25 million USD) and Rs 3123 lakhs (7.02 million USD) respectively as per the CMS study data whereas MIS data shows Rs 2932 lakhs (6.59 million USD) as the amount received and Rs 2788 lakhs (6.27 million USD) as expenditure incurred in six states. Nearly 49% is the financial achievement in year 2009-10.

Figure 1.1: State-wise physical progress status (Reported v/s MIS data) till March 2010 (in nos.)



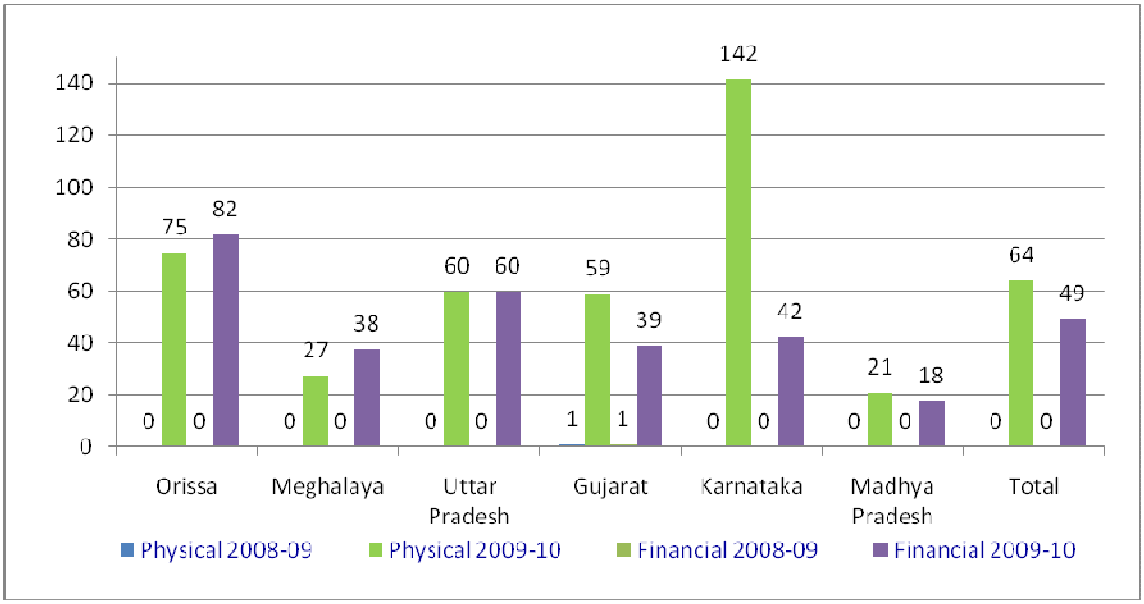
Source: Jalmani Information System, ddws.nic.in and Assessment of the Jalmani Programme (SAWPS) by CMS in rural India, 2011

Figure 1.2: State-wise financial progress status (Reported v/s MIS data) till March 2010 (Rs in lakhs)



Source: Jalmani Information System, ddws.nic.in and Assessment of the Jalmani Programme (SAWPS) by CMS in rural India, 2011

Figure 1.3: State-wise physical and financial progress status till March 2010 (in percentage)



Source: Assessment of the Jalmani Programme (SAWPS) by CMS in Rural India, 2011

1.6 IMPLEMENTATION MECHANISM

In Meghalaya and Madhya Pradesh, Public Health and Engineering Department (PHED) and in Uttar Pradesh, Jal Nigam is implementing the Jalmani programme. Rural Development and Panchayati Raj Department (RDPR) in Karnataka, Rural Water Supply & Sanitation (RWS&S) in Orissa while Water and Sanitation Management Organisation (WASMO) in Gujarat are implementing the programme (refer annexure 3 for the respective implementing department/ organisations organogram). Except for Meghalaya, Gujarat and Uttar Pradesh where Jalmani was initiated in 2008-09 in rest of the sample states it was started during 2009-10. Almost all the districts in the sample states are covered under Jalmani programme till March, 2010 except for Madhya Pradesh where only 26% districts are covered.

Table 1.3: Details of implementation mechanism for Jalmani scheme in sample states

Sl. No	States	Name of implementing department	Year of implementation	Total districts	Districts covered under Jalmani	Percentage of the districts covered
1.	Gujarat	Water and Sanitation Management Organisation (WASMO)	2008-09	25	24	96
2.	Karnataka	Rural Development and Panchayati Raj Department (RDPR)	2009-10	30	29	97
3.	Madhya Pradesh	Public Health and Engineering Department (PHED)	2009-10	50	13	26
4.	Meghalaya	Public Health and Engineering Department (PHED)	2008-09	7	7	100
5.	Orissa	Rural Water Supply & Sanitation (RWS& S)	2009-10	30	29	97
6.	Uttar Pradesh	Jal Nigam	2008-09	70	70	100

1.7 ASSESSMENT STUDY

1.7.1 Rationale for the Study

Before extending the scheme the Department of Drinking Water Supply, Ministry of Rural Development, Government of India has requested UNICEF to carry out an evaluation of Jalmani programme. The objectives of this study are:

- To ascertain the performance of the programme in the field
- To ensure that the intended benefits are being realised
- To ensure the long-term sustainability of the programme

1.7.2 Major Users of the Study

The results will be of use to the Department of Drinking Water Supply, the Department of Education and the State line departments, as well as UNICEF, WES and Education sections. State level Departments (of Rural Development and Education) will also be provided a presentation and the report by UNICEF and the Ministry. The study findings will be disseminated in report format and presentation approved by UNICEF. The primary data collected from field would be compiled and punched. The information collected from the officials will be analysed and the relevant findings will be incorporated in the report.

The expected impacts are

- Dissemination and capacity building (National and state levels)
- Discuss and define the way forward (National, state and district levels)
- Develop revised implementation strategy (state level)
- Advocacy for improved effective water treatment systems in schools
- Influence GoI guidelines (National level)

Table 1.4: Major Users of Research and Dissemination Plan (as per RFP)

No.	Level	Major Users	Communication Method	Expected Impact
1.	National Level	Department of Drinking Water Supply, Ministry of Rural Development, Govt. of India, UNICEF, Delhi	Final report, power point presentation on final report	National Level dissemination and capacity building and Influencing GoI Guidelines
2.	State Level	Department of Rural Development, Department of Education	Report and power point presentation and disseminating of the results and way forward	Develop Revised implementation strategy –define way forward
		UNICEF	Power point presentation and final report	Advocacy for improved effective water treatment systems in schools
3.	District Level	District Collector, SSA, PHED,	Power point presentation and executive summary and dissemination	Develop revised implementation strategy –define way forward

CHAPTER 2 STUDY, APPROACH AND METHODOLOGY

This chapter describes in detail the approach to the study, sampling methodology and plan of action to complete the same. CMS Environment worked in coordination with the state level nodal agencies responsible for implementing the Jalmani programme. The study used both qualitative and quantitative techniques such as FGDs and IDI besides structured questionnaire for a variety of stakeholders and research questions. Another important aspect of the quantitative tools was testing of the raw and treated water samples.

2.1 SCOPE AND TECHNICAL APPROACH

The objective of the study was to conduct a ground assessment of the performance of Jalmani programme on parameter like general adherence to the Jalmani guidelines. The study results also throw some very useful insights into the strengths and weaknesses of the programmes and the areas which need improvement, changes and modifications.

As per the ToR, the prime reason for undertaking the study was to understand whether the intended benefits of the programme has been realised by the beneficiaries and whether a long-term sustainability of the programme is ensured. The Jalmani guideline was constantly referred during designing of the research tool as well as in the field. In the process of preparing the tools and putting together this report, the purpose of the study and indicators mentioned in ToR were analysed as given below:

Table 2.1: Technical approach of the study (as per ToR – annexure 5)

Areas of research	Questions of research	Proposed Methods	Proposed Respondents
Objective 1: To ascertain the performance of the programme in the field			
Impact	• Does the school have a sustainable source of clean drinking water?	• Semi Structured Interview Schedules • Focus Group Discussion	Principal/teacher representative and school children
	• Is there less or greater risk now than before the SAWPS was installed?	• Semi Structured Interview Schedules • Focus Group Discussion	Principal/teacher representative, school children, PRI member, Grass root worker, VWSC members, state & district concerned officials
	• Can all children access the SAWP directly?	Focus Group Discussion Semi Structured Interview Schedules	Principal/teacher representative, PRI member and school children
Effectiveness	• What procurement process was followed to get SAWPS, How long have the SAWPS been installed, and are they still in use.	Semi Structured Interview Schedules	Supplier/manufacture, state and district concerned officials and school principal/teacher representative, PRI and VWSC members
	• Do they produce clean water, do the children like the water, is it accessible to all children, equally.	Water testing, Semi Structured Interview Schedules and Focus Group Discussion	Principal/teacher representative and school children
	• Are some groups not allowed or discouraged from using the filters?	Focus Group Discussion	School children

Areas of research	Questions of research	Proposed Methods	Proposed Respondents
Efficiency	• Is there sufficient water for all students and teachers? e.g. students/filter	Semi Structured Interview Schedules and Focus Group Discussion	Principal/teacher representative and school children
	• Is there a waiting time to access the water?	Semi Structured Interview Schedules and Focus Group Discussion	Principal/teacher representative and school children
Objective 2: To ensure that the intended benefits are being realised			
Suitability	• What types of SAWPS have been used in schools, how were they selected, who selected the type of system and why? What are the water storage issues?	Semi Structured Interview Schedules	Supplier/manufacture, state and district concerned officials and school principal/teacher representative, PRI member and Grass root worker/VWSC members
	• Is there any knowledge of the raw/source water quality.	Semi Structured Interview Schedules	School principal/teacher representative, PRI member and Grass root worker/VWSC members
	• Was the filter type decided based on the required treatment, or other reason?	Semi Structured Interview Schedules	Supplier/manufacture, state and district concerned officials and school principal/ teacher representative and PRI member
	• What is the quality of the raw water?	Water testing, secondary data	
	• Is the water tested by any of the five `grass root workers' assigned under the NRDWQMSP	Semi Structured Interview Schedules	State and district concerned officials, principal/teacher representative, and Grass root worker, VWSC members
	• Are the results known to the school and community?	Semi Structured Interview Schedules	School principal/teacher representative, PRI member and Grass root worker, VWSC members
Objective 3: To ensure the long-term sustainability of the programme (leading to sustainability indicators)			
Sustainability	• What are the costs of the filter?	Semi Structured Interview Schedules	Supplier/manufacture, State and district concerned officials and school principal, teacher representative
	• What are the running costs?	Semi Structured Interview Schedules	Supplier/manufacture, State and district concerned officials and school principal/teacher representative
	• Are the school authorities aware of the costs and do they have a recurring budget to pay?	Semi Structured Interview Schedules	School principal/teacher representative
	• Are spare parts and consumables available locally/conveniently?	Semi Structured Interview Schedules	Supplier/manufacture, school principal/teacher representative
	• Do the users know how to use and maintain the device properly?	Semi Structured Interview Schedules and Focus Group Discussion	School principal/teacher representative and school children
	• Are they aware of any negative consequences of not maintaining the filter?	Semi Structured Interview Schedules	School principal/teacher representative

Areas of research	Questions of research	Proposed Methods	Proposed Respondents
	• Who is responsible for the SAWPS and are they skilled enough to maintain the SAWPS?	Semi Structured Interview Schedules	Supplier/manufacture, state and district concerned officials, school principal/teacher representative, PRI member and Grass root worker, VWSC members
	• Is there a maintenance arrangement with the manufacturers?	Semi Structured Interview Schedules	Supplier/manufacture, state and district concerned officials and school principal/teacher representative
	• Was there a need to have repair or maintenance, and did the company respond and how adequate was the response?	Semi Structured Interview Schedules	Supplier/manufacture, state and district concerned officials and school principal/teacher representative

2.2 SAMPLING FRAMEWORK AND METHODOLOGY

The overall sampling framework was prepared by CMS Environment in consultation with UNICEF and DDWS officials. The preliminary visit in Uttar Pradesh and Meghalaya facilitate tools development. The study was undertaken in 320 schools (1.6% of the total installed as per March 31, 2010 data) spread across 20 districts and six states. To assess the functionality, usage, accessibility and sustainability of the SAWPS, the study time period was **April 2008 – March 2010.** The process for selection of states, districts, blocks, habitations/ schools are given below;

2.2.1 Selection of States

The states for the assessment were proposed by UNICEF. The logic behind the selection of the sample states was to get a broader view of the scenario. So, one state each from six geographic regions (north, south, east, west, central and north east) were selected (refer table 2.2).

Table 2.2: Final selected states

S. No.	Region	States Proposed as per RFP	Final Selected States
1.	North	Uttar Pradesh	Uttar Pradesh
2.	South	Karnataka or Tamil Nadu	Karnataka
3.	West	Gujarat	Gujarat
4.	East	Orissa or Bihar	Orissa
5.	Central	Madhya Pradesh	Madhya Pradesh
6.	North-East	Tripura or Meghalaya	Meghalaya

2.2.2 Selection of Districts

The sample districts were selected by using the percentile method - keeping 50th percentile as base. The percentage of SAWPS installed against target has been taken as the basis for calculation of the percentile. In total CMS Environment covered 20 districts which are approximately 12% of all the districts across the selected six states where Jalmani programme was initiated. However adjustment in number of districts selected through 50th percentile was done on direction of DDWS to ensure representation of the districts in each sample states.

Table 2.3: Selected districts and sample schools

Sl. No	States	Total number of SAWPS districts till March 31, 2010	Number of districts	Districts' Name	Number of Schools
1	Gujarat	24	03	Vadodara, Sabar Kantha and Kheda	48
2	Karnataka	29	04	Chickkballapur, Dharwad, Chitradurga and Raichur	64
3	Madhya Pradesh	13	03	Dhar, Alirajpur and Narsinghpur	48
4	Meghalaya	07	02	Jaintia Hills and Ri Bhoi	32
5	Orissa	29	03	Angul, Ganjam and Cuttack	48
6	Uttar Pradesh	70	05	Ghaziabad, Chandauli, Balrampur, Farookhabad and Barabanki	80
Grand Total		**172**	**20**		**320**

Note: 16 schools were selected per district (for details of the sample covered refer annexure 1)

2.2.3 Selection of blocks and schools

Total blocks where SAWPS were installed till March 2010 were organised in descending order on the basis of their SCs/ STs population and out of that 50% blocks were covered. Further out of the selected blocks 50% blocks were those having maximum population of SC/ ST and remaining 50% blocks were shortlisted randomly.

In the shortlisted blocks, schools were selected randomly and equally distributed in each selected blocks.

2.3 STUDY TOOLS AND STAKEHOLDERS

Qualitative and quantitative approach was undertaken for the study. The raw and treated water quality testing was conducted through Jal TARA kits on parameters like turbidity, iron and total coliform presence. CMS Environment has developed semi structured interview schedules for (i) school principal/ teacher representative; (ii) Grass root workers; (iii) PRI head; (iv) Panchayat level committee - VWSC/SMC/Jalmani Committee/Others; (v) suppliers/ manufacturers (vi) district/ state concerned officials and a focus group discussion guidelines for school children. Given below respondents and sample size details:

Table 2.4: Study tools, respondents and final sample size

S. No	Research Tools (Annexure – 6)	Respondents	Total Sample Size
1.	Focus Group Discussion Guideline (One FGD per school)	School children (at least 50% SC/ ST) with equal representation from both gender	320
2.	Format for data collection (raw and treated water sample)	Schools	436
3.	Semi Structured Interview Schedules (SSIS) - One per school	Principal/ Teachers representative	320
4.	Observation Checklist - One per school	Schools	320
5.	Semi Structured Interview Schedules (SSIS) – one per GP	Sarpanch (PRI head)	313
6.	Semi Structured Interview Schedules (SSIS) - one per GP	`Grass root workers' assigned under the NRDWQMSP	183
7.	Semi Structured Interview Schedules (SSIS) - One from each committee per Gram Panchayat	Village Level Committee (VWSC/SMC/Jalmani Committee)	222
8.	Semi Structured Interview Schedules (SSIS)	Manufacturers/supplier representatives	09
9.	Semi Structured Interview Schedules (SSIS)	States/ districts officials	26
Total			**2149**

(Refer annexure 1 for names of schools covered)

2.3.1 Selection of Water Quality Testing Kit

The final decision on selection of water testing kit went through lot of churning before it was finally agreed to conduct the tests using Jal Tara field testing kits. In the process of decision making CMS also evaluated the option of using the services of NABL Accredited Laboratories. The reason for considering this option was that CMS will get a comprehensive test done across various parameters (Fe, TU, bacteriological TC and FC). CMS thus spent considerable time and effort in identifying the regional NABL accredited labs, getting the rate cards and working out the modalities for carrying out the tests at block levels and ensuring fidelity of the test report. What prevented UNICEF from going ahead with NABL was the prohibitive cost.

It was thus decided to use equally efficient and accredited Jal TARA kit to test the raw and treated water for Fe, TU, and Faecal Coliform). Thus 20 TARA kits were purchased and testing of raw and treated water were conducted for Fe, TU and presence of faecal contamination.

2.4 WORK AND ANALYSIS PLAN

A meeting was held on December 21, 2010 with DDWS and UNICEF staff where detail sampling plan, water quality testing parameters, procedure and pre-testing plan was discussed.

2.4.1 Desk Research and Secondary Data Collection

The team conducted desk research to get an overview on Jalmani scheme and also collected information from respective states and districts on districts, blocks, habitations and schools where SAWPS were installed. Data from DDWS website, UNICEF, WHO, WSP and other related websites were referred apart from NRDWQM&S, Jalmani guidelines, Census 20011, SMC, VWSC, PTA committees' roles for desk research.

2.4.2 Preliminary Visit

CMS Environment team conducted preliminary visits in Meghalaya and Uttar Pradesh (January 17-19, 2011). The visit was conducted for three days simultaneously in both states. Interactions were held with Chief Engineers, Executive engineers, Asst. engineers, Junior Engineers of PHED and Jal Nigam and suppliers engaged under programme. Although the preliminary visit was proposed to be conducted in Madhya Pradesh (MP) but pre-occupation of the state and district concerned officials in Madhya Pradesh on proposed dates, Uttar Pradesh was selected for the visit in consultation with UNICEF.

The team had consultations with key stakeholders at state and district level to get first hand information about the scheme and its entire implementation mechanism. Various schools where SAWPS have been installed were also visited. This preliminary visit helped in developing further understanding about ground scenario and contributed in reframing and enriching the methodology and the tools.

Table 2.5: Officials interacted and schools visited during the preliminary visit

State	Officials' Interacted	Designation	Schools Visited
Uttar Pradesh	S P Kureel	Chief Engineer	1. Primary School, Seri Gram Panchayat, Rai Bareilly 2. Upper Primary School, Datauli Gram Panchayat, Rai Bareilly 3. Primary School, Salimpur Gram Panchayat,
	A K Tripathi	Joint Director	
	R C Saxena	Deputy Director	
	Mukesh Chandra	Deputy Director	
	Samim Akhtar	Asst. Engineer, Rai Bareilly	

State	Officials' Interacted	Designation	Schools Visited
	Awadh Kishore	J E Engineer, Rai Bareilly	Rai Bareilly 4. Primary School, Chhijarasi Gram Panchayat, Ghaziabad 5. Primary School, Galand No. 1 Gram Panchayat, Ghaziabad 6. Upper Primary School, Hasanpur Gram Panchayat, Ghaziabad
	A K Tyagi	Asst. Engineer, Ghaziabad	
	S K Saxena	Junior Engineer, Ghaziabad	
	Sanjay Kumar Srivastava	Chief Executive Officer, Pacific Water Solution Pvt. Ltd (Supplier)	
Meghalaya	Himanshu Prasad	Chief Enginner, PHED, Shillong	1. Government L.P. School, Pahamjari, Ri Bhoi District
	Ms Emisalan Passah	Assistant Engineer, PHED, Shillong	
	Mr P Dutta	JE, PHED, Nongpoh Division	
	Mr D War	EE, PHED, Nongpoh Division	

2.4.3 Inception Report

The inception report containing information and details on survey designs, final sample size details, different stakeholders, work plan, time line, and preliminary visit report was submitted on January 12, 2011. Final report structure based on indicators and research focus was also prepared and included in the inception report.

2.4.4 Research Tools

Nine different research tools were pre-tested in Madhya Pradesh and Karnataka. The pre-testing was undertaken in one district in each of the two states. Based on the pre-testing experience research tools were finalised and submitted to UNICEF (refer annexure 6 for research tools).

The tools were translated in four regional languages for saving information loss. All the interviews were conducted in local languages and further the responses were translated into English for coding and analysis.

Table 2.6: Research tools in regional language

Sl. No	States	Languages
1.	Gujarat	English and Gujarati
2.	Karnataka	English and Kannada
3.	Madhya Pradesh	Hindi and English
4.	Meghalaya	Hindi and English
5.	Orissa	English and Orriya
6.	Uttar Pradesh	Hindi and English

2.4.5 Orientation of the Field Personnel

Since this study involved understanding of water quality related issues, a very comprehensive training on all aspects of the assignment was given by the team leader to all senior research associates, research associates, senior field manager, senior field executives, field executives involved in this study. The senior research associates further provided trainings to field team on each and every aspect of the study – in terms of data to be collected, how to conduct the IDIs and FGDs, how to deal with stimulus materials, etc. The briefing for the teams of Uttar Pradesh and Madhya Pradesh was provided by the team leader, senior research associates and senior field manager in Delhi and for rest of the four states senior research associates oriented the teams in their respective states. In each state orientation was given for three days on three components:

- Theoretical orientation involving briefing on the objectives of the project, methodology, type of material, quality checks and issues related to water quality

- Field methods and instrumentation, covering all aspects of data collection including water quality testing, and
- An ethics module to orient the team regarding maintenance of confidentiality and data storage.

2.4.6 Field Work and Testing of Water Quality

The field work was completed in a month time and conducted simultaneously across the sample states in Feb 2011. The sampling and testing of raw and functional SAWPS on selected parameters were also done by CMS Environment team. From wherever possible following documents were also collected to validate the information:

- Physical and financial progress report upto March, 2010 (district wise)
- Advertisement for empanelment of suppliers (if any)
- Copy of sanction letter or MoU signed with the supplier(s)
- List of final selected suppliers
- Asset handing over form (post installation) for all schools where SAWPS installed upto March, 2010 (at district level)
- Maintenance certificates (if any) for all schools where SAWPS installed upto March, 2010 (at district level)
- Water testing report before installation of SAWPS for all schools where SAWPS installed upto March, 2010 (at district level)
- Water testing report after installation of SAWPS for all schools where SAWPS installed upto March, 2010 (at district level)

2.4.7 Interim Presentation and Final Report

Interim presentation summarising the qualitative top line findings from all sample states was given on March 7, 2011 to DDWS and UNICEF officials. The presentation highlights included the findings and observations that emerged from the discussion with concerned implementing officials at state and district level, suppliers/ manufactures, teachers and in-charge, panchayats members and schools visits by the senior research associates. A brief interim report was submitted thereafter.

The data was scrutinised, coded and entered in SPSS. Further the data was validated for quality assurance. The draft final report was submitted on April 7, 2011 and comments and suggestions from DDWS and UNICEF were incorporated in the final report. The presentations were held on April 25, 2011 and May 4, 2011 (for final presentation refer Annexure 7).

CHAPTER 3 RESPONDENTS: A SOCIO-DEMOGRAPHIC ANALYSIS

This chapter deals with the demographic profile of our unit of analysis. It provides key information such as the following;

- Sample size
- Gender
- School level & type and enrolment status
- SC/ ST children composition etc of the schools
- Information on numbers of girls, boys and co-ed schools
- Profile of the PRI members, Grass root workers and committee members

The below mentioned table provides the complete details about the sample size covered;

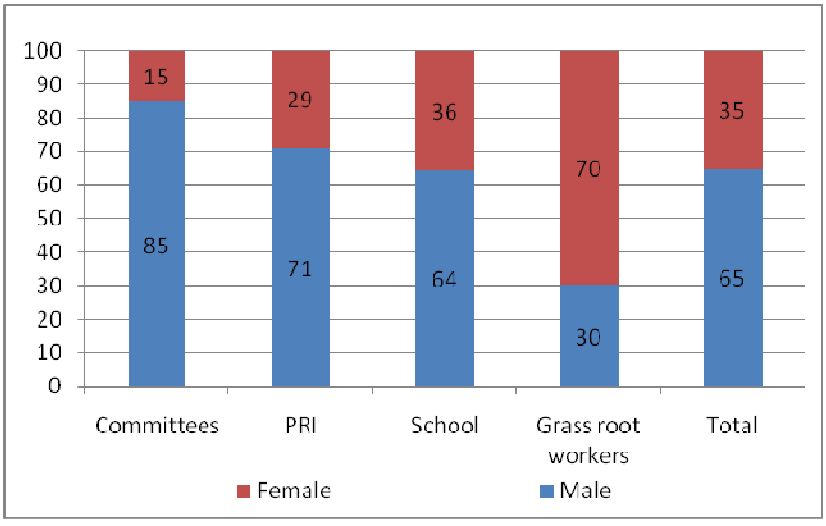
Table 3.1: Respondent-wise sample size

State	School Teacher	PRI Member	Grass root Workers	Committee Member	State/District Officials	Suppliers/Manufactures	Total
Gujarat	48	48	47	39	4	2	188
Karnataka	64	64	59	47	5	3	242
Madhya Pradesh	48	48	17	32	4	1	150
Meghalaya	32	32	4	26	3	2	95
Orissa	48	48	47	61	4	1	209
Uttar Pradesh	80	73	13	17	6	2	191
Total	320	313	183	222	26	11	1075

3.1 GENDER PROFILE OF RESPONDENTS

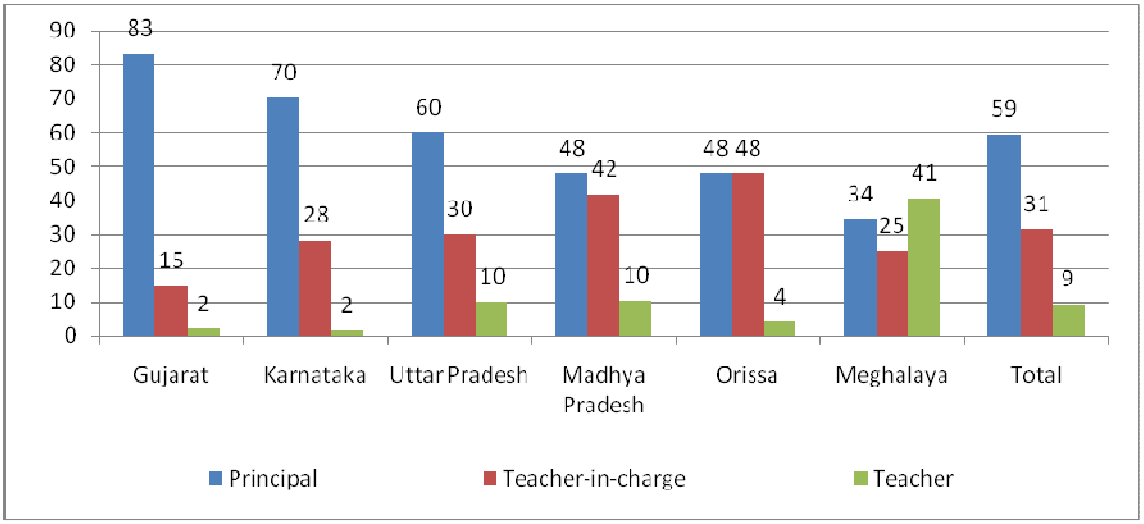
Of all the respondents types interviewed, majority were male (nearly 65%) except for the grassroots workers where the female respondents were more than double (70%) compare to male (30%). The percentage of male respondents in committees was approx. 85% as against around 15% female.

Figure 3.1: Gender profile of all the respondents (in percentage)



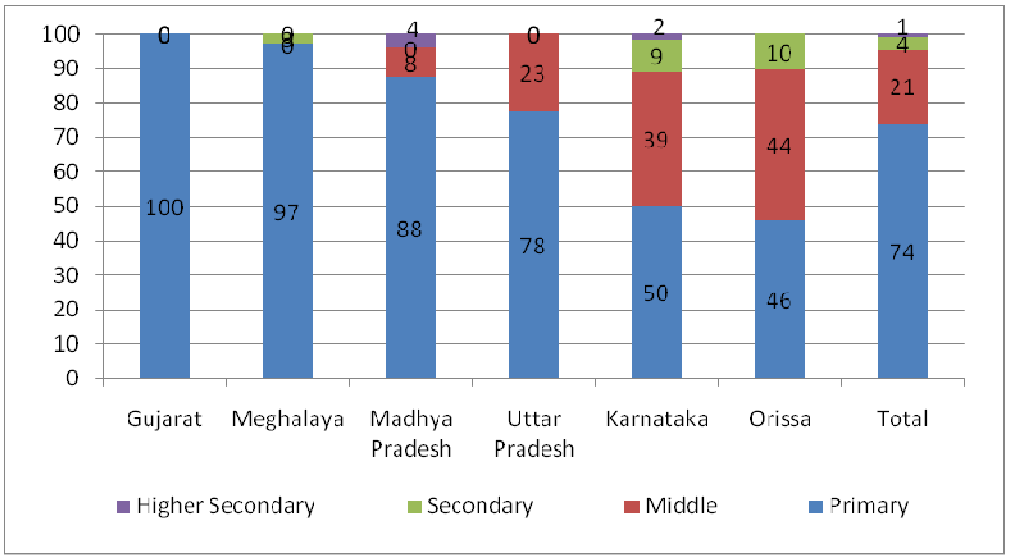
3.2 SCHOOLS PROFILE

Figure 3.2: Profile of the respondents in schools (in percentage)



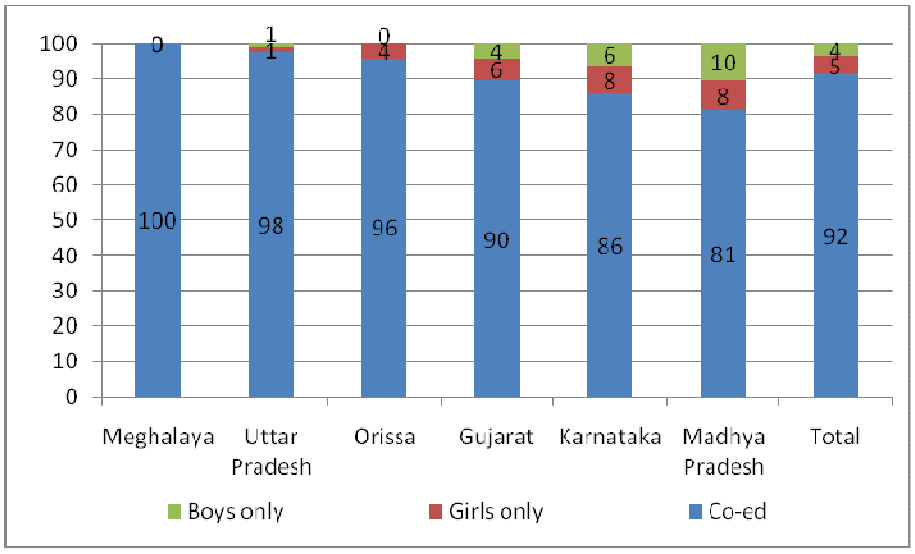
In the schools, CMS interviewed Principals, Teacher-in-charge and Teacher in the order of preference and availability. Almost 59% principals were interviewed to get an understanding about the performance of SAWPS and issues involved. Wherever the Principal was not available CMS team spoke to Teacher-in-charge (31%) and in small instances (9%) teachers were interviwed. At state level, interviews with principal/ head masters were maximum in Gujarat (83%) while lowest in Meghalaya (34%). In Orissa 48% interviews were conducted with teacher-in-charge and in Meghlaya 40% with the teachers present at the time of the field work.

Figure 3.3: Category of schools (in percentage)



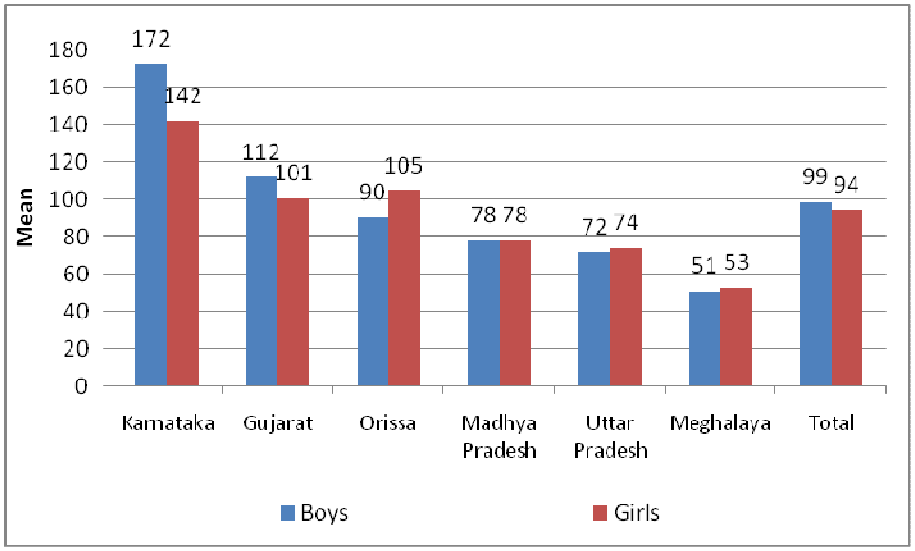
SAWPS have been installed predominantly in primary schools in the sample states. Primary schools accounted for 74% of the installations, followed by middle school (21%), secondary schools (4%) and higher secondary (less than 1%). In Gujarat, all the sample schools where SAWPS installed were primary schools only.

Figure 3.4: Gender wise school profile (in percenatge)



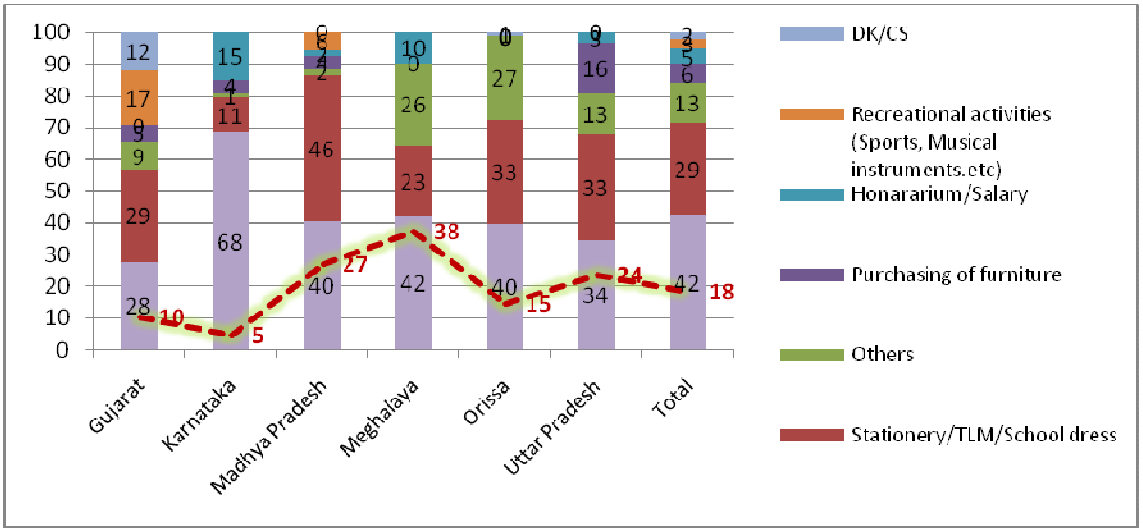
Of all the schools visited, 92% of the schools were co-ed, around 5% of the schools were of only girls and approx. 4% were of only boys. In Meghalaya, all the schools visited were co-ed while none of the schools were only for girls in Orissa.

Figure 3.5: Enrollment status of the schools (average mean)



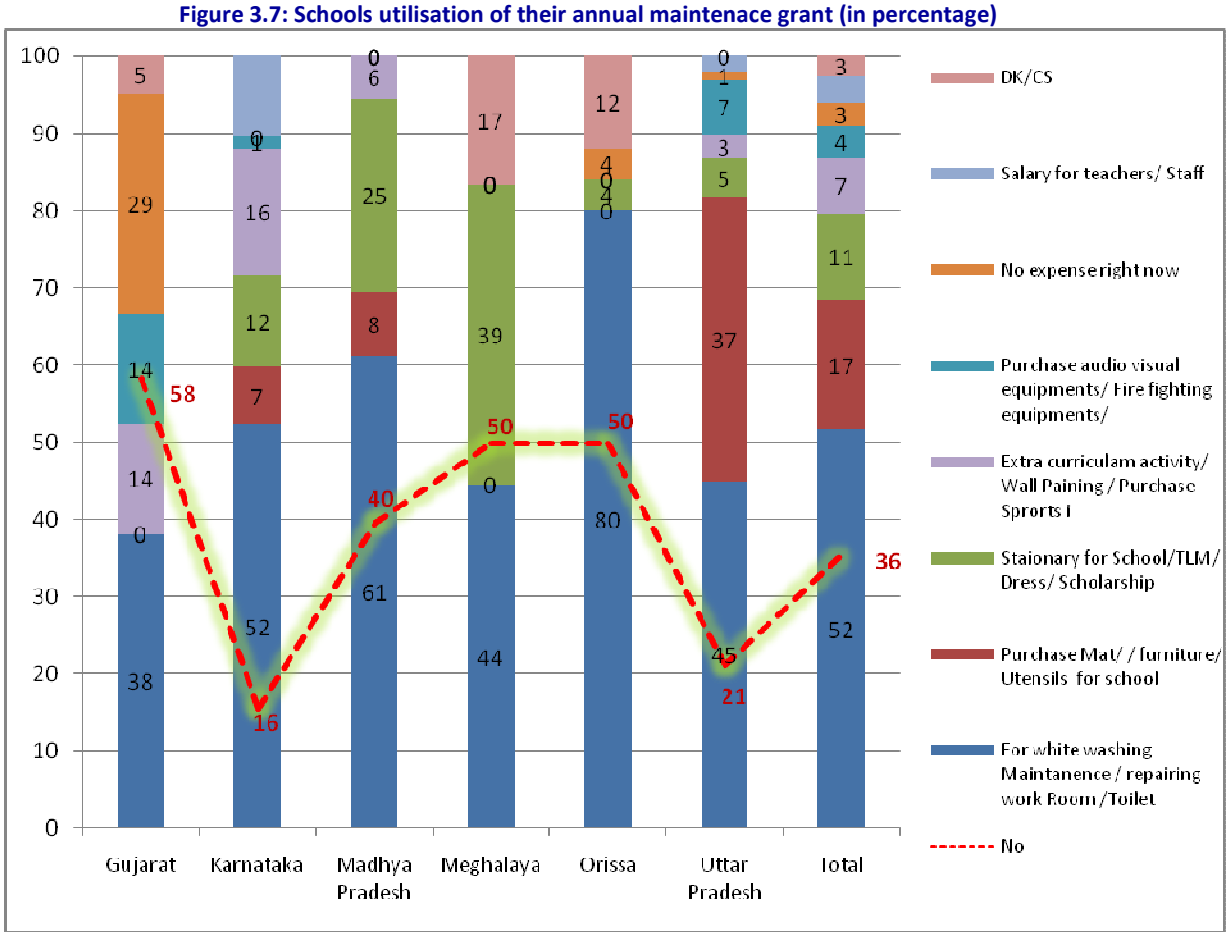
In the sample, on an avearge 99 boys were found enrolled in schools which was marginally higher than that of girls enrollment (94). In Madhya Pradesh the average enrollment of boys and girls was almost equal. In Uttar Pradesh and Orissa girls enrollment was higher than boys. In Karnataka, there was a noticeable difference between the number of boys and girls enrollment.

Figure 3.6: School utilisation of their SSA funds (in percentage)



Overall around 82% sample schools were provided with SSA funds during the year 2009-10. In Karnataka 95% of sample schools and in Meghalaya 63% of the sample schools received SSA grant. Regarding the utilisation of SSA grant, 42% schools had reportedly spent the funds on maintenance and repair work (building, toilet, furniture, door, window, etc) followed by expenditure on stationary/ Teaching Learning Material (TLM) by 29%.

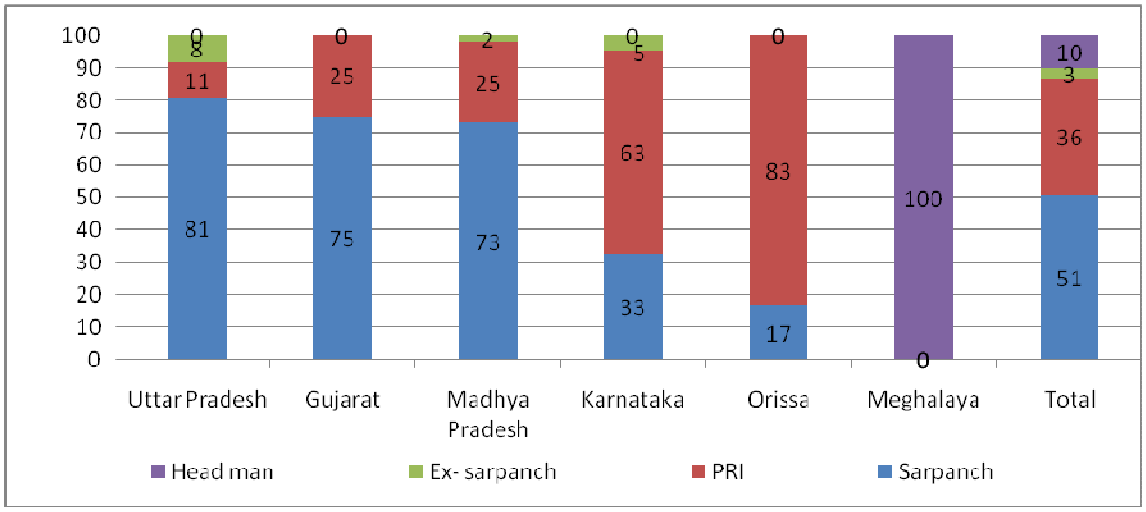
Figure 3.7: Schools utilisation of their annual maintenace grant (in percentage)



On an average, 64% of the sample schools had received their quota of annual maintenance grant for year 2009-10. The remaining 36% of the schools were yet to get their fund. In Karnataka and Uttar Pradesh, approximately 84% and 79% of the schools respectively received their quota. Nearly 52% of the schools spent the grant on white washing/ maintenance and repair work like door, room, window,boundary wall, furniture, toilet, stage, roof etc.

3.3 PRI MEMBERS PROFILE

Figure 3.8: Profile of the PRI representatives (in percentage)



Majority of the respondents amongst the PRI representatives consisted of the senior most people such as the Sarpanch, Head man and former Sarpanch. In overall sample 51% of the respondents were Sarpanch, followed by PRI members (36%) and Head Man (10%) and Ex-Sarpanch (3%). In Meghalaya all the respondents interviewed were Head Man.

3.4 PANCHYAT LEVEL COMMITTEE MEMBERS PROFILE

Figure 3.9: Panchyat level committees (in percentage)

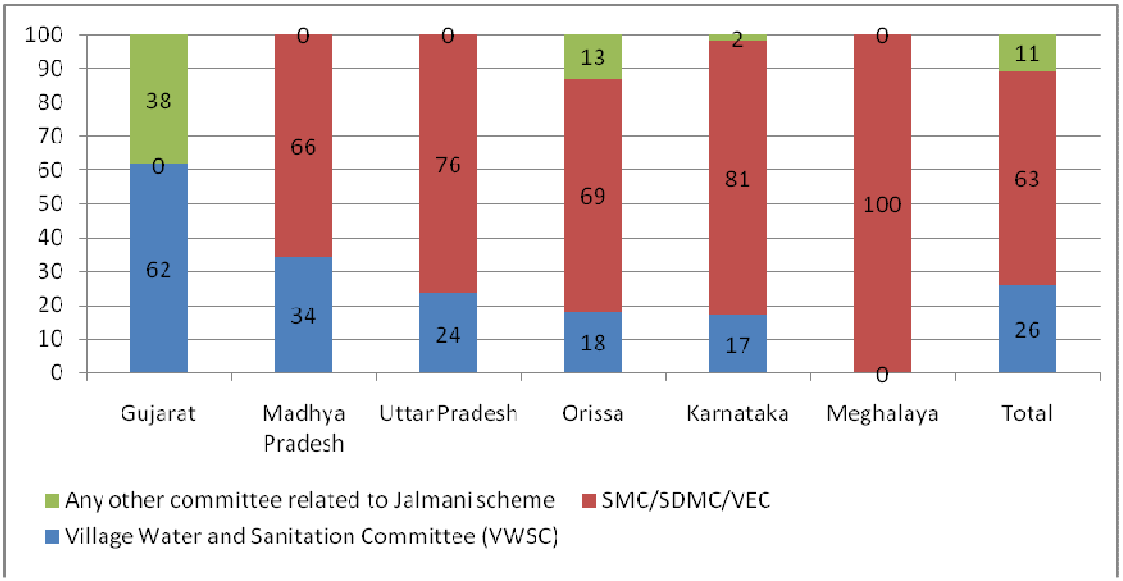
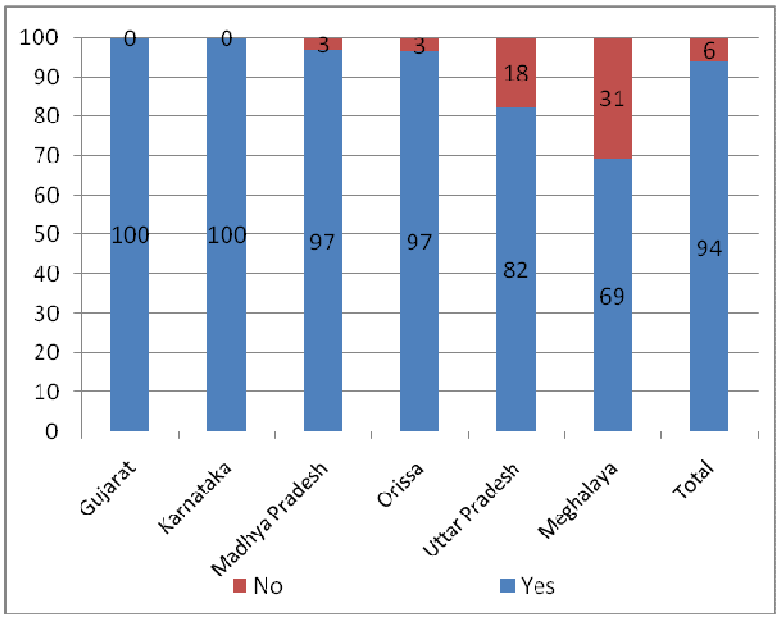


Figure 3.10: Functional status of the committees (in percentage)

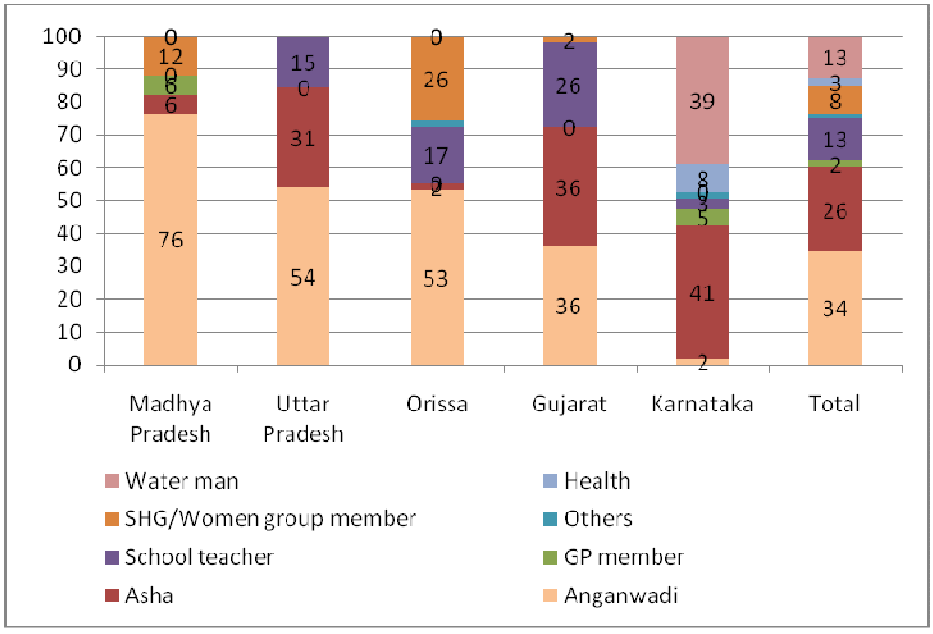


In overall sample more than 63% of the committees interviewed were School Management Committee (SMC), followed by Village Water and Sanitation Committee (VWSC) 26% and Other Committees (Pani Samiti in Gujarat) 11%. In Karnataka SMC is known as School Development and Monitoring Committees (SDMC) which were covered to the extent of 81%.

The functional status of the committees approached and interviewed varies between lowest 69% in Meghalaya to highest 100% in Gujarat and Karnataka.

3.5 GRASS ROOT WORKERS

Figure 3.11: Types of grass root workers interviewed (in percentage)



The profile of grassroots workers included Waterman, Health workers, Anganwadi workers etc. Majority of the respondents interviewed were Anganwadi workers (35%) followed by Asha workers (26%). Water man and school teachers both being 13% each were also interviewed. Approx. 8% women groups/ SHGs were interviewed for their role as grass root workers. In Madhya Pradesh 76% interviews were conducted only with Anganwadi workers while water man (39%) was found to be involved as grass root worker in Karnataka.

CHAPTER 4 SAWPS: CURRENT STATUS AND EFFECTIVENESS

The chapter is divided in three main sections. First section elaborates about procurement process for manufactures/ suppliers' selection and school selection process followed for SAWPS installation in six sample states. The second section provides details on functionality status of the SAWPS and reasons for dysfunctionality. The third section presents the usage and accessibility status of these SAWPS installed in the schools.

4.1 PROCUREMENT PROCESS: MANUFACTURERS/ SUPPLIER SELECTION

Different states have followed different pattern for selecting the suppliers for installing and providing O & M services for SAWPS. Gujarat, Karnataka, Madhya Pradesh and Uttar Pradesh followed the tendering route. On other hand, Meghalaya and Orissa engaged the civil contractors (no reputed and experienced suppliers/ manufactures) to install the filters.

4.1.1 Gujarat

In Gujarat online tender was floated for providing comprehensive service including O & M, installing, commissioning for three SAWPS technologies i.e. (1) Ultra Violet Radiation Systems (100-500 LPH) (2) Ultra Filtration Systems (100-500 LPH) and (3) Reverse Osmosis Plants (50–250 LPH) in schools of rural areas. 23 companies participated in the bid and a committee constituted of Chief Executive Officer, Project Director, Chief General Manager Finance & Account (CGM - F&A), and consultant - technical selected the suppliers. The final selection was done on the L1 basis. The technical and financial eligibility criteria for selecting the manufactures/ suppliers were as per the Jalmani guidelines which included:

Financial criteria

- Average annual turnover for last three years in manufacturing of drinking water purification systems should be at least Rs 500 lakhs (1.12 million USD).

Technical criteria

- The bidder should have own registered manufacturing/assembling unit. Dealers/ franchise/ traders were not allowed to participate in this bid. No joint ventures were allowed.
- The bidder should have minimum five years of work experience in the field of manufacturing/ assembling and servicing of water treatment systems.
- The bidder must have manufactured/ assembled and commissioned at least 500 units of Drinking Water Purifying Systems in last three years.
- Registered manufacturing and assembling factory must be capable to assemble minimum 1000 SAWPS in a year.
- Registered manufacturing and assembling unit must have testing facilities and should be also capable to assemble minimum 25 systems at a time including testing and inspection.

Schedule of payment

50% payment to the manufactures/ suppliers have been made on supply, installation, testing, commissioning

and trial run of 15 days of SAWPS in schools while remaining 50% after completion of successful service contract in following manner;

1st year- 10%

2nd year- 10%

3rd year - 10%

4th year - 10%

5th year - 10%

Scope of Pani Samiti/ Gram Panchayat/ School Committee developed by WASMOS for supplier's tender

The following arrangement/ items shall be provided by the Pani Samiti / Gram Panchayat / School Committee.

- Required appropriate protected location for installing drinking water purification system.
- Power supply at one point near the system to be installed. (not more than five meters from the system)
- Raw water supply at one point near the system (not more than 5 mtr from the system).
- Power supply charges
- The storage of raw water / treated water if required in the form of the tank with the financial support from Govt. through CMSU/ DWSC.
- Day to day operation and maintenance of drinking water system.
- Necessary record of working of the system, break down if any, non-function of plant, instruction to the supplier for rectification, certification of repairing
- Performance of the system – production quantity and quality.
- Record of year-wise expenditure incurred by the supplier for providing service contract for 5 years.
- The ownership of the system as well its appropriate security shall be of school authorities / School committee.
- During service contract drinking water purification system shall be operated and maintained by school committee. However, it will be the direct responsibility of Village Panchayat/ Pani Samiti that the system is running effective and the school children get sufficient water.

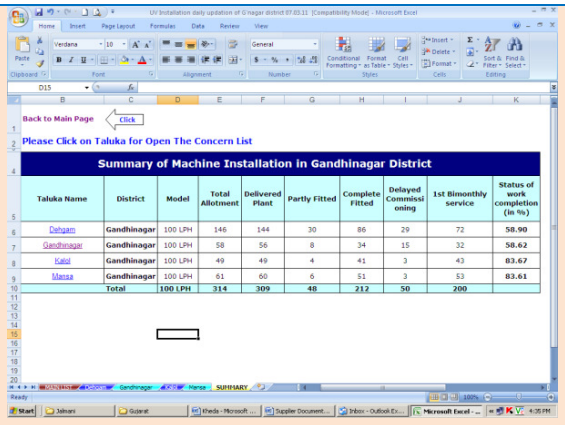
Feedback on manufactures/ suppliers' performance

The responsibility of making sites ready (water connection from the source to the filter and from filter to the overhead storage tank, electricity connection to the filter, room/ place for installation of the filter) lies with the school authority before installing SAWPS. Once the sites get ready, the suppliers install the SAWPS. The time lag between making the school sites ready and installing the SAWPS has been one reason behind the huge gap between the supply and installation time period.

One of the supplier (Shivam Water Treaters) did not undertake the assigned task and its performance was very appalling. Its deposit was forfeited and the entire work order was cancelled and the supplier has been asked to complete the work in one district only. The same supplier provided SWAPS in Karnataka and the performance was equally poor there also. In Gujarat L1 supplier did not complete their deliverables and WASMOS had to negotiate with L2 & L3 bidders.

Supplier's Best practice
Hi-Tech Sweet water technologies from Gujarat initiated the support service like company's call centre with all India toll free number which is very helpful. Accordingly it was made compulsory to the rest of suppliers also to give one toll free number which was given to all the schools for lodging any complaint or for servicing. **Orion Appliance Pvt. Ltd**, another supplier from Gujarat follows excellent practice of documenting the summary of installation and reasons for incomplete installations of the SAWPS. The district office of the supplier provides weekly progress of each GP in detail to the main office. This data is also shared with the implementing agency to avoid any miscommunication and to have a clear picture of the problems in the field and address those problems.

The figure below shows the summary of SAWPS installations in Gandhinagar district. It gives details about model of the SAWPS, total allotment in the block, installation details (partial, complete, delayed), servicing.


Back to Main Page

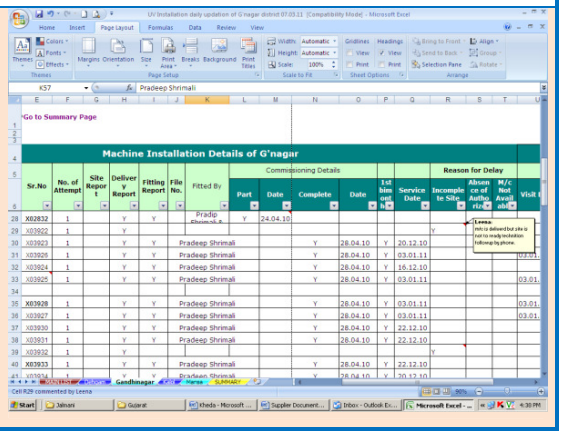
Click

Please Click on Taluka for Open The Concern List

Summary of Machine Installation in Gandhinagar District

Taluka Name	District	Model	Total Allotment	Delivered Plant	Partly Fitted	Complete Fitted	Delayed Commissioning	1st Bimonthly service	Status of work completion (in %)
Dehgam	Gandhinagar	100 LPH	146	144	30	86	29	72	58.90
Gandhinagar	Gandhinagar	100 LPH	58	56	8	34	15	32	58.62
Kalol	Gandhinagar	100 LPH	49	49	4	41	3	43	83.67
Mansa	Gandhinagar	100 LPH	61	60	6	51	3	53	83.61
	Total	100 LPH	314	309	48	212	50	200	

The figure below provides GP wise status on installation (partial/ complete), reason for delay, number of visits and the field executive details.


Go to Summary Page

Machine Installation Details of G'nagar

Sr.No	No. of Attempt	Site Report	Delivery Report	Fitting Report	File No.	Fitted By	Commissioning Details		Reason for Delay			
							Part	Date	Complete	Date	1st bimonthly	Service Date	Incomplete Site	Absence of Authority	M/c Not Available	Visit
X02832	1		Y	Y		Pradip	Y	24.04.10								
X02922	1		Y									Y				
X02923	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	20.12.10				
X02926	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	03.01.11				
X02924	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	16.12.10				
X02925	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	03.01.11				03.01
X02928	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	03.01.11				03.01
X02927	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	03.01.11				03.01
X02930	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	22.12.10				
X02931	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	22.12.10				
X02932	1		Y									Y				
X02933	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	22.12.10				
X02934	1		Y	Y		Pradeep Shrimali			Y	28.04.10	Y	30.12.10				

4.1.2 Karnataka

In Karnataka tender was invited as per the Karnataka Transparency Act for the three categories of technologies (category 1 - UV technology, category 2 - ultra filtration and category 3 - household filter). In total 12 agencies participated and nine agencies were finally technically qualified and empanelled for:

- Six agencies were empanelled for category 1 and category 2
- Two agencies for category 1, 2 & 3
- One agency for only category 3

Based on the lowest quote in each category, all the empanelled agencies were asked to undertake the work on the same rate as quoted by lowest one in each category. Suppliers are also being given plumbing charges in first year (varying from Rs 2000-Rs 4000) and 2nd year onwards till 5th year consumable charges per unit @ Category 1 – Rs 950; Category 2 – Rs 850 and Category 3 – Rs 1900.

Eligibility Criteria

- A filter should substantially be capable of purifying contaminated water having E-coli & Coliform count of 500-700 MPN.
- Post filtration the E-coli and Coliform should be absent along with foul odour and turbidity.
- The O & M of these systems will be the responsibility of manufactures/ suppliers for 5 years and the financial quote must include the cost of O & M excluding the cost of consumables.
- The technology should not pose any threat/danger to the life of school children.

Schedule of payment

As per the contract 75% payment of the total amount has been given to the manufactures/ suppliers after installing, commissioning and getting certificates from school headmasters. The remaining 25% has been agreed to be given on satisfactory O & M performance over 5 years (4th year- 15% and 5th year- 10%).

Feedback on manufactures/ suppliers' performance

According to the agreement, suppliers have to maintain the system for five years after installation. The suppliers' maintenance jobs include the reject management, servicing and replacement of consumables, rectification of any technical errors, etc. As reported by the suppliers, any complaints received from schools were rectified normally within 48 hours and maximum in a week. However in most of the schools it was found by the CMS team that the suppliers have not been addressing the complaints despite schools authority informing them.

In Chitradurga and Chickballapur districts, during 2009-10 a Gujarat based supplier named "Shivam Water Treaters", which was selected during 2009-10, is no more working in the state as the supplier only supplied the systems in schools but didn't install them. No payment has been made to the supplier in these districts till now. In some schools suppliers have not been even intimating and updating the district officials after SAWPS installation in schools.

4.1.3 Madhya Pradesh

The Madhya Pradesh Laghu Udyog Nigam Limited selected the manufactures/ suppliers through empanelment process. Quotes from the empanelled agencies were invited and the final selection was done on L1 basis. Five years operation and maintenance agreement was signed with suppliers.

Schedule of payment

75% payment to the suppliers were done after installation and commissioning of SAWPS and rest 25% after providing satisfactorily O & M services in SAWPS schools @ 5% per year.

4.1.4 Uttar Pradesh

Suppliers/ manufacturers were selected at state level through open tendering and then approx. a list of 15-20 shortlisted suppliers (with technologies options and rates) were sent to the districts. This list also included names of the suppliers recommended by DDWS. In few districts (Barabanki, Chandauli and Rai Bareily) suppliers were selected on L1 basis from technically qualified bids. In Ghaziabad district a technical committee was set up to assess the suppliers before final selection. The shortlisted bidders were asked to give demos of their technologies and out of the technically qualified ones L1 supplier was selected.

Schedule of payment

80% payment to the suppliers were done after installation and commissioning of SAWPS and remaining 20% after providing O & M services in SAWPS schools. However before releasing the payment to suppliers following process need to be complete;

- Get signature of the schools' representative after installation of SAWPS.
- Inspection of all installed SAWPS by Junior Engineer, Jal Nigam of the respective district
- Testing of the SAWPS/treated water (followed in some districts)

Feedback on manufactures/ suppliers' performance in Uttar Pradesh and Madhya Pradesh

Performance of some of the suppliers needs to be improved especially in states like Uttar Pradesh and Madhya Pradesh. In most of the schools SAWPS are not yet installed and time lapse was also observed in supplying and installing SAWPS.

The O & M services provided by the suppliers were not found to be satisfactory. In majority of the sample schools the suppliers' representatives have never visited the schools after installation. It was reported by the executive engineer, Dhar that the supplier of the district was given notice by the MP Small Scale Industries Corporation for his poor and slow performance. In some districts suppliers also faced difficulty in getting the schools list from PHED/Education Department.

4.1.5 Meghalaya

The process of spot tendering was carried out to choose the contractors from the list of registered contractors of PHED, for Jaintia Hills district and part of Ri-Bhoi district under Nongpoh PHE division. However open tendering was also done for part of Ri-Bhoi district under Umsning division. Terafil water filters were obtained from the IMMT, Bhubaneswar through Department of Science & Technology, Meghalaya.

4.1.6 Orissa

No manufactures/ suppliers were engaged at the state level. The local level civil contractors were contracting for installing one or two SAWPS at the block level. Only the Terafil cakes were supplied by Modern Pottery unit in Bhubaneswar, which has been developed by IMMT Bhubaneswar. No operation and maintenance agreement was signed with the contractors. Generally fifteen days are given to the contractors for the installation of one unit of terafil filter and once the installation is done, site inspections are undertaken by the department and thereafter payments are released. School authorities are responsible for operation and maintenance of SAWPS.

In Orissa as no tendering process followed and work was given to the civil contractors at block level, in some cases it was found difficult to find the contractors for installing just one or two units of the terafil filter. The work was often clubbed with other civil work to lure the contractors. Interestingly as only one unit is manufacturing terafil cakes, the supply is often delayed.

Given below in nutshell the suppliers/ manufacturers selection process:

Table 4.1: Supplier selection process in nutshell for sample states

State	Supplier Selection Process	Numbers of suppliers in sample districts	Name of Suppliers
Gujarat	• Online open tendering process followed for three technologies i.e. Ultra Violet Radiation, Ultra Flirtation and Reverse Osmosis Plants (ROs). • Three out of 23 companies participated were selected on L1 basis. • 50% payment to suppliers after installation and remaining 50% in five years @ 10% per year.	03	• Hi Tech Sweet Water Technologies Pvt. Ltd • Orion Application Pvt. Ltd. • Shivam Water Treaters Pvt. Ltd.

State	Supplier Selection Process	Numbers of suppliers in sample districts	Name of Suppliers
Madhya Pradesh	• Tender was called by Madhya Pradesh Laghu Udyog Nigam Limited to empanel manufactures/ suppliers • Final selection was done on L1 basis • 75% payment to the suppliers after installation and remaining 25% in five years @ 5% per year	02	• Jal Instruments • Membrane Filters(I) Pvt. Ltd
Karnataka	• Tenders were invited as per the Karnataka Transparency Act for three categories of technologies (category 1 - UV technology, category 2 - ultra filtration and category 3 - household filter) • In total 9 agencies were empanelled out of 12 agencies participated • Based on the lowest quote in each category, all the empanelled agencies were asked to undertake the work on the same rate as quoted by lowest one • 75% payment to the suppliers after installation and remaining 25% on satisfactory O & M performance over 5 years (4th year- 15% and 5th year- 10%)	04	• Dew Drops • Pentafure • Hi Tech Sweet Water Technologies Pvt. Ltd • Magic R O System
Meghalaya	• Spot tendering followed to choose the contractors from the list of the registered contractors of PHED • Open tendering was done for part of Ri-Bhoi district under Umsning division. • Terafil water filters were obtained from the IMMT, Bhubaneshwar through Department of Science & Technology, Meghalaya	01	• Triple N Enterprises
Orissa	• Suppliers were not engaged, only local level civil contractors were deployed • Terafil cakes were supplied by Modern Pottery unit in Bhubaneswar, developed by IMMT Bhubaneswar	-	-
Uttar Pradesh	• Open tendering was carried out at state level to select the suppliers • List of 15-20 shortlisted suppliers were provided to the districts and districts selected as per their technologies requirement on L1 basis	04	• Membrane Filters(I) Pvt. Ltd • Hi Tech Sweet Water Technologies Pvt. Ltd • Watek R. O System (I) Pvt. Ltd. • Pacific Water Solution Pvt. Ltd. • Harambh Chemicals (P) Ltd.

4.2 SCHOOLS SELECTION PROCESS AND CRITERIA

4.2.1 Gujarat

Education department provided the list of schools with information on type of water supply (piped or hand pump), strength of the school etc to the implementing agency and subsequently the agency verified and selected the final schools on following parameters;

- Schools with bacteriological contamination, piped water connection and large strength were randomly selected for UV technologies.
- Schools with chemical contamination, piped water connection and large strength were randomly selected for RO technologies.

4.2.2 Karnataka

The schools' list was prepared by Deputy Director of Public Institution (DDPI) and after getting approval in meeting of the executive body at district level it was forwarded to Rural Development and Panchayat Raj (RDPR) department for installation of SAWPS. The schools were selected on following criteria;

- Schools must have regular and continuous source of water supply with over head tank for category 1 and category 2
- Regular connection of electricity/power supply for category 1

However during the discussion with manufactures/ suppliers' and visits to schools it was observed that the above mentioned criteria were not followed strictly and in some schools filter were not installed just because either there was no source of water or no overhead tank was constructed.

4.2.3 Meghalaya

Public Health and Engineering Department (PHED) itself selected the schools where SAWPS to be installed from the schools list provided by the Education Department. School selection process was based on the criteria of availability of water through Piped Water Supply facility within the school campus. Except taking the list of schools, education department was not consulted while selecting the schools.

4.2.4 Orissa

Orissa Primary Education Programme Authority (OPEPA) supplied the list of schools to the Chief Engineer at state level. State had made the selection and given target to the respective districts for installation of SAWPS. Schools with piped water supply and residential facilities were given preference in the selection. Water quality issues in the respective schools were not considered at all while making the selection. Panchayat/ Village Education Committee had played no role in selection of schools but they were informed about the installation of the SAWPS. From the current financial year in some schools where strength of children was quite high, the department has been providing two terafil filters in order to provide sufficient water.

4.2.5 Madhya Pradesh

In all the sample districts, schools were selected from the list provided by education department. In Dhar and Alirajpur districts it was reported that source/ raw water of all the schools were tested and the schools having water source contamination specially fluoride above permissible limit of 1.5 mg/l and turbidity were selected for SAWPS installation. In Narsinghpur district, results of routine water testing of the habitations source were referred while selecting the schools.

4.2.6 Uttar Pradesh

Jal Nigam itself selected the schools where SAWPS to be installed from the list provided by Basic Shiksha Adhikari (BSA). It was reported in Ghaziabad and Chandauli districts that raw/source water was tested in all the schools and the schools found with water contamination were selected for installing SAWPS. The final selected list was

submitted to BSA for approval in Ghaziabad.

In other sample districts testing of water samples in all the schools have not been done like in Ghaziabad and Chandauli. The district officials relied on the routine habitations water sources test report while making the selection of schools.

4.2.7 Schools where filters where not supplied but names included in the list

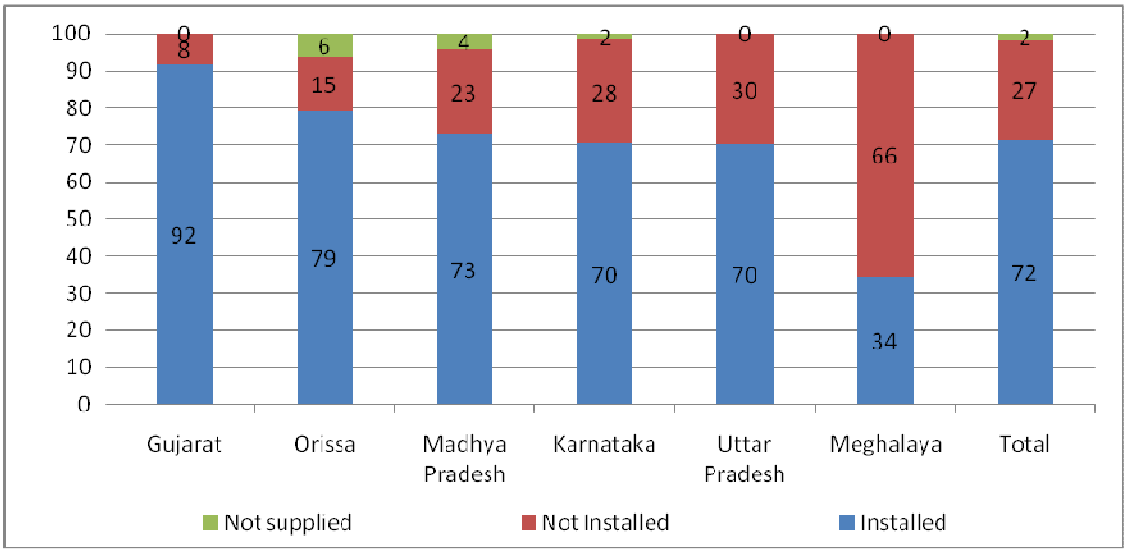
The SAWPS schools list provided to CMS also had some discrepancies. In some cases it was found that the SAWPS were installed arbitrarily in schools other than those in the list provided by the department. Similarly, there were sample schools where SAWPS have not been supplied and installed till date, but the list provided to CMS by implementing agency had names of all such schools. As a result CMS team had to change the schools on a couple of occasions because of this reason, to ensure coverage of 16 sample schools per district.

Table 4.2 List of schools visited by CMS team where SAWPS have not been supplied or installed but shown in the list

S No.	State	Dist	Block	GP	Village	School
1.	Uttar Pradesh	Chandauli	Chandauli	Parsi Khurd	Parsi Khurd	Primary School Parsi Khurd
2.	Uttar Pradesh	Chandauli	Chandauli	Teero Bidha	Teero Bidha	primary School Teero Bidha
3.	Uttar Pradesh	Barabanki	Siddhaur	Kesharganj	Kesharganj	Primary School Kesharganj
4.	Uttar Pradesh	Barabanki	Haidergarh	Amarwal	Amarwal	Priamry School Amarwal
5.	Uttar Pradesh	Barabanki	Fatehpur	Bisanpur	Bisanpur	Upper Primary School Bisanpura
6.	Madhya Pradesh	Narsinghpur	Kareli	Bamhani	Bamhani	Primary School Bamhani
7.	Madhya Pradesh	Narsinghpur	Kareli	Suatala	Suatala	Primary School Suatala
8.	Madhya Pradesh	Dhar	Kukshi	Aspur	Aspur	Primary School ESG Aspur
9.	Madhya Pradesh	Dhar	Kukshi	Roja	Khadapur	Primary School ESG Khadapur
10.	Orissa	Ganjam	Kukudakhandi	Jagadalpur	Jagadalpur	Upper Primary School, Jagdal Pur
11.	Orissa	Ganjam	Kukudakhandi	Baghalati	Kusumi	Upper Primary School, Kusumi
12.	Orissa	Ganjam	Khallikote	Langleswar	Bhejiput	Upper Primary School, Bhejiput
13.	Madhya Pradesh	Alirajpur	Jobat	Dehdala	Patel Falia	Primary School, Dehdala
14.	Madhya Pradesh	Alirajpur	Jobat	Dabdi	Patel Falia	Primary School, Dabdi
15.	Karnataka	Chickballapur	Chintamani	Murugamalla	Murugamalla	Govt Middle & Primary School Murugande

4.3 INSTALLATION OF STAND ALONE WATER PURIFICATION SYSTEM (SAWPS)

Figure 4.1: SAWPS installation status in the sample schools (in percentage)



Out of the 320 sample schools across six sample states, it was noticed that SAWPS were actually installed in only 229 (72%) schools. In 85 (26%) schools SAWPS were just supplied and till date they are lying without installation. It was surprising to note that in six cases SAWPS were not even supplied to the schools. In Gujarat 92% schools observed had SAWPS, followed by Orissa (79%), Madhya Pradesh (73%), Karnataka and Uttar Pradesh both 70% each. In Meghalaya 66% schools were found without installation despite the SAWPS being supplied.

Third Party Evaluation

Third party evaluation is done by RITES Ltd. After the manufacturing of SAWPS the whole lot is inspected once by RITES and then sent to the schools. Each SAWPS will have a hologram sticker with a serial number on it after inspection. The photo shows the details of one such inspection.

4.3.1 Reasons for not installations

The major reasons for not installation of SAWPS in schools include;	
1. Defective filter	2. No water source
3. Dumped by the supplier in the school and kept in store	4. It was directly delivered in SMC's secretary house.
5. Kept in a make shift school as the school building is under construction	6. Kept all material separately. Pipe also not connected
7. Kept packed in teacher's house	8. Taken by teacher in-charge in the house
9. Filter cake not installed	10. Water source was far from filter and hence could not connect
11. Filter not connected with water source	12. Water tank not provided
13. Incomplete installation (terafil cakes not supplied, filter not connected with electricity and water source, no pipe connectivity, connected with overhead tank, platform is under construction)	14. Electricity wiring not done

Not installed - Kept in head master's house

The Moolamanoh West RCLP School in Khliehriat block of Jaintia Hills of Meghalaya was supplied with Aquagaurd filter in November 2009 instead of Ion exchange. The filter supplied was not yet installed in the school at the time of visit and was kept packed in head master's house. The reason for non installation of SAWPS was the lack of water source in school and even students get water from their home for drinking purpose. The School Management Committee and village head man had no idea about the SAWPS and that it was supplied and for what purpose.

Unpacked Aquaguard filter in Moonlamanoh west, Meghalaya

Not installed – Supplied to SMC's secretary's house

The Lum Shong RCLP School in Khliehriat block of Jaintia Hills of Meghalaya was provided Aqua Guard filter in the year 2009. However it was observed that the filter supplied for the school was kept in the house of SMC's secretary. The contractor who supplied the filter reported that he wanted to provide SAWPS in school but secretary persuaded him to keep the filter in his house only. The school has piped water connection inside the premises but supply of water was quite irregular during all seasons except for rainy season.

Roman Catholic Lower Primary School Lumshong

SAWPS supplied to school which was not in the selected list of schools

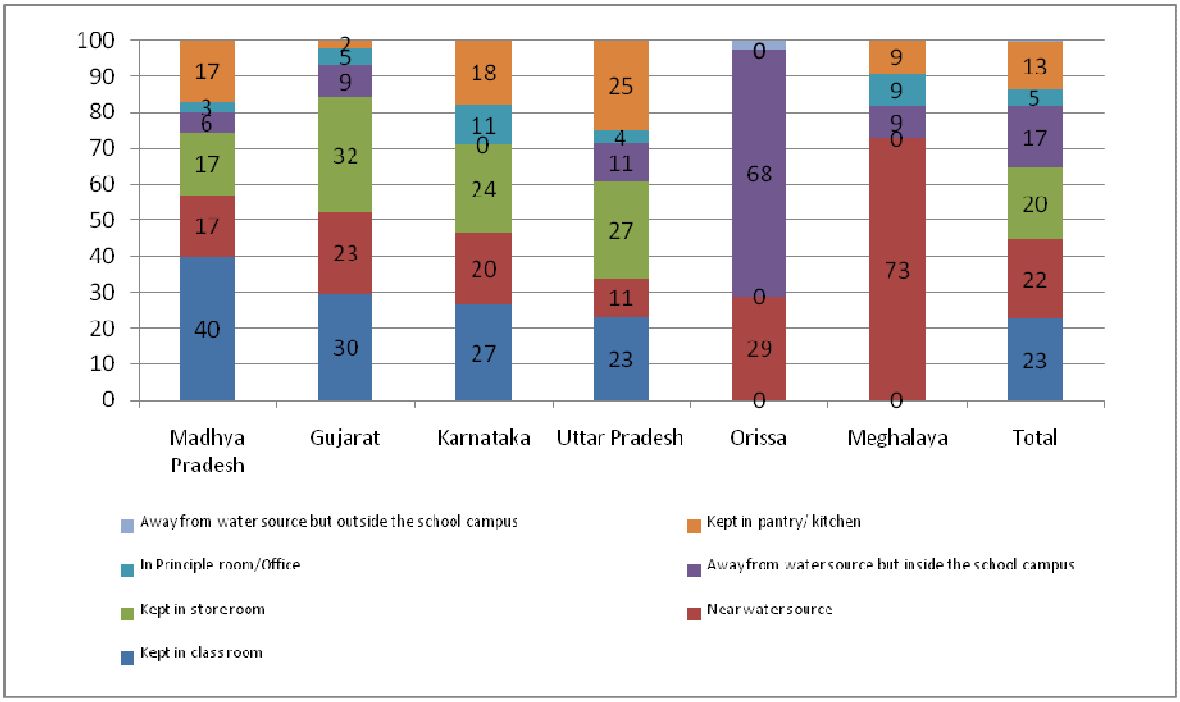
The Kanya Prathmik Vidhyalya in Jobat block of Alirajpur district of Meghalaya which was supposed to provide the SAWPS as per the list provided by PHED was found installed in other school of same village named "Balak Prathmik Vidyalaya". The principal of the Kanya Prathmik Vidhyalya had no idea about the SAWPS to be provided

under Jalmani. The SAWPS supplied in "Balak Prathmik Vidyalaya" was not in use and was kept dismantled. Interestingly water storage tank was used for white wash purpose during the renovation of the school building.

SAWPS in the Balak Prathmik school of Jobat block of Alirajpur kept dismantled and the tank being used for white washing purpose.

4.3.2 Location of SAWPS

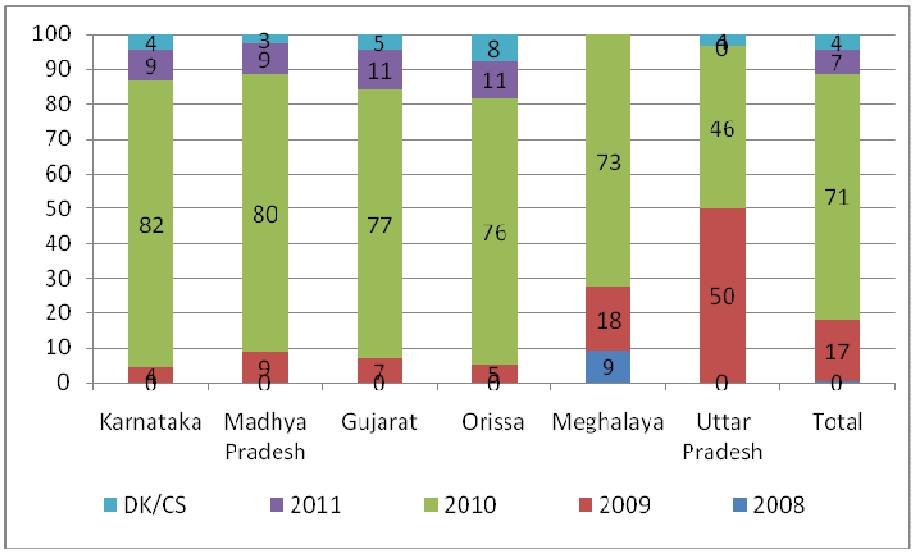
Figure 4.2: Location of installed SAWPS (in percentage)



Out of the 229 schools where SAWPS were installed, nearly 23% of SAWPS were installed in the classrooms and 20% were installed in the store rooms. Approx. 13% of the SAWPS were installed in kitchen/ pantry. SAWPS in 22% of the schools were installed near the water source. In Orissa it was found that one of the SAWPS was installed quite far (outside the school campus) from the water source and another one near toilet.

4.3.3 Year of SAWPS Installation

Figure 4.3: Year of SAWPS installation in schools (in percentage)



Most of the SAWPS (71%) covered in overall sample were installed in the year 2010 (refer annexure 4 for the list of 140 (44%) schools where SAWPS were installed after March 2010). Nearly 18% SAWPS were installed in 2009. The SAWPS found installed in year 2008 was quite negligible in the sample covered. In Uttar Pradesh in 50% schools SAWPS were installed in 2009. Overall 7% SAWAPS were installed in year 2011. In Uttar Pradesh the list provided to CMS was for the year 2008-2010, but during the study it was found that in some schools SAWPS were getting installed at the time of visit.

Dhar in Madhya Pradesh was the case where MIS data showed physical achievement of 275 SAWPS and financial achievement of Rs 45.54 lakhs (0.10 million) till March 2010. But during the interactions with the districts officials it was informed that actual installation of SAWPS was undertaken after March 2010 and before that the SAWPS were only supplied to the schools.

The below mentioned table is the list of schools where SAWPS supplied and installed in 2011 as reported by the schools authority. But the list was given to CMS as the SAWPS list installed before March 2010.

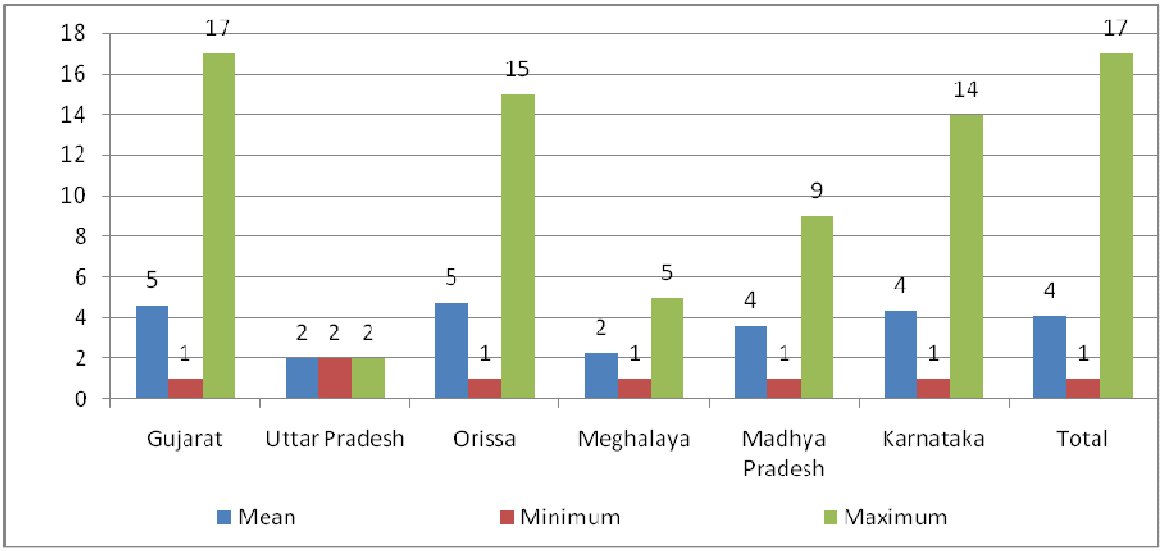
Table 4.3 List of schools where SAWPS were supplied and installed in 2011

Sl. No.	State	Dist	Block	GP	Village	School
1.	Gujarat	Kheda	Kheda	Navagam Yagar Kendra	Navagam yagar Kendra	Primary Yagar Kendra Shala Navagam
2.	Gujarat	Sabar Kantha	Idar	Chadasana	Chadasana	Primary School Chadasana
3.	Gujarat	Sabar Kantha	Khed Brahma	PADARDI	PADARDI	Primary School Padradi
4.	Gujarat	Sabar Kantha	Malpur	Aniyor	Aniyorkampa	Primary School Aniyor campa
5.	Gujarat	Vadodara	Padra	Vanachara	Vanachara	Adarsh Primary School Vanchara
6.	Orissa	Cuttack	Narasinghpur	Ekadal	Bhaliadihi	Primary School Bakahadiha
7.	Orissa	Cuttack	Narasinghpur	Badabhuin	Jaypur	Primary School Jayapuri
8.	Orissa	Ganjam	Hirijili Cut	Durbandha	Godarapalli	Upper School Godarapalli
9.	Orissa	Ganjam	Kukudakhandi	Nimakhandi	Nimakhandi	Middle School Nimakhandi

Sl. No.	State	Dist	Block	GP	Village	School
10.	Madhya Pradesh	Alirajpur	Alirajpur	Rajawat	Rajawat	Primary School Rajawat
11.	Madhya Pradesh	Alirajpur	Alirajpur	Nonpur	Nonpur	Kanya Primary School Nonpur
12.	Madhya Pradesh	Alirajpur	Alirajpur	Titi	Titi	Primary School Titi
13.	Karnataka	Dharwad	Kalagatgi	Devikoppa	Devikoppa	Government Higher Primary School Devikoppa
14.	Karnataka	Raichur	Lingsugur	Kotha	Medinapura	Government Higher Primary School Madinapura
15.	Karnataka	Raichur	Lingsugur	Mavinabhavi	Bhupur	Government Higher Primary School Bhopura
16.	Karnataka	Raichur	Manvi	Kapgal	Kapgal	Government Higher Primary School Kapgal
17.	Uttar Pradesh	Chandauli	Chandauli	Parsi Khurd	Parsi Khurd	Primary School Parsi Khurd
18.	Uttar Pradesh	Chandauli	Chandauli	Teero Bidha	Teero Bidha	primary School Teero Bidha

4.3.4 Month gap between supply and installation period

Figure 4.4: Between one month to seventeen months to install SAWPS



The above figure depicts that average gap between supply and installation of SAWPS was of four months. Gujarat and Orissa have the average gap of five months while Uttar Pradesh and Meghalaya have two months of gap in supply and installation of SAWPS. The maximum gap between SAWPS supply and installation was of seventeen months and minimum was one month.

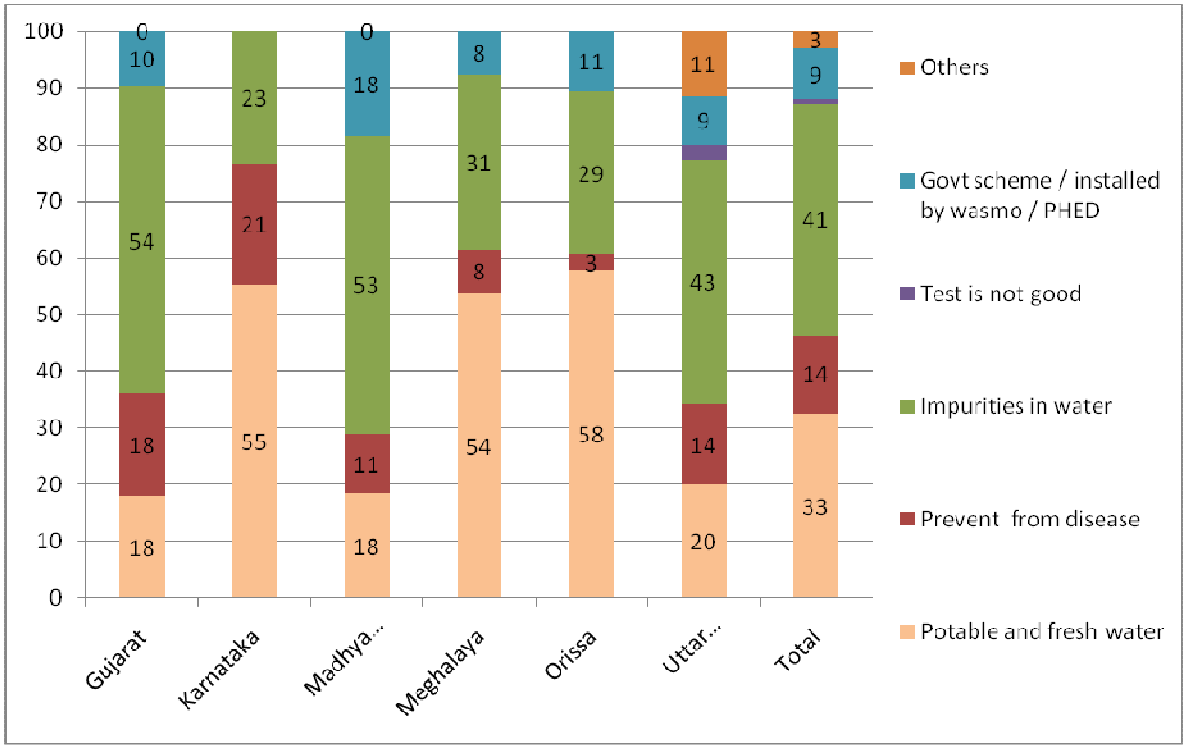
The below mentioned table would provide number wise disaggregation of time taken to install SAWPS;

Table 4.4: Time taken to install SAWPS (in nos.)

Gap	Gujarat	Uttar Pradesh	Orissa	Meghalaya	Madhya Pradesh	Karnataka	Total
Maximum	1	2	1	1	1	7	1
Mean	1	2	1	1	1	1	7
Minimum	25	56	28	9	16	23	164

4.3.5 Need for Installing SAWPS

Figure 4.5: Need for installing SAWPS in schools as reported by teachers (in percentage)



Principal/ teachers were asked about their understanding on the need and significance for installing of SAWPS in their schools. In overall sample 41% respondents stated that SAWPS were installed because there were impurities in water, 33% reported that they can get potable water. Around 14% respondents opined that SAWPS water will prevent from diseases while 9% of viewed that this is govt. scheme and installation was compulsory.

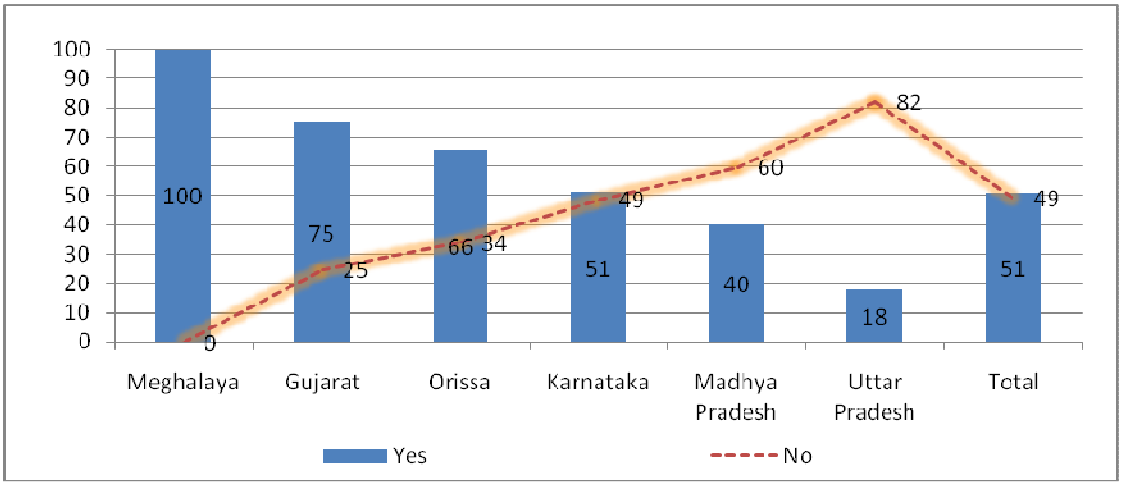
Children awareness about SAWPS significance

In the Focus Group Discussions children were asked about how much they know and understand about importance and significance of the SAWPS. Overall the knowledge about SAWPS was found to be very low because they have not been oriented properly. Hence appreciation for such an effort has also not been very significant. In some cases children cannot differentiate between quality of water from filter and the main source. In some cases (UP and MP) it has been reported by them that they do not prefer filter water because it is stored water (not fresh water) and in winter it is very cold.

4.4 FUNCTIONALITY OF SAWPS

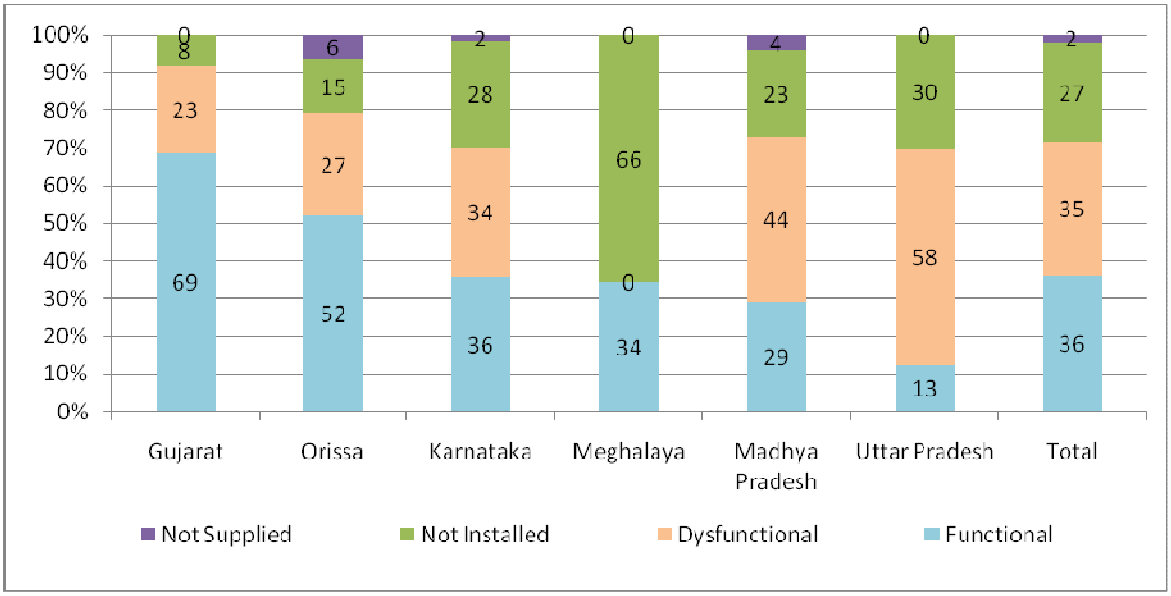
4.4.1 Functionality

Figure 4.6: Status of SAWPS functionality in installed sample schools (in percentage)



Out of 229 SAWPS installed in overall sample, 116 SAWPS (51%) were found functional as on the date of visit. In Meghalaya all the 11 SAWPS installed (100%) were functional followed by Gujarat (75%) and Orissa (66%). The lowest functionality was found in Uttar Pradesh (18%).

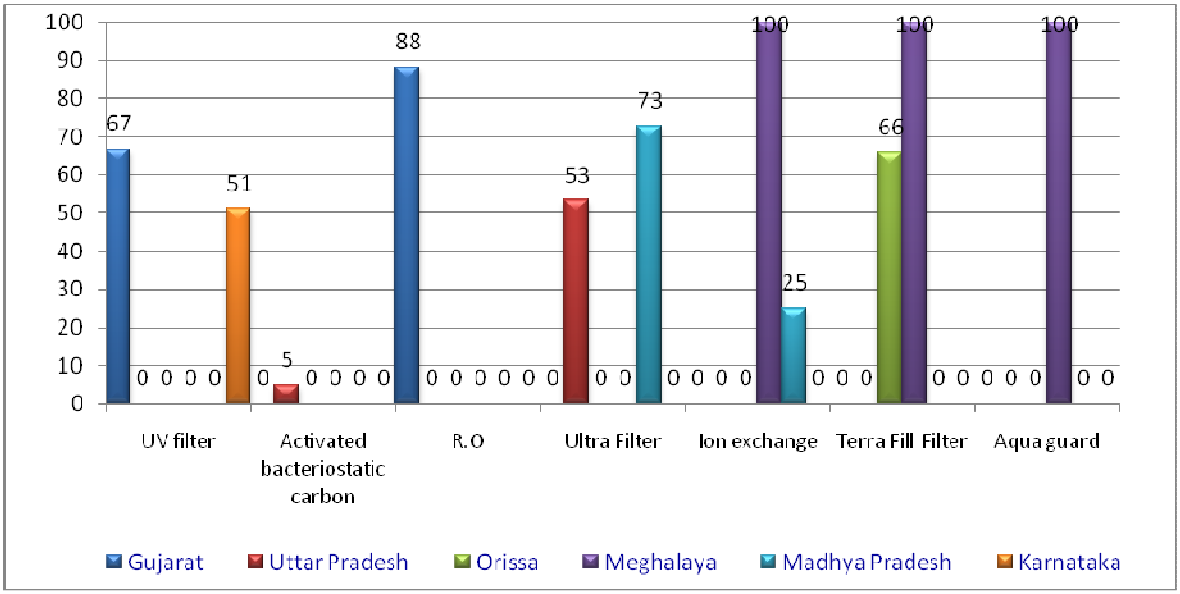
Figure 4.7: Functionality status of SAWPS in overall sample (in percentage)



If not supplied and not installed SAWPS combined, then overall functionality of SAWPS was found to the extent of 36%. Gujarat showed the highest functionality percentage (69%) and Uttar Pradesh lowest (13%). In Orissa, Karnataka, Meghalaya and Madhya Pradesh 52%, 36%, 34% and 29% SAWPS were functional respectively.

In Balrampur, Farookhabad and Barabanki district of Uttar Pradesh none of the SAWPS were found to be functional in the sample schools (refer annexure 2 for details).

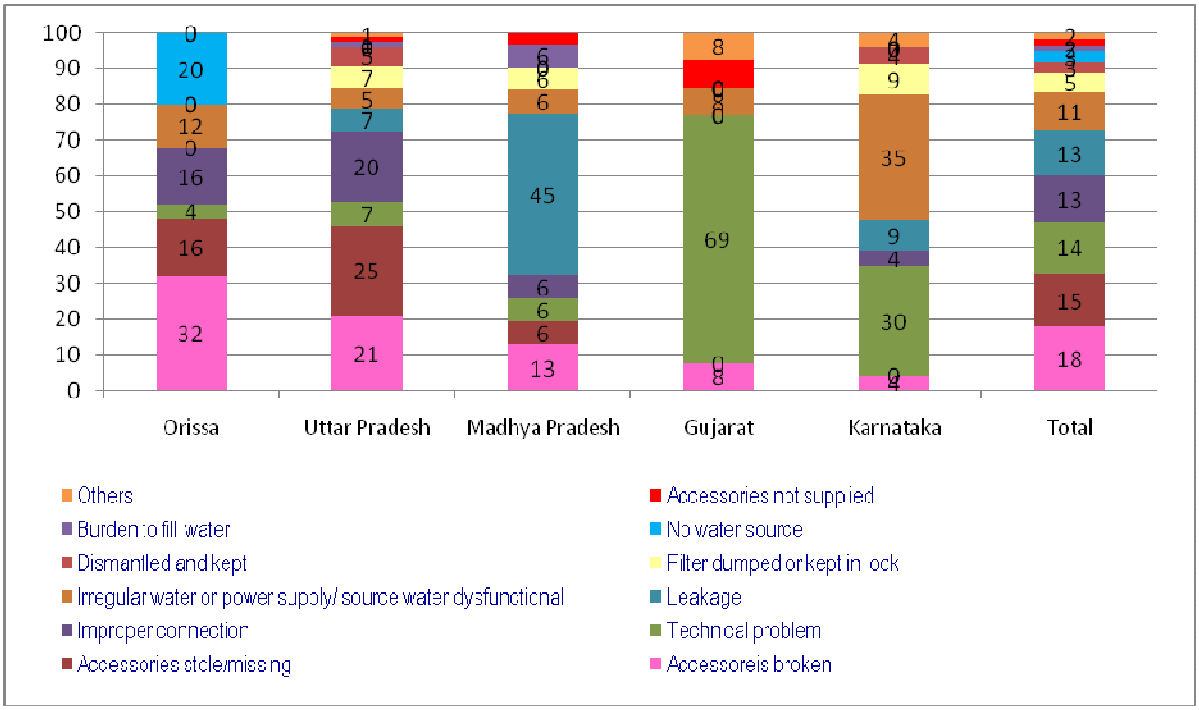
Figure 4.8: Technology wise functionality status of SAWPS (in percentage)



Out of total functional SAWPS, the figure about technology wise functionality status indicates that UV filter was found to be more (67%) functional in Gujarat than in Karnataka (51%). ROs were functional to the extent of 88% in Gujarat. In Uttar Pradesh, ultra filter technology was more functional (53%) than activated bacteriostatic (5%). Orissa has the only one technology i.e. terafil which was functional in 66% cases. In Meghalaya all the three technologies were functioning. Madhya Pradesh has two technologies and ultra filter was functional more (73%) than Ion Exchange (25%).

4.4.2 Reasons for SAWPS dysfunctionality

Figure 4.9: Reasons for SAWPS being dysfunctional (in percentage)



Majority (33%) of the SAWPS were dysfunctional due to accessories broken/ missing in overall sample, followed by technical problem in the filter (14%), improper connection and leakage in filter/ pipeline (13% each). Nearly 14% SAWPS were also not working due to irregular power/water supply and non availability and dysfunctionality of the source water.

Table 4.5: SAWPS dysfunctional due to lack of O & M services (in nos.)

State	Total dysfunctional SAWPS	Dysfunctional due to lack of O & M	
		Nos.	%
Gujarat	11	1	9
Uttar Pradesh	46	35	76
Orissa	13	12	92
Madhya Pradesh	21	6	28
Karnataka	22	1	5
Total	**113**	**55**	**48**

The key reasons for dysfunctionality of SAWPS are listed below (refer annexure 2):

1. Accessories broken and filter not working
2. Leakage in tap, filter and overhead tank
3. Accessories (taps, tray, etc) and filter missing
4. Filter is dismantled and kept separately.
5. Not enough pressure to pump the water in the filter
6. Burden to fill water
7. Improper connection and fittings
8. Less capacity of water tank/ Liter per hour (LPH)
9. School building under construction
10. Filter tank cover and taps not supplied
11. Filter choked
12. Filter has not been able to remove impurities
13. Filter motor not working due to air block
14. Water source away from school campus
15. Irregular/ no power supply
16. Key of filter box not given by the supplier
17. No connection between source water and filter, Filter pipe is small and hence can't reach water storage tank. And hence filter has been found dismantled
18. No source water/ water source dysfunctional
19. Not connected with electricity
20. Tank is gone to principal house

In Pre middle school Karimpur in Garmukteswar block of Ghaziabad district of Uttar Pradesh SAWPS was installed on August 12, 2009. The school has a total **strength of eleven (3 boys and 8 girls) children** with only one teacher. The main source of water in school was hand pump which was found dysfunctional during visit. The source water was reported to be contaminated with Iron and to remove this, Stand Alone Water Purification System was installed. However it was reported that initially after installation, SAWPS was in use by students and teacher both for some time but after source water became dysfunctional, the SAWPS also not working and students drink water from source water of nearby primary school.

Pre-Middle School Karimpur

Non Functional Ultra filter in Karimpur

Not installed – school site not ready			
State: Gujarat	District: Kheda	Block: Memdavad	GP: Aklacha

UV plant was supplied to the Primary School in Aklacha in May 2010 and got installed in July 2010. Chloride, hardness and bacteriological contamination were the major problems found in the source water. The school has the piped connection inside the premises as main source of water.

The SAWPS has been dysfunctional since the date of installation till date. Students still drink water from the main water source. The water connection of the filter to the main source wasn't yet done. It is the responsibility of school /Panchayat/ committees to make the site ready i.e. make the water and electricity connection and place available to install the SAWPS before the supplier supplies the SAWPS. If the sites are not ready the supplier only supplies the SAWPS and the school/ Panchayat has to complete the site prior to the installation. In Aklacha, the SAWPS was kept in a small room which was locked and the key was missing. When the lock was broken, the SAWPS was in really bad condition with cobwebs and dust over it. The SAWPS was never used. The school principal didn't have the supplier's contact number. The school/ Panchayat/ committees didn't take any initiative to prepare the site and they were unaware about their role in preparing the site for installation of SAWPS. Panchayat once lodged a complaint in the block office of implementing agency (WASMO) about this. Even School Management committee contacted to the district office of WASMO but they didn't get any response. Supplier also did not take initiative to be in contact with the schools for follow up.

Water connection not given to the over head tank

Incomplete installation in Primary School Aklacha

Incomplete installation – Terafil cakes not supplied and installed

The Pantheshwari upper primary school in Chendipada block of Angul district of Orissa installed terafil filter in last summer vacation of 2010. The school has piped water supply with tube well within the school campus. The terafil installed was said to be used by the students for only washing utensils. Just one look at the filter is enough to spot the problem of the SAWPS and during physical inspection of SAWPS it was found that the terafil cakes were missing and has not been installed since its beginning and so far the treated water is as good as the raw water. The school authority had no idea about this problem. When the finding of this school was shared with district officials they were clueless about it and stated that some of the contractors must have not completed the work.

Terafil at Pantheshwari upper primary school

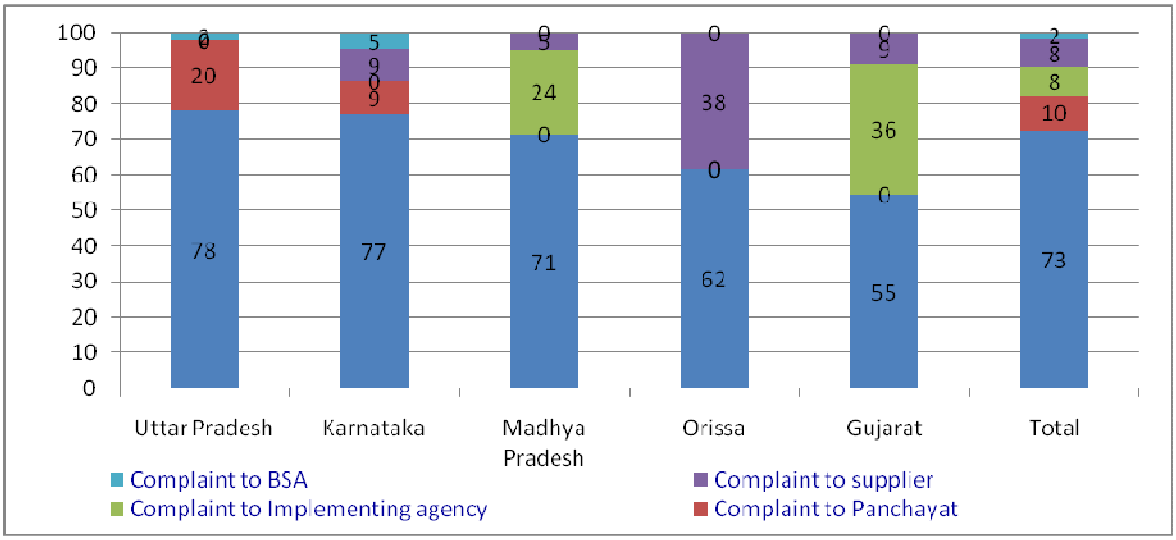
Missing terafil cakes from filter

Non functional SAWPS since installation			
State: Karnataka	District: Chitradurga	Block: Molkalmadu	GP: Konasagara
The girl's primary school in Konasagara gram panchayat was supplied UV plant in February 2010 and got installed in May 2010. The SAWPS was not in running condition on the date of visit. After discussions it was found out that the SAWPS never worked properly after installations and later due to theft reasons SAWPS was dismantled and kept in the store room. All the students drink water from the main source. The gram pradhan had no idea about the SAWPS installation. The water testing before installation of SAWPS was also not done in the school.			

Filter in not working condition in Girl's Primary School, Konasagara

4.4.3 Action taken by the Schools after SAWPS became dysfunctional

Figure 4.10: Action taken by schools after SAWPS became dysfunctional (in percentage)



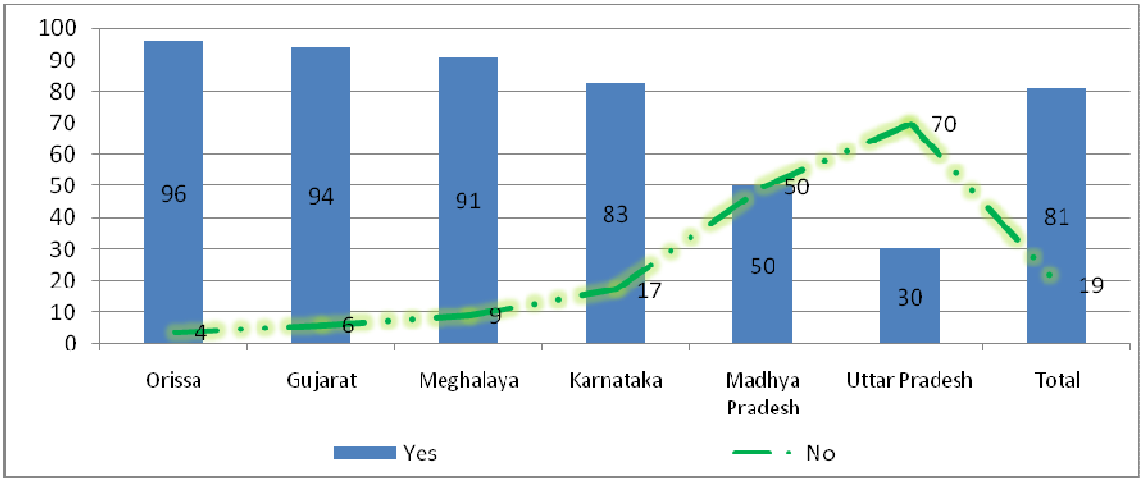
It was reported that nearly 73% schools had taken no action after SAWPS became dysfunctional. However in sample 8% each schools complained to the suppliers and implementing agency. Infact in 10% cases, schools informed the Panchayat/ PRI members and 2% schools complained to the Basic Shiksha Adhikari. The major reason for no action by the schools was the lack of awareness on who is the contact person and to whom they should approach in case of crisis. . It is also worthwhile to note that most of the schools and panchayats did know that suppliers are supposed to provide O & M services for five years and with no financial liability on them.

Although it was observed in Gujarat, Karnataka and Madhya Pradesh that suppliers has put sticker containing contact details of suppliers (name, address and telephone numbers) on filters. A user manual with toll free number was provided to schools in Gujarat. But a common complaint was noticed in Karnataka and Madhya Pradesh that either numbers provided were not working or suppliers didn't attend the call.

4.5 STATUS OF USAGE OF SAWPS

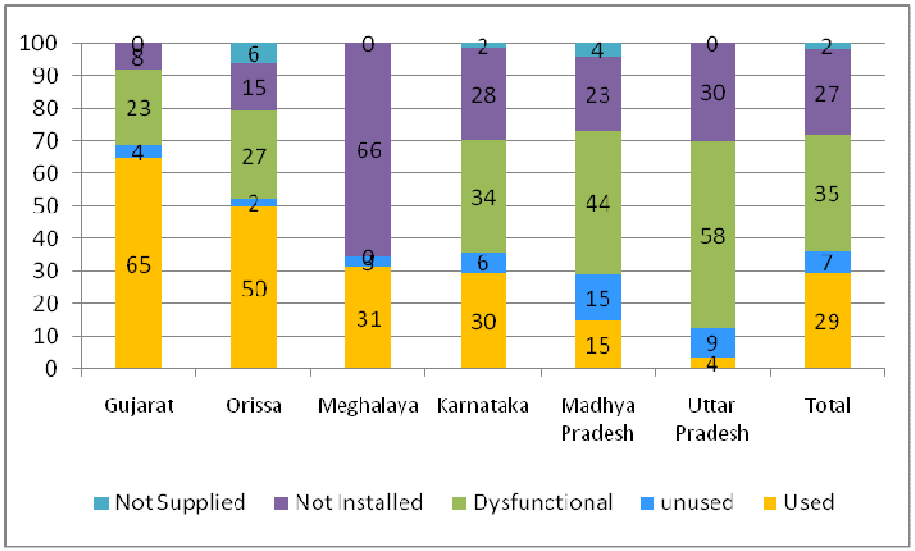
4.5.1 Usage Status

Figure 4.11: Usage status of functional SAWPS (in percentage)



In overall sample out of 116 functional SAWPS, 94 SAWPS (81%) was reported in use regularly. The usage at state level was found highest in Orissa (96%), followed by Gujarat (94%), Meghalaya (91%) and Karnataka (83%). In Uttar Pradesh only 30% of the functional SAWPS were in use.

Figure 4.12: Usage status of SAWPS against overall sample (in percentage)



If the dysfunctionality, not installed and not supplied SAWPS are combined together, then in overall sample, usage of SAWPS was found to the extent of 29% only. Gujarat reflected the highest usage percentage (65%), followed by Orissa (50%), Meghalaya and Karnataka 31% and 29% respectively. The lowest i.e. 4% usage of SAWPS was reported in Uttar Pradesh. In Madhya Pradesh around 15% SAWPS were in use at the time of visit.

Various factors such as involvement of teachers in testing water, pani samitis role, O & M systems and the awareness level in Gujarat has led to high SAWPS usage in comparison to other sample states. On the contrary in Orissa the essential connectivity of the main source with the SAWPS (terafil) is the main reason for 50% SAWPS usage. It is also important to note that SAWPS are not the only source of drinking water in the sample schools. Apart from SAWPS, the main water source and drinking water bottle from home are also substantially in use.

The major reasons for non usage of SAWPS were;

1. School building under construction
2. Burden to fill the tank
3. Daily keeping it out for accessibility is a problem
4. Door of the room is yet to be constructed. This is essential because of theft issue.
5. Due to cold water in winter, filter has been kept in store from 4 months
6. Due to frequent and long power cuts during school timings
7. Due to security reasons it has been kept in lock
8. Kept in Anganwadi room in school which is most of the time locked
9. Lack of awareness about significance of SAWPS
10. Litre per hour (LPH) capacity is less and hence not in use
11. SAWPS was installed three days before. Yet to be used.
12. Water scarcity/ source water dysfunctional

Low height of SAWPS taps and water logging & drainage problem			
State: Orissa	**District: Cuttack**	**Block: Athagarh**	**GP: Mahakalapasta**
The terafil filter was installed in Government girl's high school in the month of November 2010. The school has a total strength of 300 students. Although the SAWPS has been working well but the problem was found with the very low height of taps attached to the SAWPS and students face difficulty to drink the water. The absence of platform around SAWPS has been leading to huge water logging. The SAWPS was installed near kitchen, water logging around SAWPS creates problem. Apart from the drinking, filter water, is also being used for washing of utensils which again adds to water logging and drainage problem. The school authority said that construction of platform around SAWPS is the responsibility of the RWS&S department while the department people said that budget for installation of SAWPs doesn't include building of the platform.			

Very low height of taps at Government Girls High School, Athagarh

Water logging and drainage problem in Government Girls High School, Athagarh

Best Practice – Installation and drainage

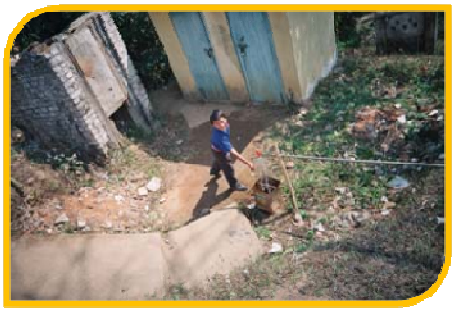
Rahangula Ashram residential school in Athagarg block of Cuttack district, Orissa has total strength of 392 students. The terafil filter based SAWPS was installed in October 2010. The filter was functional and in regular use as on the date of visit. One best practice which was observed with the SAWPS in the school that filter had been designed in such a way that after cleaning of terafil cakes in the filter water can be drained out easily. There was an extra outlet on the chamber where terafil cakes are fixed. It was reported that the person responsible for the cleaning of the SAWPS opens this outlet after cleaning and the water is drained out easily from the filter.

The school authorities had dug up the place around the filter and got the place filled with sand and red soil so that the extra water gets soaked up in the sand and the place remains neat and clean without accumulation water around the filter.

Terafil at Rahangula Ashram School, fitted with an extra tap to drain the water, and area around the SAWP being filled with sand and red soil to soak the extra water

Best practice – Usage and Accessibility

The Nongshilliang LP School in Amlarem block of Jaintia Hills district, Meghalaya having total strength of 34 children was provided Stand Alone Water purification System during the year 2008-09 with the aim to provide clean and potable water to school children. Terafil technology is used in school which is installed in the school compound near the water source. Piped water supply is the main source of water in the school and SAWPS was found connected with water source through pipeline. The operation of the SAWPS is based on gravity system and no manual effort is required to operate.

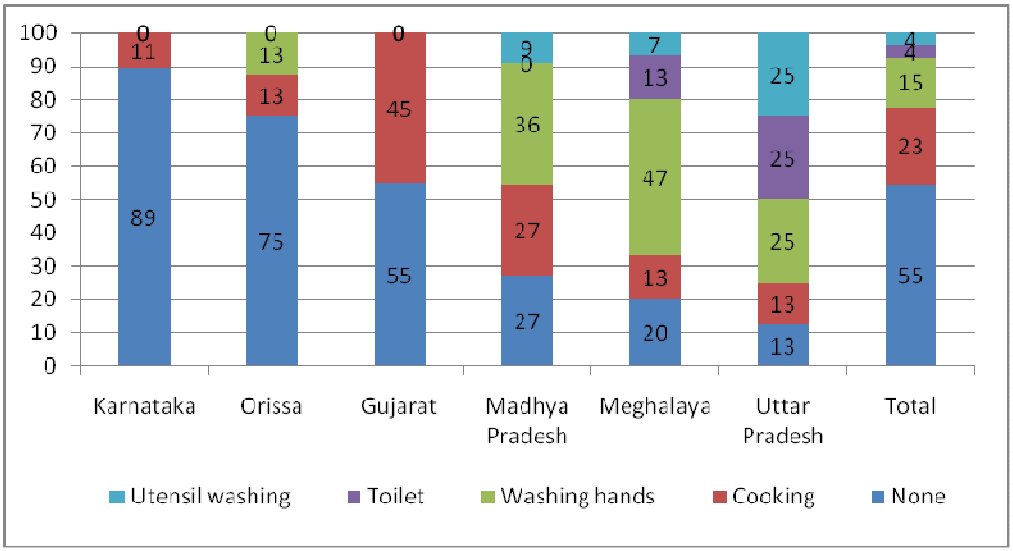


Child filling bottle from tap connected with Terafil

Terafil water filter in Nongshilliang

It is observed that school was not aware about any handing over process followed for SAWPS installation. The contractor just installed the SAWPS and didn't brief school authority about the basic operation and maintenance of SAWPS. The SAWPS was found functional and in use as on the date of visit. All children and school teachers were using the SAWPS water for drinking purpose all the time irrespective of any season. No discrimination was found while using the SAWPS and everyone had direct access to the SAWPS. The SAWPS installed reportedly produce clean and potable water and also liked by students.

Figure 4.13: Usage of SAWPS for other purposes (in percentage)

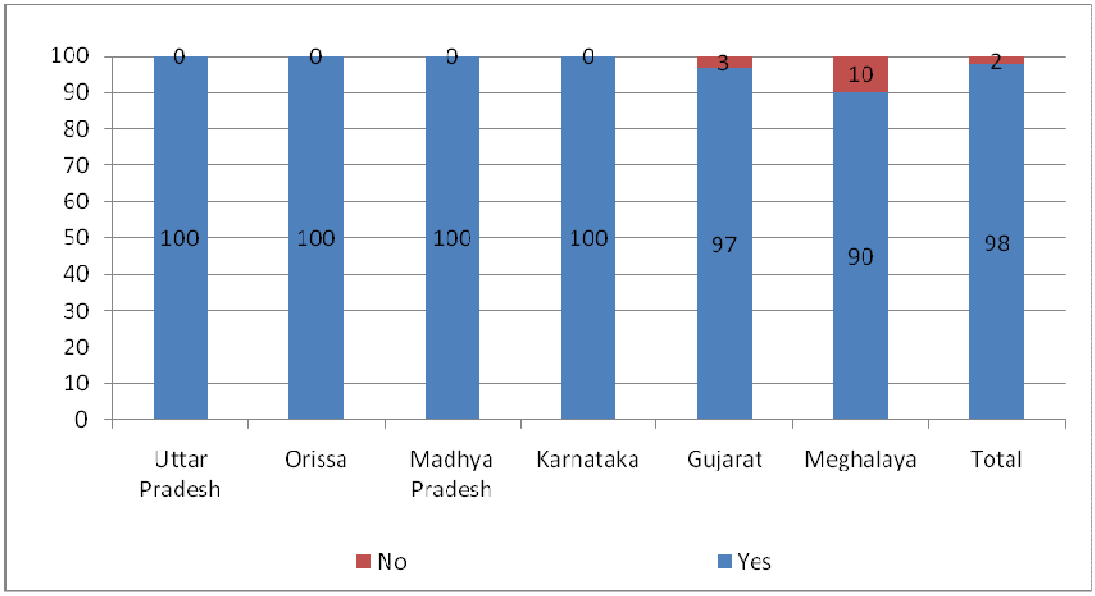


The figure indicates that out of 94 SAWPS in use, water of 55% SAWPS were used only for drinking purpose and 23% used for cooking purpose apart from drinking. Approx 15% SAWPS water was used for hand washing purpose other than drinking and 4% each for toilets and washing utensils.

4.6 ACCESSIBILITY AND ADEQUACY OF SAWPS TO THE CHILDREN

4.6.1 Accessibility of SAWAPS to Children

Figure 4.14: Direct accessibility of SAWPS to the school children (in percentage)



Almost all the SAWPS in use were directly accessible to the school children except in very few cases (2%). Although in some cases SAWPS were installed in principals/ staff room but tap connection with pipe were given outside the room for easy accessibility by children. This trend has been observed in few schools of Gujarat where connection was given outside the room and 4-5 taps were attached to it. Wherever accessible, the SAWPS were use by all the children without any gender bias or caste discrimination.

In the 2% cases where SAWPS were not accessible for school children, this was mainly because filters were kept in staff room/principal's room and usage was restricted only to the teachers.

Best practice – usage and accessibility

The higher primary school in Reddyhalli gram panchayat of Chitradurga district, Karnataka was supplied UV plant in March 2010 and got installed in December 2010 (after nine months). The system was installed in the class room and the water from the filter was being stored in the drum which was kept outside the classroom for the direct accessibility of the children. The SAWPS was clean. The daily upkeep of the SAWPS was done by the school staff and water storage tank was cleaned once in a month. The SAWPS was in use by children and teachers both, however main water source was also being used by children for drinking purpose equally. Water testing before installation of SAWPS was not done in the school.

Water storage drum outside the class in Reddyhalli

Usage and access by principal and teachers			
State: Gujarat	District: Vadodara	Block: Chotaudepur	GP: Puniyawant

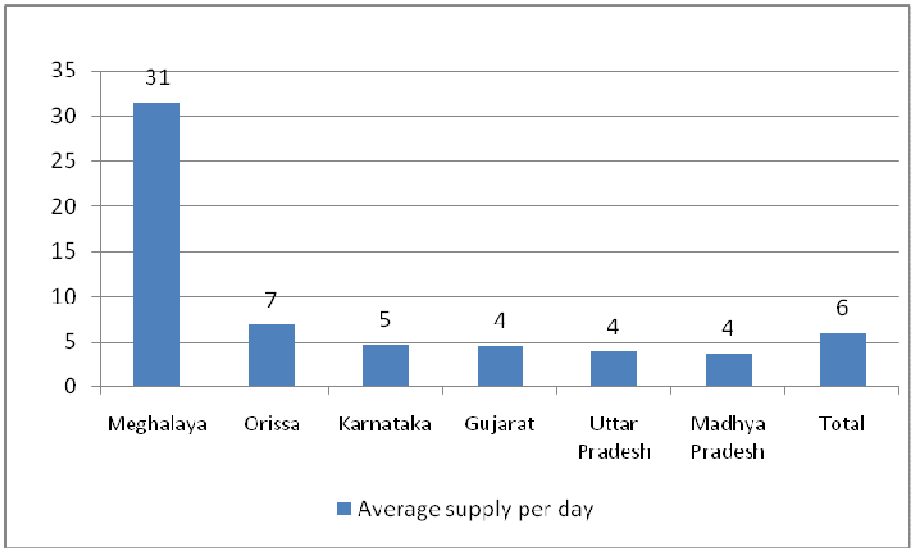
UV plant was supplied to the Primary School in Puniyawant in February 2010 and got installed in May 2010. The school has the piped connection inside the premises as main source of water and it is connected with the SAWPS. The SAWPS is installed in the principal's room. The water flow from the filter is also minimal and takes time to fill. No water storage tank was provided in the school for collecting and storing the water for all the students. The school authority has not taken the initiative to rectify the problem or get a storage tank to store the filter water. Hence it has limited use and access by the teachers and the principal. Students don't have any idea about SAWPS being installed in the school and reportedly they have never tasted the filtered water.

Filter kept in Principal room in Puniyawant

Primary School Puniyawant

4.6.2 Adequacy of Filtered Water

Figure 4.15: Average supply of SAWPS water per capita per day



It was observed that while selecting the SAWPS technologies all the sample states have taken into consideration the Govt. of India guidelines for providing adequate filter water to school children (norm: 3 litres per capita/day). The average supply of SAWPS water per capita per day was noticed around 6 litres in overall sample.

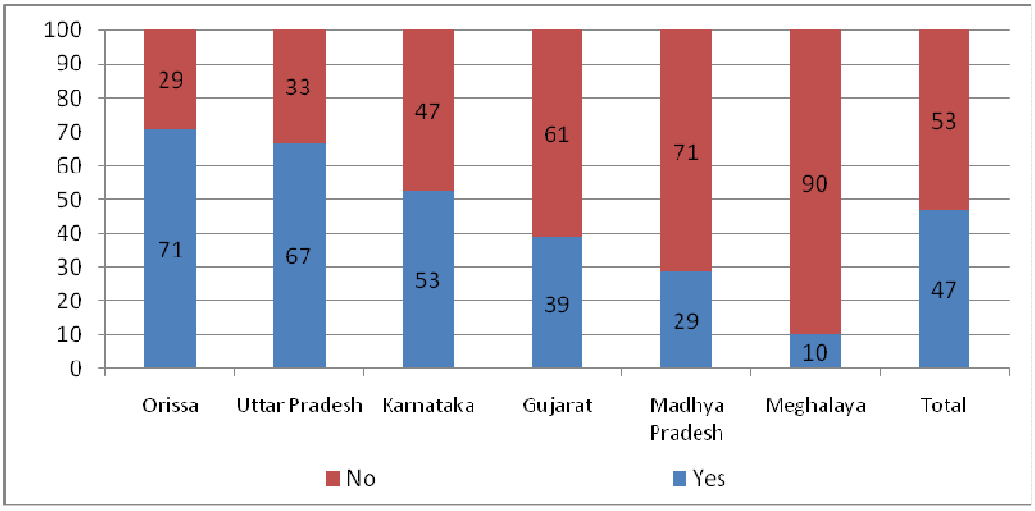
Meghalaya showed the highest percentage of SAWPS water (31 litres per capita per day) and Madhya Pradesh lowest with 3.6 litre per capita per day. The reason for such a high supply of filtered water in Meghalaya was the technology used i.e. terafil having 1700 litres of storage capacity of tank and number of average enrolled students is too less as compared to other states.

Best Practice - Two terafil in a school according to students strength			
State: Orissa	District: Cuttack	Block: Tigiria	School: Popara residential school
This school in Cuttack district received the Terafil filter in November 2010. The SAWPS has been working perfectly well since its installation. The school authority is fully satisfied with the functioning of filter, providing clean drinking water to the students. The school has the strength of 295 students comprising of 186 boys and 106 girls. Keeping the high strength of the school into consideration which is also a residential school, one more Terafil filter has been provided to the school in the current year. School authorities now have designated one SAWPS for boys and another one for girls, with this it has become easier for the students to access water. The SAWPS are located near to the hostels so that it is easy for the students to avail water during odd hours also. Cuttack district has many residential and ashram schools and the demand for an extra terafil filter is very often coming to the department. The department is also willing to address such demands provided that the school fits in their criteria for the selection of schools.			

Two Terafil filter at Popara Residential School, one for the boys and another for the girls.

4.6.3 Students queuing up for drinking water from SAWPS

Figure 4.16: Students queuing up for drinking water from SAWPS (in percentage)



In 47% of the schools, principals/ teachers reported that the students have to queue up for drinking water from SAWPS. Orissa showed the highest percentage (71%), followed by Uttar Pradesh (67%) and Meghalaya has the lowest percentage (10%), where students need to queue up for drinking water from SAWPS. It has been observed by the CMS team that on an average students have to wait for approx 3-4 minutes to use the SAWPS water and 5-6 students were normally observed queuing up at a time. Uttar Pradesh showed the highest number of students (10) queuing up for using SAWPS water with an average waiting time of 4 minutes per student.

4.7 OVERALL SAWPS STATUS- SIGNIFICANTLY LOW FUNCTIONALITY AND USAGE

The sample survey reveals that out of 320 schools visited, the SAWPS were supplied in only 314 schools (98%) and in six schools SAWPS were not supplied by the suppliers despite the names given in the physical progress list provided by the implementing agency.

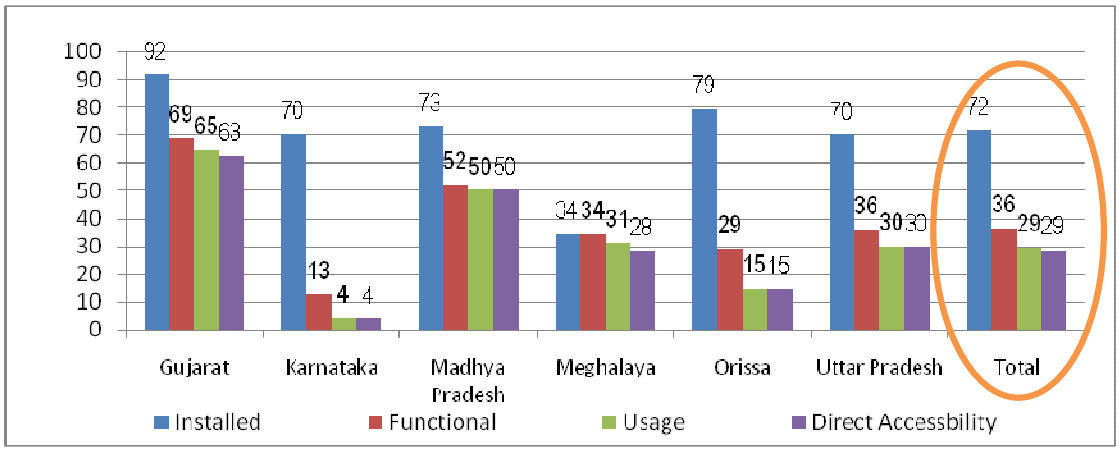
Similarly the SAWPS were installed in only 229 schools (71%) and were functional only in 116 schools (36%) of the overall sample. The usage status of SAWPS was found to the extent of 29% (94 schools) in the overall sample schools. Direct accessibility of SAWPS was in 92 schools. The below mentioned table and graph will present the state and district wise status of SAWPS installation, functionality, usage and accessibility.

Table 4.5: District wise SAWPS installation, functionality, usage and accessibility status (in nos.)

State	District	No. of schools	No. of schools where filters delivered	No. of schools where filters installed	No. of schools where filters functional	No. of schools where filters are in use	No. of schools where used filters are directly accessible
Gujarat	Kheda	16	16	14	8	8	8
	Sabar Kantha	16	16	15	12	12	12
	Vadodara	16	16	15	13	11	10
Sub total		**48**	**48**	**44**	**33**	**31**	**30**
Meghalaya	Jaintia Hills	16	16	5	5	4	4
	Ri Bhoi	16	16	6	6	6	5
Sub total		**32**	**32**	**11**	**11**	**10**	**9**
Madhya Pradesh	Alirajpur	16	14	10	2	0	0
	Dhar	16	16	14	4	2	2
	Narsinghpur	16	16	11	8	5	5
Sub total		**48**	**46**	**35**	**14**	**7**	**7**
Karnataka	Chickkballapur	16	15	10	5	5	5
	Chitradurga	16	16	12	4	4	4
	Dharwad	16	16	12	8	8	8
	Raichur	16	16	11	6	2	2
Sub total		**64**	**63**	**45**	**23**	**19**	**19**
Orissa	Cuttack	16	16	15	12	11	11
	Angul	16	16	13	6	6	6
	Ganjam	16	13	10	7	7	7
Sub total		**48**	**45**	**38**	**25**	**24**	**24**
Uttar Pradesh	Chandauli	16	16	13	2	2	2
	Ghaziabad	16	16	15	8	1	1
	Balrampur	16	16	11	0	0	0
	Barabanki	16	16	12	0	0	0
	Farookhabad	16	16	5	0	0	0
Sub total		**80**	**80**	**56**	**10**	**3**	**3**
State Total		**320**	**314**	**229**	**116**	**94**	**92**

Note: School wise SAWPS status is given in annexure 2

Figure 4.17: State wise SAWPS installation, functionality, usage and accessibility status on overall sample (in percentage)



CHAPTER 5 SAWPS: SUITABILITY, EFFICIENCY AND IMPACT

The chapter gives an idea about the detailed process followed for selection and use of appropriate technologies in the sample states. Besides, status of water testing in six sample states and results of water testing done during assessment are also covered. This chapter also elaborates about involvement of grass root workers appointed under National Rural Water Quality Monitoring and Surveillance Programme (NRDWQM&SP) in sustaining the Jalmani programme.

5.1 SAWPS TECHNOLOGIES SUITABILITY

Most of the states have preferred the manual driven technologies except for Gujarat, Karnataka and Meghalaya. In Gujarat UV filter and RO (both technologies were eclectically driven) were used while Karnataka adopted both electrically (UV filter) and manually (ultra filter and household filter) technologies. Similarly Meghalaya has also preferred both technologies i.e. Aquaguard (electrically driven) and Ion Exchange and Terafil (manually driven). Orissa, Madhya Pradesh and Uttar Pradesh have followed only manually driven SAWPS technologies.

Selection of Technology Options

In order to decide on technology options, the Department of Drinking Water Supply, Government of India, had constituted a High Level Technical Committee (HLTC) in March 2008. The Technologies Identified by the High Level Technical Committee (HLTC) for deployment of stand alone drinking water purification systems, with or without electricity is based on Ultrafiltration, filtration and radiation principles. Ion exchange and RO based systems as well as those useful for removal of arsenic; fluoride, etc. are recommended for use only where the local body could take responsibility for managing the rejects.

5.1.1 Technologies Selection Process and Reasons

Table 5.1: SAWPS Technology used in the sample states and reasons for selection

Sl. No	States	SAWPS Technology	Total Cost of SAWPS (including O & M cost) in INR	Reasons for selection of these technologies
1	Gujarat	Ultra Violet Radiation (UV) 100 LPH (With power supply)	7100	Out of the technologies identified by HLTC, three technologies were considered appropriate for Gujarat (UV, RO & Ultra Filtration). The RO was provided in the schools where drinking water contains chemical contamination and UV technology was opted in the schools where bacteriological contamination has been detected. The ultra filtration technology is yet to be implemented in the state. Almost in every village power connection in schools have been provided. Therefore Gujarat opted for UV, UF and RO systems which are electricity driven.
		Ultra Violet Radiation (UV) 250 LPH (With power supply)	9000	
		Reverse Osmosis (RO)	67290	
2	Karnataka	Category 1 - UV (electricity driven)	10950	As per the specification, suppliers were asked to suggest technologies operated through electricity and without electricity. Accordingly UV technology (with electricity) and ultra filtration (without electricity) were recommended by empanelled suppliers. The household filters were also provided where schools have no water supply facility. The
		Category 2 - Ultra filtration (without electricity)	9650	

Sl. No	States	SAWPS Technology	Total Cost of SAWPS (including O & M cost) in INR	Reasons for selection of these technologies
		Category 3 - Household filter	1900	reasons reported for selecting these technologies were that the UV +electricity technology is maintenance friendly and more effective in bacteria removal. The ultra filtration has also been quite effective in bacteria removal. Spare parts are also available locally on economical rates. The electrically driven technology is not appropriate in the remote and rural areas as it requires regular power supply throughout the school timing, which is not feasible. Many SAWPS were lying unused due to power cut.
		Suppliers are also being given plumbing charges in first year (varying from Rs 2000-Rs 4000) and 2nd year onwards till 5th year consumable charges per unit i.e. Category 1 – Rs 950; Category 2 – Rs 850 and Category 3 – Rs 1900		
3	Meghalaya	Aqua guard	12,000	The technologies were recommended by HLTC. The cost of these technologies was within the approved amount. The electricity supply has been also good in state which was required for operating aqua guard.
		Ion exchange	18,250	
		Terafil filter	29,330 - 29,940	
4	Orissa	Terafil filter	20,000/-	Recommended by the State Level Technical Committee. This is most suitable technology for the districts affected with iron. The cost for maintenance was very low and also can be easily maintained by the respective schools.
5	Uttar Pradesh	Bacteriostatic activated carbon	17,500	The technologies were recommended by the State Level Technical Committee. Bacteriostatic activated carbon was selected as it removes iron, fluoride and bacteriological contamination. Ultra filter was mainly selected for removing iron and bacteriological impurities. Terafil is cost effective, and is highly recommended for areas with iron impurities. Terafil is operated without power supply which makes it easy for operation in rural areas and requires less maintenance. Terafil is also suitable for schools having large number of children because of large storage capacity of water tank, fixed installation unlike portable bacteriostatic activated carbon and Ultra filter which are prone to theft.
		Terafil water filter Being installed in the current financial year (2010-2011)	10,900	
		Ultra Filter	16,500	
6	Madhya Pradesh	Ion Exchange	19626	The technology selection was decided by High level Technical Committee keeping in view the water contamination issues in the state. Fluoride is the major problem with the source water and ion exchange technology has been fully successful in removing fluoride and turbidity. The reason for selecting Ultra filter technology was the cost which is within the approved budget. Ultra filter was mainly selected for removing iron and bacteriological impurities.
		Ultra Filter	31642	

Developing Entrepreneur skills - Modern Pottery, Bhubaneswar

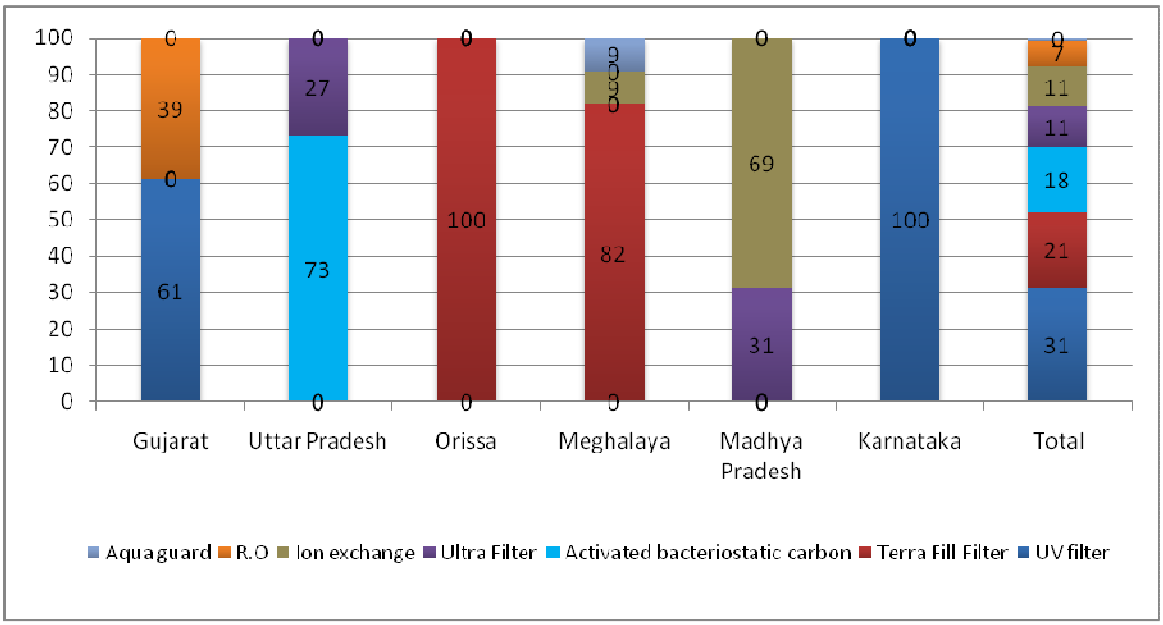
The Modern Pottery, Bhubaneswar, a major terafil production centre in Orissa is an interesting case study. It has received license from IMMT (CSIR), Bhubaneswar in the year 2000 for manufacturing and marketing terafil water filters. It has manufactured more than 80,000 terafil disc till now and filters are already in used by thousands of households in the state of Orissa and other states in various forms. Modern pottery started as a pottery unit serving the demand of famous Lingaraj temple by its proprietor Mr Prasantha Kumar Khuntia in 1993. It manufactured earthen pots and other tera products to be used in offerings to the deity. IIMT scientist Mr S. Khuntia developed this pottery unit to manufacture terafil cakes by building the capacity of its potters. Looking at the growing demand of terafil disc many similar pottery units throughout the country may be developed for supplying terafil cakes. Under the Jalmani scheme Modern Pottery is the biggest supplier of terafil cakes to many states across the country, even to the far flung states like Meghalaya.

The technology for producing Terafil water filter is undoubtedly novel yet simple and therefore can be manufactured anywhere by small and micro entrepreneurs without any prerequisite conditions.

Terafil cakes being manufactured at Modern pottery, Bhubaneswar

5.2 TECHNOLOGIES USED IN SAMPLE SCHOOLS

Figure 5.1: Type of technologies installed (in percentage)



In the sample, UV filter technology was used in 31% of the schools, followed by terafil filter (21%) and activated bacteriostatic carbon (18%). Ultra filter and ion exchange technologies each were provided in 11% of sample schools while RO was installed only in 7% of sample schools.

In Karnataka all the schools visited were provided with UV filter while RO was mainly found in Gujarat. Ultra filter technology was used only in Uttar Pradesh and Madhya Pradesh while Ion exchange used in Meghalaya and Madhya Pradesh. In Orissa, 100% schools were installed only Terafil technology.

The UV filter technology is not appropriate and successful in Karnataka as it requires regular power supply during school time which is not feasible in remote and rural areas of schools and many SAWPS were lying unused due to power cut.

While selecting and installing the filter technology, schools strength was not taken into consideration in any the sample states except for Gujarat and filters with similar capacity were installed in all the schools. However in Gujarat different LPH (litters per hours) capacity of filters was provided keeping in view the schools' strength.

Snapshots of Technologies

[**ULTRAVIOLET (UV)**

Ultraviolet (UV) water purification lamps produce UV-C or "germicidal UV," radiation of much greater intensity than sunlight. Almost all of a UV lamp's output is concentrated in the 254 nanometers (nm) region in order to take full advantage of the germicidal properties of this wavelength. Most ultraviolet purification systems are combined with various forms of filtration, as UV light is only capable of killing microorganisms such as bacteria, viruses, molds, algae, yeast, and oocysts like cryptosporidium and giardia. UV light generally has no impact on chlorine, VOCs, heavy metals, and other chemical contaminants. Nevertheless, it is probably the most cost effective and efficient technology available to eliminate a wide range of biological contaminants from their water supply.

UV water treatment offers many advantages over other forms of water treatment for microbiological contaminants. Most importantly, it does not introduce any chemicals to the water, it produces no bi-products, and it does not alter the taste, pH, or other properties of the water. Accordingly, in addition to producing safe drinking water, it is not harmful to your plumbing and septic system. Further, it is easy and cost-effective to install and maintain without any special training. For most microorganisms, the removal efficiency of UV for microbiological contaminants such as bacteria and virus generally exceeds 99.99%.

How it works

Ultraviolet purification uses a UV light source (lamp) which is enclosed in a protective transparent sleeve (usually quartz). The lamp is mounted such that water passing through a flow chamber is exposed to the UV-C light rays. When harmful microbes are exposed to the UV rays, their nucleic acid absorbs the UV energy, which then scrambles the DNA structure of the organism. The cell is rendered sterile and can no longer reproduce. The cell is now considered dead and is no longer a threat.

Since UV is not a physical filter, suspended particles (or turbidity) in the water could "shade" bacteria from the direct rays. From the UV source "live" bacteria and virus could pass through the system. For this reason a good UV systems have ceramic cartridge as a pre and final filter. The following factors can reduce the UV performance:

- Iron and hardness, which build up on the quartz sleeve is a process industry known as "fouling".
- Iron, decayed organic matters, tannins and any UV energy absorptive material commonly found in tap water.

UV, by itself, does not remove any particulate matter or turbidity. It does not remove volatile organic compounds such as pesticides or insecticides. Purchase, installation, operating and maintenance costs should be considered before selecting UV as a drinking water treatment system.

UV 100 LPH is the filter with the capacity of filtering 100 litre water per hour and similarly UV 250 LPH filters 250 litre water per hour.

Ultraviolet Skid Technology (Gujarat)

Ultraviolet Technology (Gujarat)

REVERSE OSMOSIS (RO)

The Reverse Osmosis (RO) system works on the principle of natural Phenomenon of Osmosis Process. Since the external pressure reverses Osmosis Process, the process is termed as Reverse Osmosis.

The RO is a filtration method that removes many types of large molecules and ions from solutions by applying pressure to the solution when it is on one side of a selective membrane. The result is that the solute is retained on the pressurised side of the membrane and the pure solvent is allowed to pass to the other side. To be "selective," this membrane does not allow large molecules or ions through the pores (holes), but allows smaller components of the solution (such as the solvent) to pass freely.

In the normal osmosis process the solvent naturally moves from an area of low solute concentration, through a membrane, to an area of high solute concentration. The movement of a pure solvent to equalise solute concentrations on each side of a membrane generates a pressure and this is the "osmotic pressure." Applying an external pressure to reverse the natural flow of pure solvent, thus, is reverse osmosis. The process is similar to membrane filtration. However, there are key differences between reverse osmosis and filtration. The predominant removal mechanism in membrane filtration is straining, or size exclusion, so the process can theoretically achieve perfect exclusion of particles regardless of operational parameters such as influent pressure and concentration. Reverse osmosis, however, involves a diffusive mechanism so that separation efficiency is dependent on solute concentration, pressure, and water flux rate. Reverse osmosis is most commonly known for its use in drinking water purification from seawater, removing the salt and other substances from the water molecules.

RO system is the latest technology applied for water purification. Reverse Osmosis is the process of water purification using special membranes to make water free and safe from biological impurities and remove total dissolved solids (TDS) up to 95.99%.

Reverse Osmosis 100 LPH, Sabar Kantha, Gujarat

ULTRA FILTRATION (UF)

Ultra filtration (UF) is a variety of membrane filtration in which hydrostatic pressure forces a liquid against a semi permeable membrane. Suspended solids and solutes of high molecular weight are retained, while water and low molecular weight solutes pass through the membrane. This separation process is used in industry and research for purifying and concentrating macromolecular (103 - 106 Da) solutions, especially protein solutions. Ultrafiltration is not fundamentally different from reverse osmosis, microfiltration or nanofiltration, except in terms of the size of the molecules it retains.

A membrane or, more properly, a semi permeable membrane, is a thin layer of material capable of separating substances when a driving force is applied across the membrane. Once considered a viable technology only for desalination, membrane processes are increasingly employed for removal of bacteria and other micro organisms, particulate material, and natural organic material, which can impart colour, tastes, and odours to the water and react with disinfectants to form disinfection byproducts (DBP). As advancements are made in membrane production and module design, capital and operating costs continue to decline.

UF technology is used to remove essentially all colloidal particles (0.01 to 1.0 microns) from water and some of the largest dissolved contaminants. The pore size in a UF membrane is mainly responsible for determining the type and size of contaminants removed. In general, membrane pores range in size from 0.005 to 0.1 micron. UF membrane manufacturers classify each UF product as having a specific molecular weight cutoff (MWC), which is a rough measurement of the size of contaminants removed by a given UF membrane. A 100,000 MWC UF membrane means that when water containing a given standard compound with a molecular weight of around 100,000 daltons is fed to the UF unit, nearly all of the compound will not pass through the membrane.

UF membranes are used where essentially all colloidal particles (including most pathogenic organisms) must be removed, but most of the dissolved solids may pass through the membrane without causing problems downstream or in the finished water. UF will remove most turbidity from water.

Ultra filtration in Ghaziabad

ION EXCHANGE

The Ion Exchange process percolates water through bead-like spherical resin materials (ion-exchange resins). Ions in the water are exchanged for other ions fixed to the beads. The two most common ion-exchange methods are softening and deionization.

Softening is used primarily as a pretreatment method to reduce water hardness prior to Reverse Osmosis (RO) processing. The softeners contain beads that exchange two sodium ions for every calcium or magnesium ion removed from the "softened" water.

Deionization (DI) beads exchange either hydrogen ions for cations or hydroxyl ions for anions. The cation exchange resins, made of styrene and divinyl benzene containing sulfuric acid groups, will exchange a hydrogen ion for any cations they encounter (e.g., Na+, Ca++, Al+++). Similarly, the anion exchange resins, made of styrene and containing quaternary ammonium groups, will exchange a hydroxyl ion for any anions (e.g., Cl-). The hydrogen ion from the cation exchanger unites with the hydroxyl ion of the anion exchanger to form pure water.

These resins may be packaged in separate bed exchangers with separate units for the cation and anion exchange beds. Or, they may be packed in mixed bed exchangers containing a mixture of both types of resins. In either case, the resin must be "regenerated" once it has exchanged all its hydrogen and/or hydroxyl ions for charged contaminants in the water. This regeneration reverses the purification process, replacing the contaminants bound to the DI resins with hydrogen and hydroxyl ions.

Deionization is an important component of a total water purification system when used in combination with other methods discussed in this primer such as RO, filtration and carbon adsorption. DI systems effectively remove ions, but they do not effectively remove most organics or microorganisms. Microorganisms can attach to the resins, providing a culture media for rapid bacterial growth and subsequent pyrogen generation.

Ion Exchange in Meghalaya

Ion-Exchange Filter, Alirajpur, Madhya Pradesh

TERAFIL WATER FILTER

Terafil Water Filter is a low cost device to filter impure water into clean drinking water. The filter is developed to cater to the needs for clean drinking water, especially when the water is rich in sediments, suspended particles, iron and certain microorganisms causing water borne diseases. It is most suitable for areas where water from dug wells, ponds, tube wells and rivers is used for drinking purpose.

Terafil has been developed at the Institute of Mineral and Materials Technology (IMMT), formerly known as Regional Research Laboratory, CSIR, Bhubaneswar. Terafil discs are prepared under license and training from IMMT. The ingredients used in the preparation of the Terafil discs are red clay, sand and wood saw dust mixed in a definite proportion which is then sintered (burnt) in kiln used by artisans. The technology for producing Terafil water filter is undoubtedly novel yet simple and, therefore, can be manufactured anywhere by small and micro entrepreneurs, without any prerequisite conditions.

All what is required is the easy availability of its raw materials, namely, red clay (clay used by potters), river sand and wood saw dust. The production unit requires one 5 hp Atta Chakki (Pulverizer) for grinding red clay, manual/motorized sieves, mixing machine, hand tools for moulding green Terafil, RCC platforms (60 ft × 40 ft) for sun drying of Terafil, coal/wood fired pottery kiln for sintering of Terafil, and a shed of 30ft × 20ft size. A three phase 5 KW power is required for operations of the machines. Manpower, without any specific expertise, can be easily trained for producing Terafil water filtration discs. There is a minimal technology fee for licensing the manufacture of Terafil discs. The traditional artisans can be trained to produce Terafil water filters, in place of water pitchers in rural areas of the country. The marketing of Terafil water filters can be carried out by the artisans themselves, just as water pitchers and other domestic earthen items are sold. The cost of complete set of Terafil water filter with clay containers is about Rs.200/-.

Terafill technology in Meghalaya

Terafill technology in Orissa

BACTERIOSTATIC ACTIVATED CARBON

In this technology the filter consists of the carbon cartridge made from high grade silver impregnated carbon to remove organic impurities, carcinogenic chemicals (such as VOC and THMs), chlorine, colour and odour from water. It also prevents the growth of bacteria on the carbon itself. This makes the water crisp to taste.

Activated carbon can be made from coal, wood, or coconut shell. Coconut shell is the most expensive and effective form. Carbon is "activated" by adding a positive charge, which enhances the adsorption and reduction of contaminants which have a negative charge. The three forms of activated carbon used in water filtration systems are granulated activated carbon (GAC), activated carbon block, and catalytic carbon.

Activated carbon removes impurities, chemicals and contaminants from water through adsorption and a process called catalytic reduction. Contaminants removed include volatile organic compounds (VOCs), herbicides, pesticides, chlorine (which is why water tastes better when filtered with activated carbon), chloramines, radon, and most man-made chemicals.

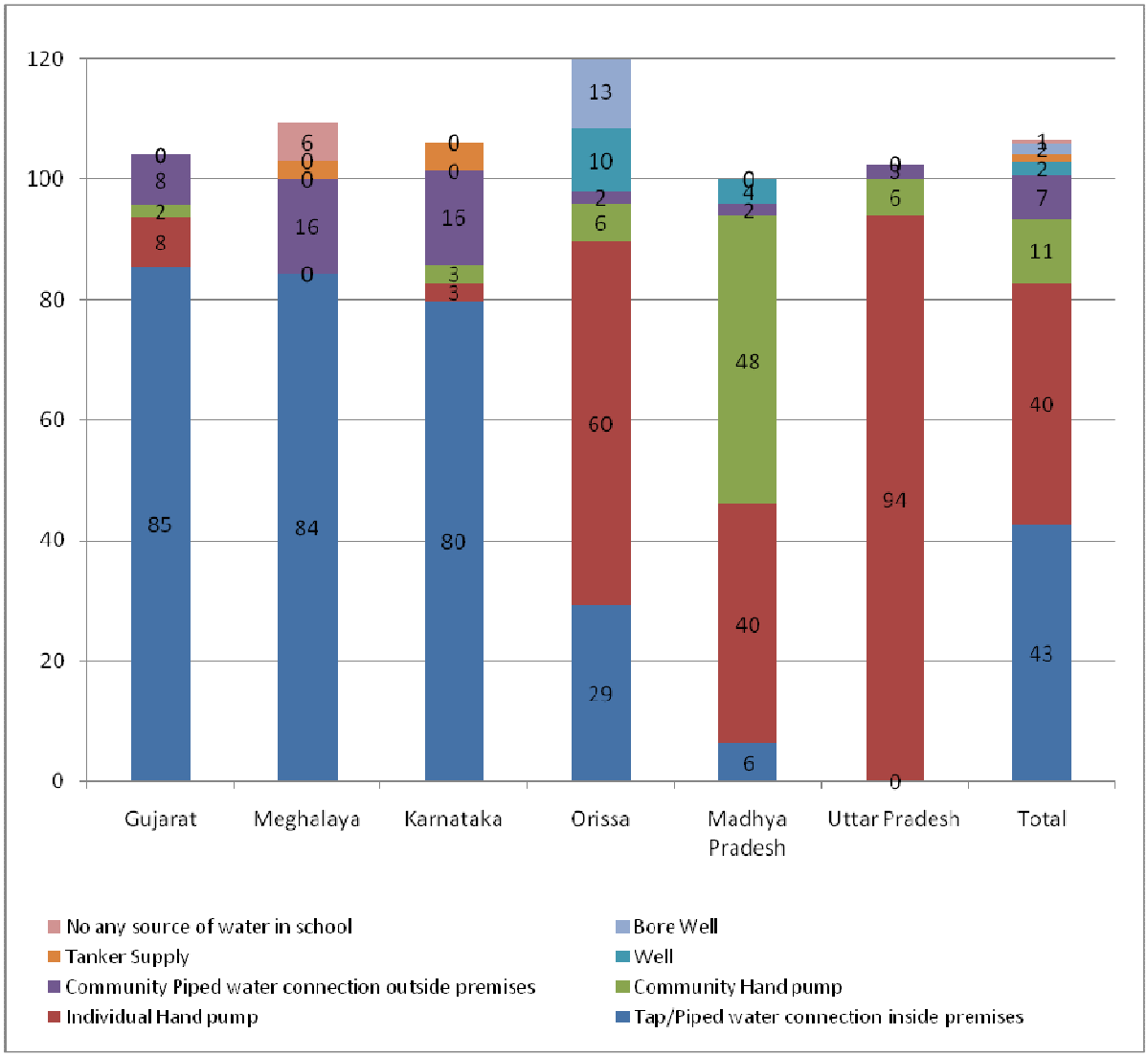
Activated carbon is not effective at removing heavy metals, nitrites, nitrates, dissolved inorganic contaminants or sediment.

Activated carbon technology in Uttar Pradesh

5.3 MAIN WATER SOURCE – TYPE AND FUNTIONALITY

5.3.1 Type of Water Sources in Schools

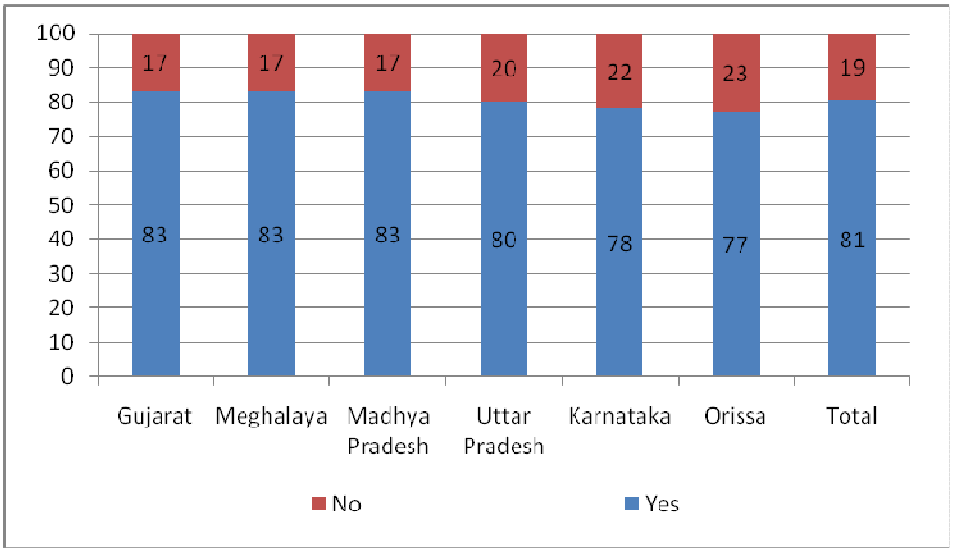
Figure 5.2: Type of water source in schools (in percentage)



Out of 320 schools in six sample states, 136 (42.5%) schools have tap/piped water connection inside the school premises as the main source of water in the school whereas, 40.30% of the total schools have individual hand pump. Around 18% of the total schools depend on the community hand pump and community piped water supply as their main source of water. Only two cases were in Meghalaya found with no water source.

5.3.2 Functionality of Main Water Source

Figure 5.3: Functionality status of main source of water (in percentage)



Out of 318 sampled schools where water source was found, 80% of the water sources were found functional on the date of visit. More or less same trend was observed in all the sample states. In Orissa nearly 77% of the main source of water was functional.

5.4 WATER QUALITY ASSESSMENT – REPORTED

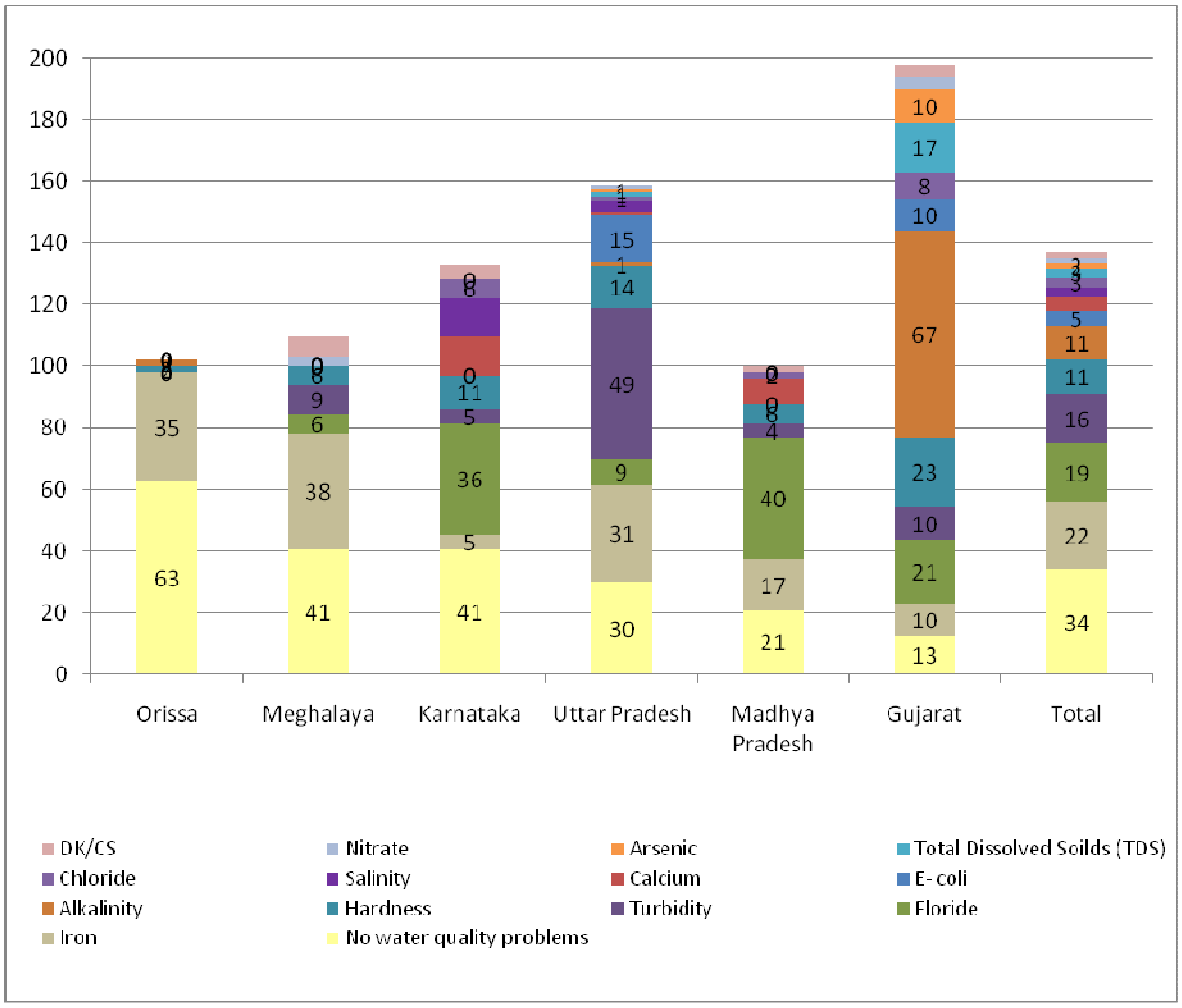
5.4.1 Drinking water quality status in the sample states

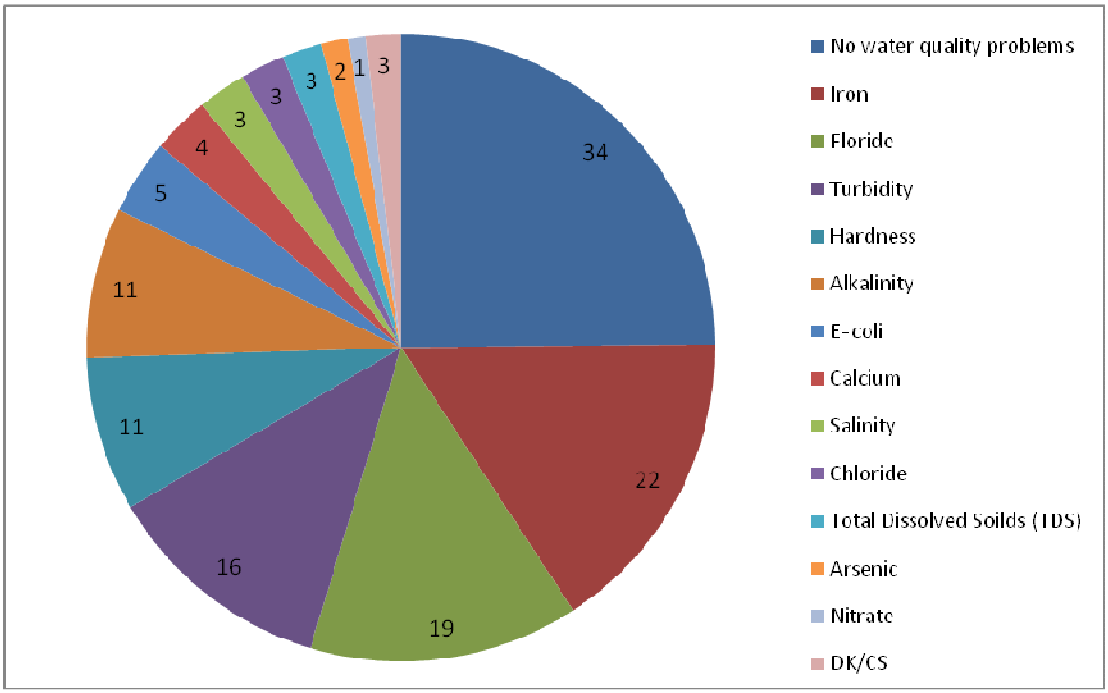
Table 5.2: Contaminations in raw water (reported by state and district officials)

S. No	States	Contamination
1	Gujarat	Alkalinity, Salinity, Fluoride and Bacteriological
2	Karnataka	Fluoride, Hardness, Turbidity and Bacteriological
3	Madhya Pradesh	Iron and Fluoride
4	Meghalaya	Iron and Bacteriological
5	Orissa	Iron and Bacteriological
6	Uttar Pradesh	Iron, Turbidity, Arsenic ,Fluoride and Bacteriological

As per the discussions with state and district officials it was concluded that Gujarat had major water contaminations of alkalinity, salinity, fluorides and bacteriological. While in Karnataka, fluorides, hardness, turbidity and bacteriological contaminations were the key issues. Iron and fluoride were the only two issues found in Madhya Pradesh. Meghalaya and Orissa had iron and bacteriological impurities. Uttar Pradesh reported iron, turbidity, arsenic, fluoride and bacteriological contaminations in the main source.

Figure 5.4: Awareness of school authorities regarding contamination in the source water

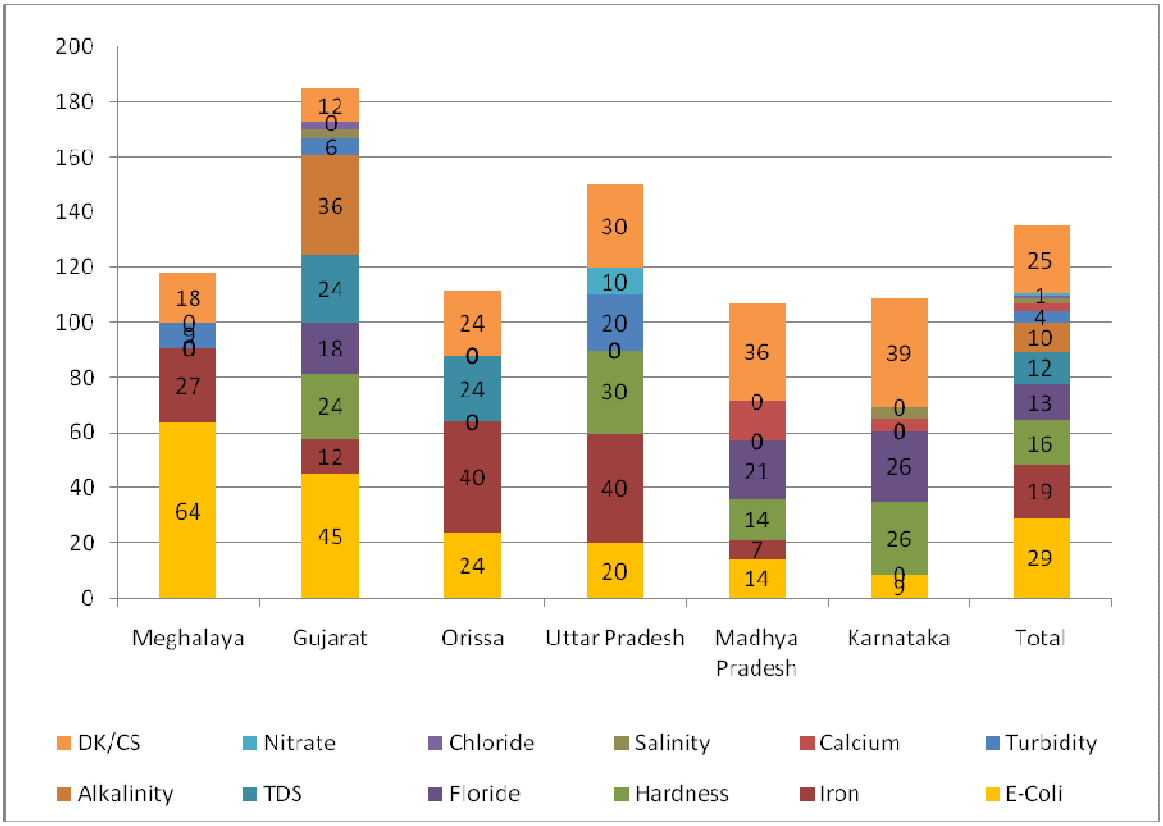




In the overall sample, 34% schools teachers/ principals reported that there was no water quality problem with the main source water (raw). Problem of iron was reported in 21% of the sample schools, followed by fluoride (19%), turbidity (16%), hardness and alkalinity both being 11% each. In Madhya Pradesh and Karnataka 40% and 36% schools respectively reported fluorides. In Gujarat 67% of the schools were having alkalinity problem. In Uttar Pradesh turbidity was reported by 49% schools as a problem in the main source water.

5.4.2 Water Impurities Treated by SAWPS (reported by teachers)

Figure 5.5: Impurities in water removed by SAWPS (in percentage)



As reported by schools SAWPS is treating e-coli in approx. 29% of schools, iron in 19%, hardness in 16%, fluoride in 13%, TDS in 12% and alkalinity in 10% of the sample schools. Reportedly turbidity and salinity were being removed in 4% and 2% of the sample schools respectively. In nearly 25% of the sample schools, principals/teachers had no information and knowledge on what all contaminations are treated by SAWPS.

5.4.3 Water Quality Testing Status (Reported)

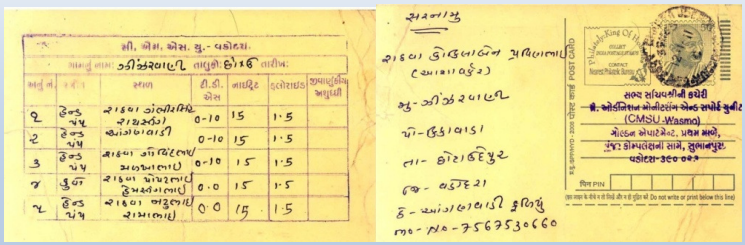
Questions pertaining to the water testing (raw and treated) process existing in the states and how it has been integrated with the Jalmani scheme were asked from the implementing agencies at all levels till panchayat.

Gujarat

It was informed by the officials that the water quality testing has been done before and after installation of SAWPS. Pani Samiti/ district laboratories conduct a routine water testing survey (pre monsoon and post monsoon) of the whole panchayat. On this basis, the selection of the schools was done. After installation the testing was done in respective schools by teachers. Training was given to teachers for carrying out the tests. Normally, water quality tests (parameters - bacteriological contamination, TDS, nitrate, chlorides, nitrates, fluorides and hardness) are being conducted quarterly in schools by the teachers.

Best practice in Gujarat

Gujarat follows a system where the implementing agency at district level gives a stamped post card to each grass root worker. The grass root worker then conducts the water quality test and fills in the given format and posts it back to the implementing agency office at district level. These tests are conducted for raw as well as treated water. This system is followed for the village water quality testing and Jalmani schools are also integrated in this. This allows the villagers and school teachers to know the results of the tests conducted. Figure below shows the table format in which the grass root workers fill the tests results.



An innovative water quality test results reporting mechanism has been developed for the grass root workers (teachers). Each grass root worker is given post cards with printed table of parameters to be tested. These post cards are delivered at district level. But it was found that pace of water testing has been slowed down as compared to the initial response because of irregular supply of testing kits and its consumables.

Karnataka

Water testing was done mainly through the district level laboratories. It was reported by the officials that training on water testing and testing kits was also provided in some gram panchayats. But it was observed in most of the panchayats that the grass root workers were either not given water testing kits or if given, they are not doing the test.

Meghalaya

As per the official reporting, PHED conducted the half yearly testing of panchayat/ school water sources and the parameters tested included pH, Iron, Nitrate, Fluoride Alkalinity, Hardness, Turbidity and Bacteriological contamination. The testing results have been shared with the community and the schools. Importantly, it was observed that water testing before or after installation of SAWPS has not been done in the schools by PHED.

Orissa

Rural Water Supply & Sanitation Department (RWS&S) routinely conducts water quality testing of the main water sources in the entire gram panchayats. However, with such large number of water resources in a district it becomes almost impossible for the Rural Water Supply & Sanitation Department to conduct water quality testing of all the water resources, so it is often recommended that the areas suffering with major toxicity as those of Iron and arsenic may only be addressed. Testing is also been done as and when any water quality complaints are received. In the last quarter of 2010-2011, 'Self Employed Mechanics (SEM)' are provided training for three days on water testing and kits are also being provided to them.

As per the official reporting, water testing before and after installation of SAWPS has been done and junior

engineers at the block level conduct test of all the water sources regularly including in schools where SAWPS have been installed. In Cuttack the team has found documents pertaining to the water quality testing of water sources in SAWPS installed schools (before and after installation of SAWPS).

Uttar Pradesh

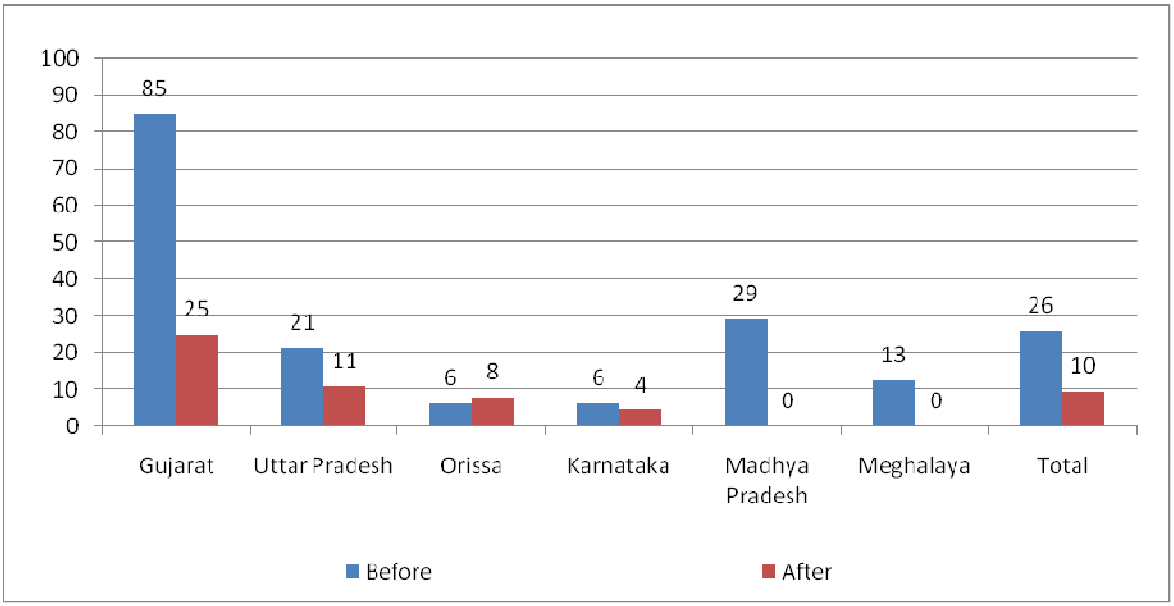
In Uttar Pradesh since Jal Nigam being the implementing body for rural water supply scheme, water testing is a routine process for them but it was not being done specifically for Jalmani scheme. At panchayat level five people (grass root workers) have been provided training on water testing under water supply programme. It was stated by the officials that in all the sample districts raw water for pH, Iron, Nitrate, Fluoride Alkalinity, Hardness, Turbidity and Bacteriological contamination has been tested before installing the SAWPS. School authorities had no knowledge about these tests either before or after SAWPS installation.

Madhya Pradesh

The officials reported that the water testing field kits have been distributed and training has been imparted to five people (grass root workers) from each gram panchayat. The efforts were initiated in 2008 and the test results are being shared with PHED's offices. The water quality monitoring is being done by the salaried hand pump mechanics/ district hand pump technicians of PHED. In Alirajpur and Narsinghpur it was reported by the officials that approx. six hand pump technicians in each block have been entrusted with the responsibility of routine water testing of habitations and SAWPS schools. Generally pH, Iron, Fluoride, Turbidity, Alkalinity, Hardness and Bacteriological contamination are being tested.

5.4.4 Water testing before and after installation of SAWPS

Figure 5.6: 74% of SAWPS installed without water testing (in percentage)



Water testing before installation of SWAPS was reportedly conducted in 26% of the overall sample schools. In 58% schools water testing was not done before installation while in 17% schools principal/ teachers had no idea on this. Gujarat showed the maximum percentage (85%) of schools conducting water testing before installation followed by Madhya Pradesh (29%) and Uttar Pradesh (21%). In Orissa, 31% schools were not aware about any such testing.

It was reported by the teachers or principal in-charge that water testing after installation was done only in around 10% of the sample schools. In Gujarat 25% schools and in Uttar Pradesh and Orissa 11% & 8% schools respectively reported about water testing done after installation of SAWPS. In Meghalaya and Madhya Pradesh no water testing was carried out after installation of SAWPS.

5.5 INVOLVEMENT OF GRASS ROOT WORKERS

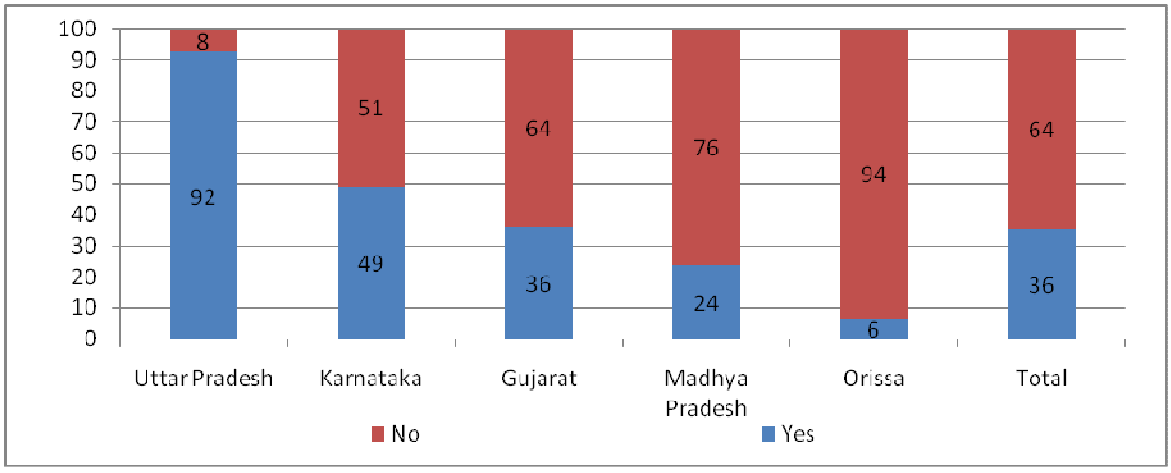
The grass root workers engaged under National Rural Water Quality Monitoring and Surveillance Programme (NRDWQM&SP) are mainly Asha, Anganwadi worker, school/ science teacher, health personnel, other grass root level workers and Panchayat representatives. The associations of grass root workers with Jalmani programme have been found to be very limited in all the sample states except, to some extent in, Gujarat and Karnataka. In Orissa and Meghalaya the grass root workers were not yet involved in the Jalmani scheme. In Orissa, from this year onwards officials are planning to provide training to five grass root workers on water testing.

In Gujarat a well structured water quality monitoring mechanism is in place for overall village water supply. The district laboratories or Pani Samiti have been doing routine water test (pre monsoon and post monsoon). The Jalmani scheme is also integrated in the existing system. 'Water Quality Coordinators' at district level have tested the water in schools before installation. The post installation water testing is done by trained school teachers on quarterly basis. They check bacteriological presence, TDS, hardness, chlorides, nitrate, and fluorides. Basic bacteriological test kits have been provided to almost all schools but kits for other tests have not been provided. The results have been shared with WASMO at district level. The teachers are often given post cards where they have to write the results and post it to WASMO district office. Cluster Resource Centres and NGOs have been creating awareness about water issues and significance of using water purification system.

In Karnataka, as reported, five grass root level workers i.e. Asha, Anganwadi worker, school/ science teacher, water man and panchayat secretary were appointed under NRDWQM&SP in each GP. They have received one day training on water testing at the district level. Grass root workers were also provided training on water testing but in many places either they have not been given the testing kits or they themselves are not taking any interest in conducting the test especially in Chitradurga district.

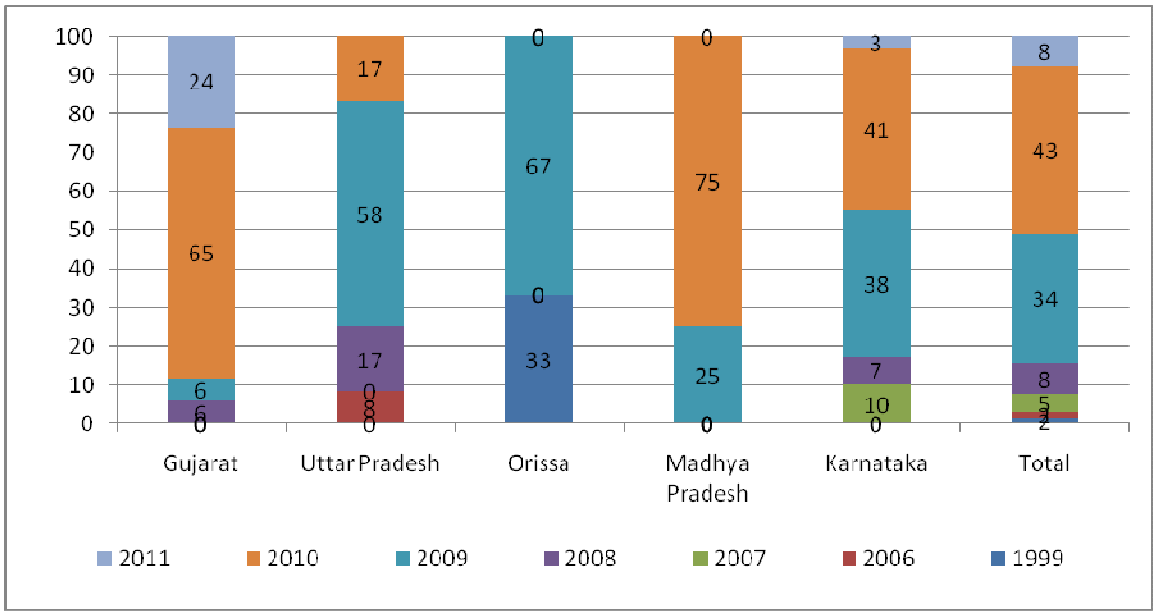
5.5.1 Training of Grass Root Workers

Figure 5.7: Training received by grass root workers (in percentage)



Around 36% grass root workers in overall sample were provided trainings on water quality issues and testing. In Uttar Pradesh nearly 92% grass root workers reported that they have received the training followed by 49% and 36% respondents respectively in Karnataka and Gujarat. However in most of the sample states except for Gujarat, it was observed that either grass root workers were not provided water testing kits or wherever provided, they were taking least interest in water testing.

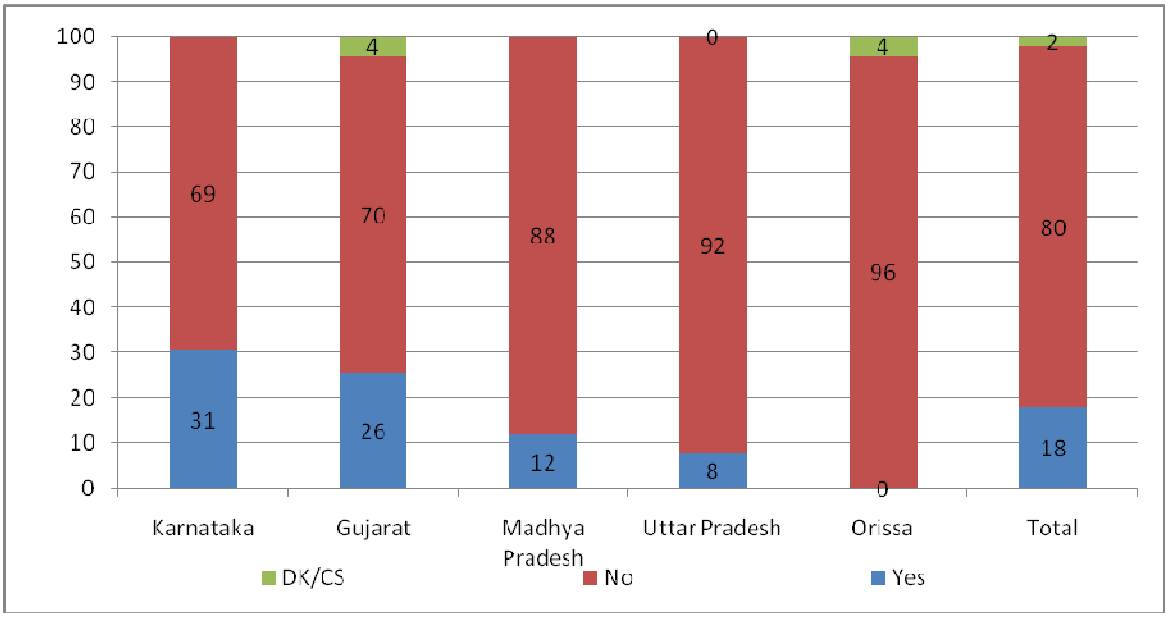
Figure 5.8: Year in which training was given to the grass root workers



The figure indicates that most of the training to the grass root workers were provided in the year 2009 and 2010 (nearly 74% grass root workers). In year 2008 and 2011 around 8% workers from each year were given the training on water quality issues especially water quality testing of water.

5.5.2 Water Testing Kits Provided to the Grass Root Workers

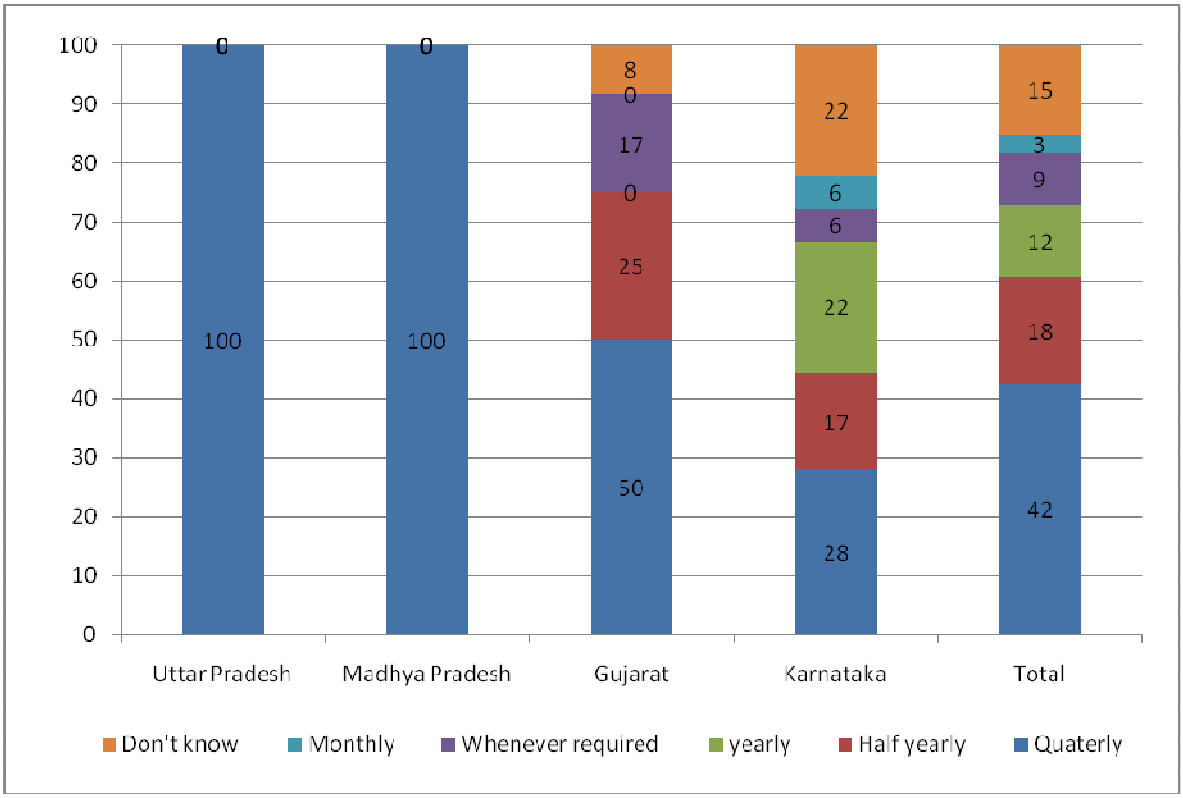
Figure 5.9: Status of testing kits provided to the grass root workers (in percentage)



Another interesting revelation which may have a repercussion on the Jalmani programme was regarding the testing kits made available to the grassroots workers. The figure reveals that in total about 18% grass root workers were only given the water testing kits. In Karnataka nearly 31% grass root workers were provided with testing kits, followed by Gujarat (26%), Madhya Pradesh (12%) and Uttar Pradesh (8%). In Orissa none of the workers were given water testing kits yet as training will start soon.

5.5.3 Frequency of Consumables Replacement

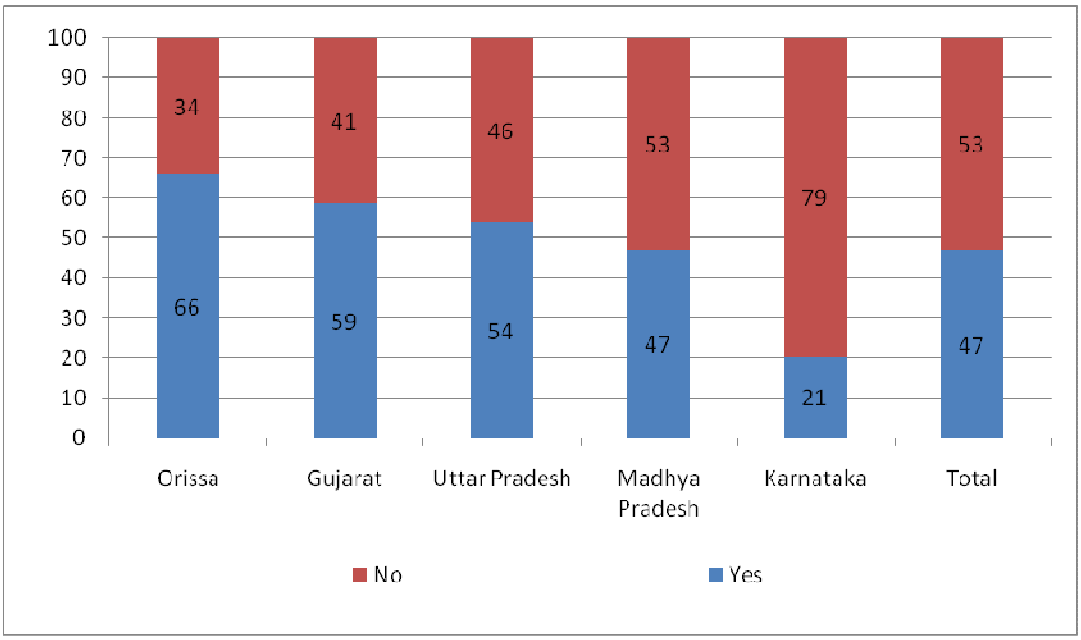
Figure 5.10: Frequency of consumables replacement in the testing kits



Amongst those grassroots workers who acknowledged having received the testing kit, the practice with regards to replacement of consumables was quite varied in terms of frequency. In nearly 42% cases grass root workers reported that the quarterly replacement of the consumables of the testing kits are being done, followed by half yearly replacement in 18% cases. Around 9% workers stated that consumables are being replaced as per the need i.e. whenever required. The grass root workers in Madhya Pradesh and Uttar Pradesh reported the replacement of the consumables quarterly.

5.5.4 Awareness about SAWPS Installation

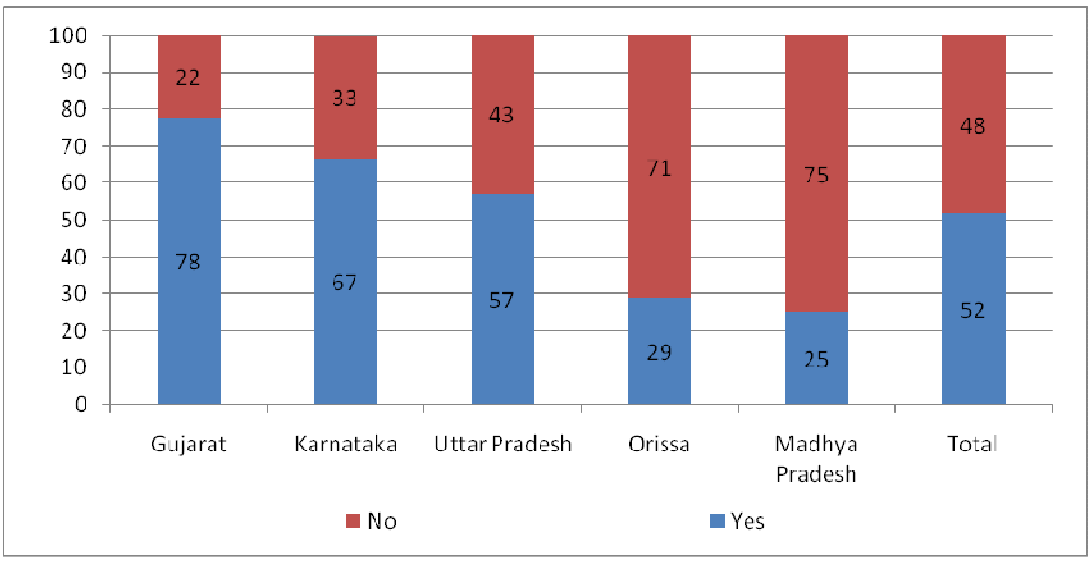
Figure 5.11: Awareness of grass root workers about SAWPS installed in schools



Out of the 181 grass root workers interviewed, almost half of them (47%) were aware about the SAWPS facility provided in the schools of their Panchayat. Orissa had the highest percentage (66%) and Karnataka lowest percentage (21%) of grass root workers who were aware of the provision of SAWPS facility in the schools of Panchayat. The sample also included all the grass root workers who are intended to get trainings under NRDWQM&SP.

5.5.5 Awareness about Water Quality Issues

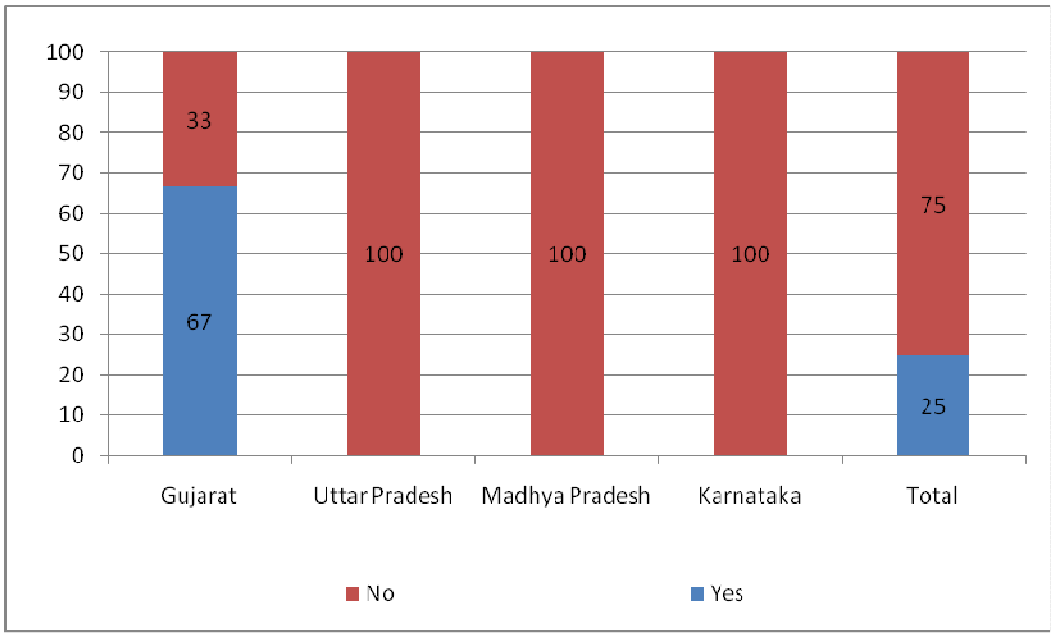
Figure 5.12: Awareness of grass root workers about water quality issues in SAWPS schools (in percentage)



Out of the grass root workers who were aware about the SAWPS facility being provided in schools of their Panchayat, almost half of them (48.2%) were unaware of the water quality problems in the main water source of the school.

5.5.6 Water Testing in SAWPS Schools by Grass Root Workers

Figure 5.13: Grass root workers reported water testing in schools (in percentage)



On asking about the water testing in the sample schools, it was revealed that only 25% of grass root workers conduct the water testing in these SAWPS schools. Out of 12 grass root workers (teachers) in Gujarat 8 have been conducting water tests in schools (68%).

5.6 WATER QUALITY TESTING - AN ANALYSIS

As per the ToR, raw and treated water was tested to assess the potability of drinking water available for school.

Sampling

Raw water samples were collected from each schools and treated water from the schools where SAWPS were functional in all the 20 sample districts of six states. The sampling was done carefully from the taps of the source and treated water to avoid any contamination.

Testing kit

With mutual discussions, JAL TARA water testing kits were used for testing the sample water. JAL TARA is a portable, compact and easy to operate accredited water testing kit. The kit was used to perform basic tests to check water quality. Standards prescribed norms by the **Bureau of Indian standards** were followed for all the tests.

Parameters

As per the decision taken in the meeting held between DDWS, UNICEF and CMS dated December 21, 2010 three major parameters i.e. Iron, Turbidity and Faecal Coliform were tested.

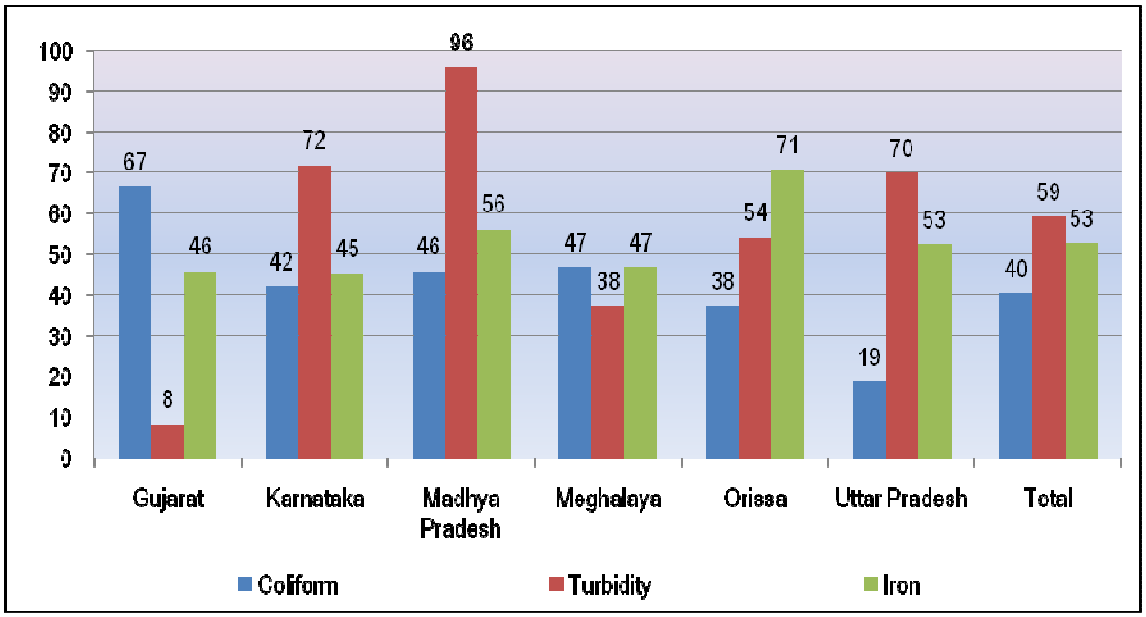
5.6.1 Contaminations in the Drinking Water and Its Health Hazards

PARAMETER	EFFECTS
Faecal Contamination	
Water gets contaminated with pathogenic microorganisms through intestinal discharges of man and animals. Furthermore, in the intestinal tract of man and animals, there exists a characteristic group of organism's designated as coliforms. The coliform group of bacteria includes aerobic and facultative anaerobic, gram negative, non spore forming bacilli which ferment lactose with acid and produce gas within 48 hours at, 35°C. The most common species of this group are various strains of Escherichia coli and Aerobacter aerogenes. **Sources:** Human and Animal wastes (faeces, sewage, etc) **Permissible limits:** 0 mg/l (absent)	Water-borne diseases such as typhoid, diarrhea and dysentery are more common. Among the diseases associated with poor microbial water quality, those causing dehydrating diarrhea are of critical importance as they could lead to death within 48 hours after the initial symptoms. Examples of faecal waterborne diseases are gastroenteritis, typhoid and paratyphoid fevers, salmonellosis, cholera, meningitis, hepatitis, encephalitis, amoebic meningoencephalitis, cryptosporidiosis, giardiasis, dysentery, and amoebic dysentery. Water faecal pollution is also responsible for a number of skin, eye, and ear infections.
Turbidity	
Turbidity is a measure of water clarity (cloudiness). Suspended solids in water can raise water temperature. Suspended solids often present in water are mud, clay, algae, bacteria and minerals such as silica, calcium carbonate and ochre (iron oxide). Suspended solids can be increased by the discharge of wastes (domestic sewage, industrial and agricultural effluents) and leaching of wastes (from mines). **Source:** Turbidity is the result of fine solids in water. These solids can be in the form of silt, clay, sand, industrial wastes, sewage, organic matter, phytoplankton and other microscopic organism **Permissible limits:** <10 NTU (Nephelometric Turbidity Units)	The main impact is merely aesthetic: nobody likes the look of dirty water. But also, it is essential to eliminate the turbidity of water in order to effectively disinfect it for drinking purposes. Turbidity makes water unfit for domestic purposes. A reduction in turbidity is associated with a reduction in suspended matter and microbial growth. It is used to indicate water quality and filtration effectiveness (e.g., whether disease-causing organisms are present). Higher turbidity levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites and some bacteria. These organisms can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

Iron	
Iron Iron is an essential trace element required by both plants and animals. It is a vital oxygen transport mechanism in the blood of all vertebrates and in some invertebrate animals. Iron is more soluble in acidic pH levels; therefore, large quantities of iron are leached out from the soils by acidic waters. Reduced iron is generally more soluble than oxidized iron. In ground water most of the iron remains in ferrous state due to generally lack of oxygen. Iron overload: It is possible for one to get too much iron through one's diet, but ingesting too much iron through drinking water is not associated with adverse health effects. However, while chronically consuming large amounts of iron can lead to a condition known as iron overload; this condition is usually the result of a gene mutation. Untreated, iron overload can lead to hemochromatosis, a severe disease that can damage the body's organs. Early symptoms include fatigue, weight loss, and joint pain, but if hemochromatosis is not treated, it can lead to heart disease, liver problems and diabetes. **Source:** Natural sources (iron ore mines), corrosion of pipes, pumps etc. **Permissible limits:** 0.3mg/l	Iron is of little concern as a health hazard but is still considered a nuisance in excessive quantities. Iron is necessary for health. The most well-known role that iron plays in human nutrition is in the formation of the protein hemoglobin, which transports oxygen to all cells of the body. Iron is also used in cellular metabolism and is found in many of the body's enzymes. Low iron stores in the body can lead to iron deficiency, anemia and fatigue and can make people more susceptible to infections. It is possible that drinking water that is high in iron may be beneficial, as it adds small amounts of iron to the diet. The higher concentration of iron is also not suitable for processing of food. Water with higher concentrations of iron, which is used in preparation of tea and coffee, interacts with tannins to give a black inky appearance with metallic taste. Coffee may even become unpalatable at concentrations of iron more than 1.0mg/l. Potatoes also turn black on boiling in such type of water. Iron in higher concentrations may cause vomiting. Iron in excess of 0.3mg/l causes staining of clothes and utensils. The limits on iron in waters are based on aesthetic and taste consideration rather than its physiological effects. The EPA cautions that although iron in drinking water is safe to ingest, the iron sediments may contain trace impurities or harbour bacteria that can be harmful.

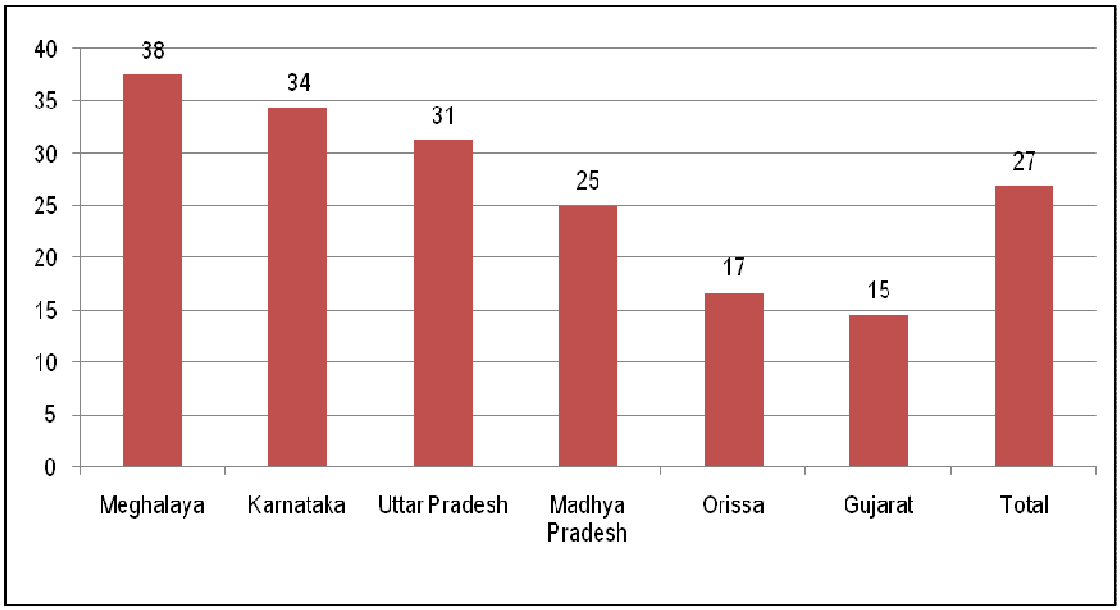
5.6.2 Raw Water Analysis of 320 Schools

Figure 5.14: Presence of faecal coliform, turbidity and iron above permissible limit in all raw water sample (in percentage)



Out of the total 320 raw samples tested for water potability, faecal coliform was present in 129 (40%) samples. In Gujarat approx. 67% and in Karnataka 42% raw water samples had traces of faecal coliform. Similarly turbidity was above permissible limit in 190 samples (59%) and iron was above permissible limit in 53% of the raw water sample.

Figure 5.15: 320 schools raw water samples without any contamination (in percentage)



Contamination was not always the leading reason for SAWPS installation and in the overall raw water sample of 320, 27% (86 samples) were found without any contamination. Nearly 38% (12 out of 20) sample in Meghalaya and 15% samples in Gujarat (7 out of 41) were without any faecal coliform, turbidity and iron presence.

5.6.3 Comparative Analysis of Raw and Treated Water

Figure 5.16: Contamination above permissible limit in 116 raw water sample (in percentage)

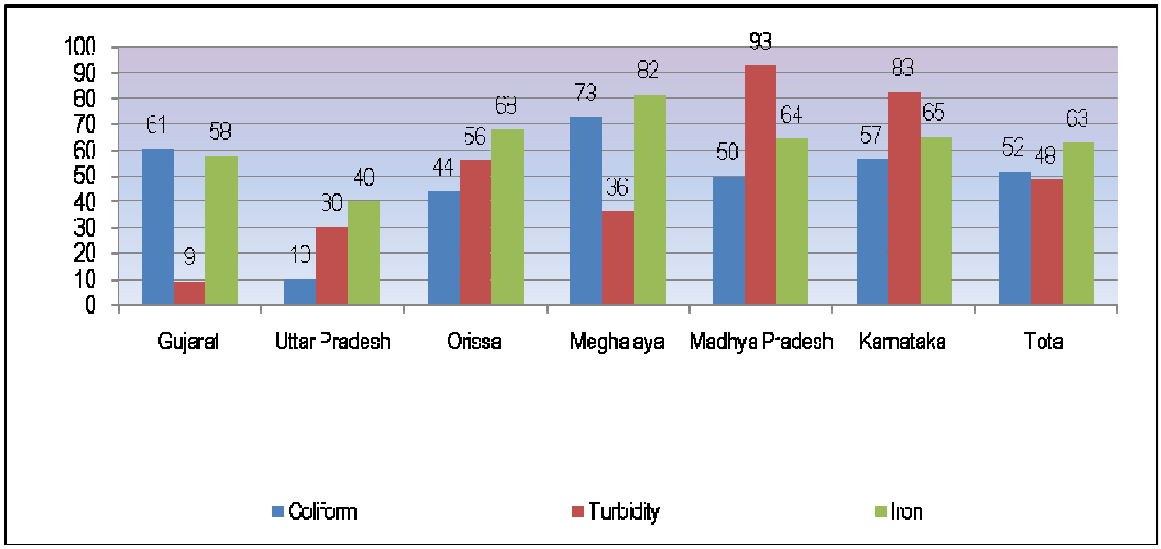
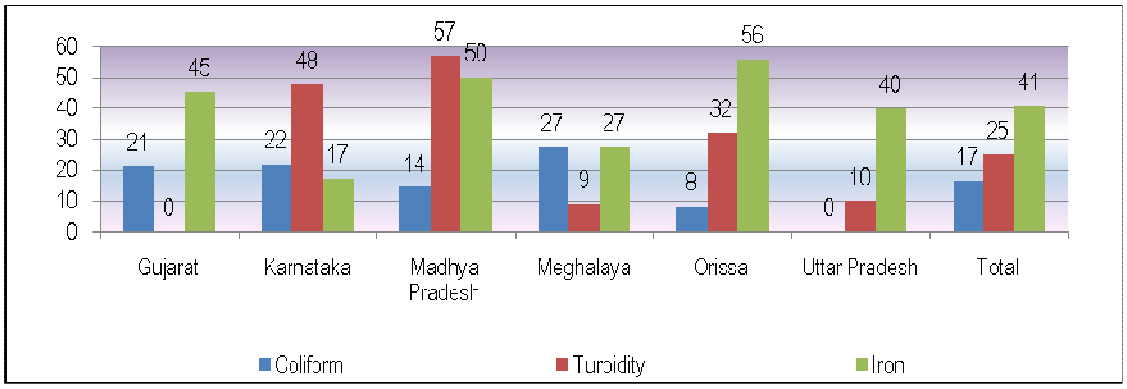


Figure 5.17: Contamination above permissible limit in 116 treated water sample (in percentage)



The comparative analysis of the water quality test of raw and treated water samples (116 schools where SAWPS were functional) concludes that the faecal coliform was present in 52% (60) raw water samples. 17% (20) SAWPS treated water samples were still contaminated with faecal coliform.

Similarly turbidity was above permissible limit in 48% raw water samples (56) whereas 25% (29) treated water samples continued having high turbidity. Around 63% (73) school's main source water had presence of iron above permissible limit and after treatment 41% (49) school's potable water had traces of iron above permission limit.

Table 5.3: Overall table about comparison between raw and treated water test results (in nos.)

State	Total sample	Raw (above permissible limit)			Treated (above permissible limit)		
		Fecal Coliform	Turbidity	Iron	Fecal Coliform	Turbidity	Iron
Gujarat	33	20	3	19	7	0	15
Karnataka	23	13	19	15	5	11	4
Meghalaya	11	8	4	9	3	1	3
Madhya Pradesh	14	7	13	9	2	8	7
Orissa	25	11	14	17	3	8	14
Uttar Pradesh	10	1	3	4	0	1	4
Total	**116**	**60**	**56**	**73**	**20**	**29**	**49**

Figure 5.18: Raw and treated 116 water sample without any contamination (in percentage)

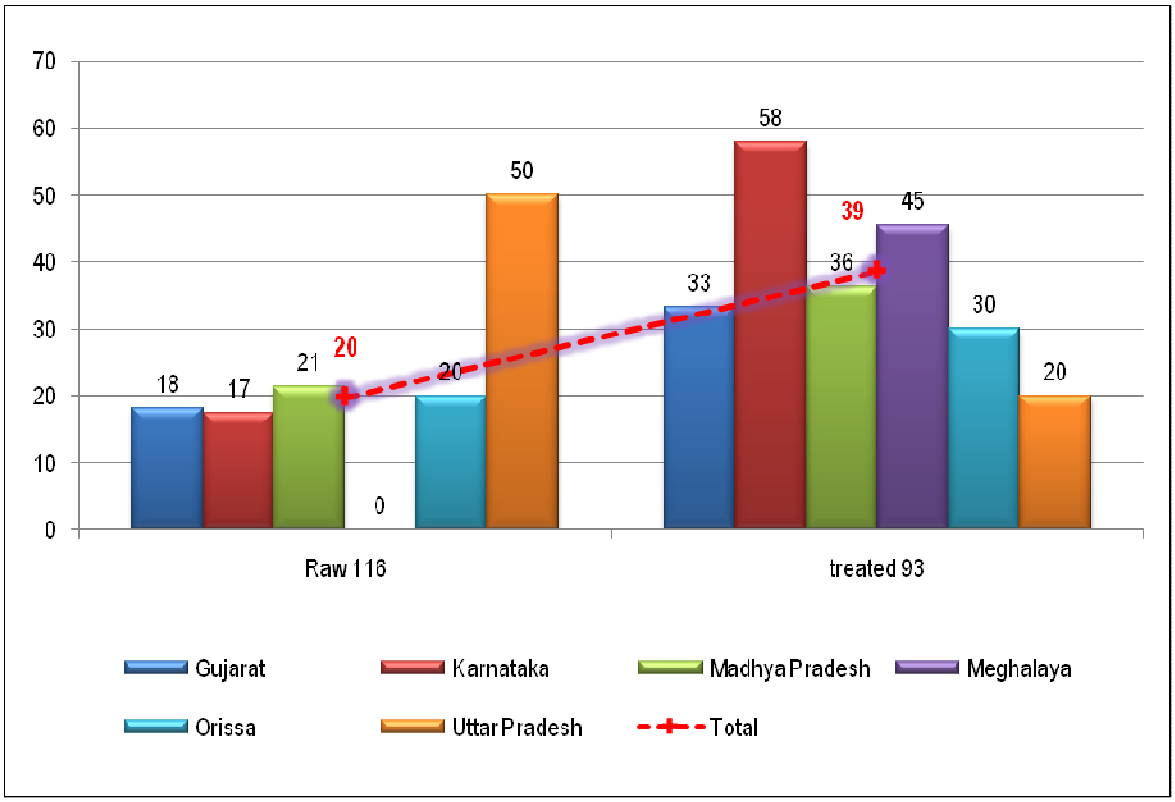


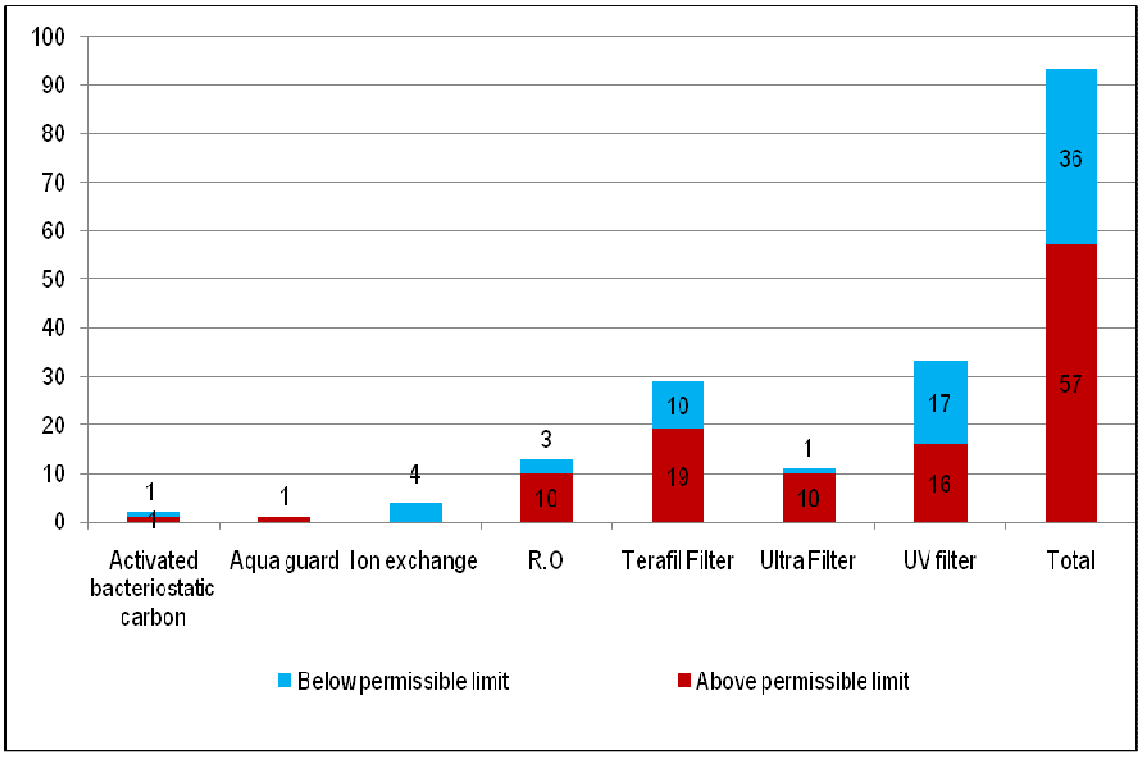
Table 5.4: Raw and treated water sample without any contamination (in nos.)

States	Raw water sample in SAWPS functional schools (116)	Raw water (116) without any contamination	Treated water sample	Treated Water without any contamination
Gujarat	33	6	27	9
Karnataka	23	4	19	11
Meghalaya	11	0	11	5
Madhya Pradesh	14	3	11	4
Orissa	25	5	20	6
Uttar Pradesh	10	5	5	1
Total	**116**	**23**	**93**	**36**

In the raw water sample of 116 schools where SAWPS were functional, 20% (23 samples) were found without any water contamination. The schools' main drinking water source in Uttar Pradesh (50%), Gujarat (18%) and Karnataka (17%) were without any contamination.

In the 93 SAWPS treated water samples where contamination in the respective raw water was found before treatment, 61% samples were still contaminated after treatment. In Uttar Pradesh, Orissa and Meghalaya approx. 60-80% water samples had some or other contamination.

Figure 5.19: Technology wise treatment status (in nos.)



The technology wise analysis of contamination in treated water sample indicates that Ion Exchange was the only technology wherein all the four treated water samples were found contamination within permissible limit. In UV filter 17 (52%) and terafil technology 10 (34%) samples had water quality parameters within permissible limit. 91% of the water samples could not be treated by Ultra filter technology and similarly 77% in RO technology.

CHAPTER 6 SUSTAINABILITY ASSESSMENT OF SAWPS

This chapter focuses on sustainability of SAWPS installed in the Jalmani scheme. Keeping ToR research questions in view, this chapter covers operation and maintenance issues and supplier's role in providing the O & M services. The school's role in daily up keeping of the systems, financial concerns and panchayat level committees' role in providing and creating support systems are also covered in this chapter.

6.1 OPERATION, MAINTENANCE AND DAILY UPKEEPING OF SAWPS

In all the sample states, schools are fully responsible for daily upkeep of SAWPS and suppliers are responsible for five years operation & maintenance (reject management, servicing/ replacement of consumables, rectification of any technical error etc) of SAWPS.

In Karnataka from second year onwards till five years suppliers are given consumables charges @ 950/- per unit for category 1, Rs 850/- for category 2 and Rs 1200/- for category 3 in addition to the filter cost for timely servicing and replacement of the filter.

As per the suppliers in Karnataka their field mechanics usually visit the SAWPS schools to check the functionality of system and there is a routine process for half yearly servicing of consumables and yearly replacement of the filter. They have also mentioned about giving the user manuals to the schools and giving demonstrations/ trainings on basics of operations. Conversely, during the field visit it was found that no one had visited the school after installation of SAWPS. The teachers had no information on user's manuals and only some schools reported getting brief information about the SAWPS by the suppliers. The School Development Monitoring Committee (SDMC) is also not been playing any role in monitoring of the SAWPS.

In Gujarat, overall maintenance of the SAWPS is handled by School Management Committee (SMC). Every school was given a pamphlet providing details about operation and maintenance, importance of SAWPS and the contact details of the supplier with toll free contact number. In case of any problem with the SAWPS' functioning the suppliers are called through the toll free helpline numbers to address the problem. Twice the training on basics and filters importance was given to the districts officials by WASMOS. In districts where NGOs are working on installation of SAWPS, orientation/ general information about water borne diseases and SAWPS significance have been given to the children and the teachers.

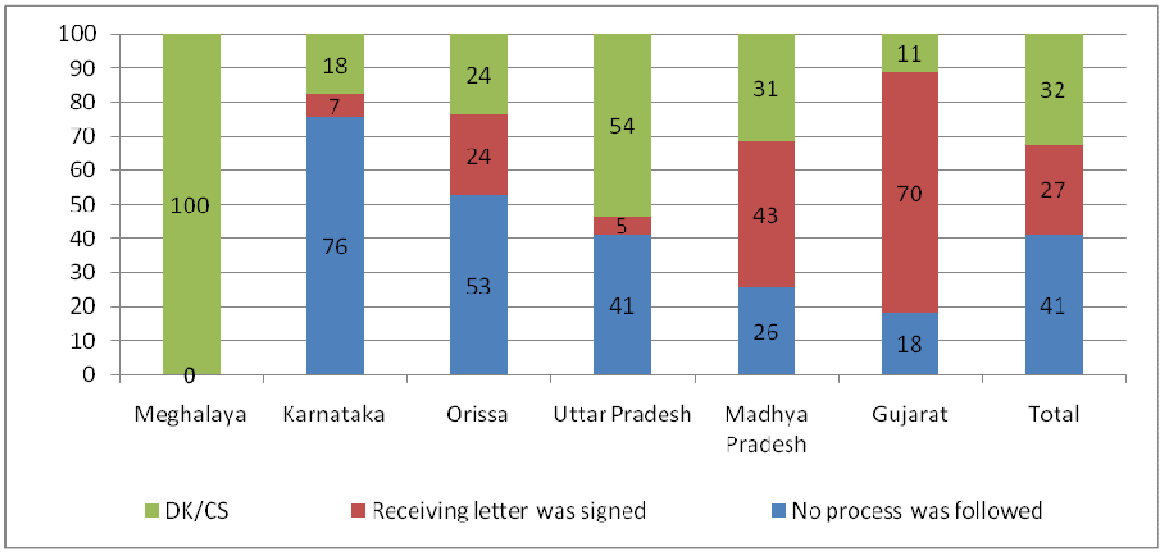
Although the replacement filter/terafil cakes depends on the level of impurities present in the water. However the terafil cakes in the terafil filter requires to be replaced at least in two years but the implementing agency in Orissa has not made any provision for replacing the same.

In terafil filter constrain is to do the tank cleaning often and either the tanks remained unclean or if cleaned only by the small school children.

6.2 SUPPLIER/ MANUFACTURER'S ROLE IN SUSTAINING SAWPS

6.2.1 Handing Over Process (Ownership)

Figure 6.1: Handing over process followed for SAWPS installation (in percentage)



Out of 229 schools where SAWPS were installed, the process for handing over SAWPS was followed in only 27% of the schools. Approx 41% schools had reported of no such process followed while 32% of the schools did not have any idea about the handing over process. Overall 73% of the schools respondents had no information on any assets (SAWPS) handing over process followed by the supplier after installing SAWPS in their school. In Meghalaya, the school teachers had no information about the handing over process. Gujarat showed the maximum percentage of schools (76%) where handing over process was followed. Given below some samples of handing over forms in use by the sample states.

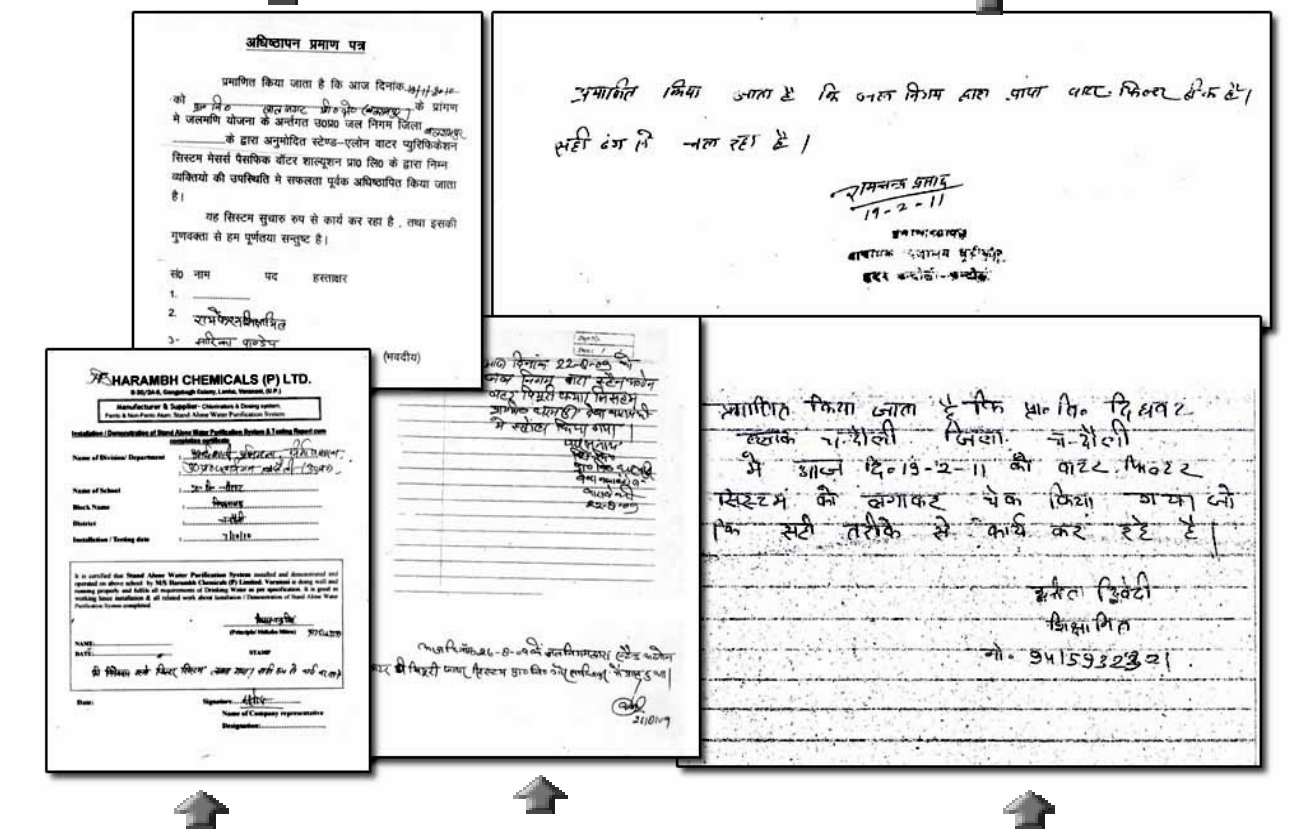
It has been observed in Gujarat that where school teachers are active, the system is in very good working condition. In some states it has been observed that the schools are taking less interest in overall upkeep and maintenance of the systems after installation. The knowledge about Jalmani scheme has also been very limited among the schools and Panchayat level functionaries. In Meghalaya, except in a part of Ri-bhoi district, the ownership of SAWPS has not been transferred yet.

SAWPS not being used due to lack of power supply			
State: Karnataka	District: Raichur	Block: Manvi	GP: Patakanadoddi
In the govt. primary school Patakanadoddi in Manvi block of Raichur, Karnataka UV technology was installed in December 2010. The SAWPS was functional as on the date of visit but was not in regular use due to irregular power supply in schools. The SAWPS was kept in store room. Principal told that he didn't receive or sign any handing over form. School Development Monitoring Committee is in place but has not been playing any role in the Jalmani programme.			

Sample of handing over forms

Balrampur, UP

Chandauli, UP

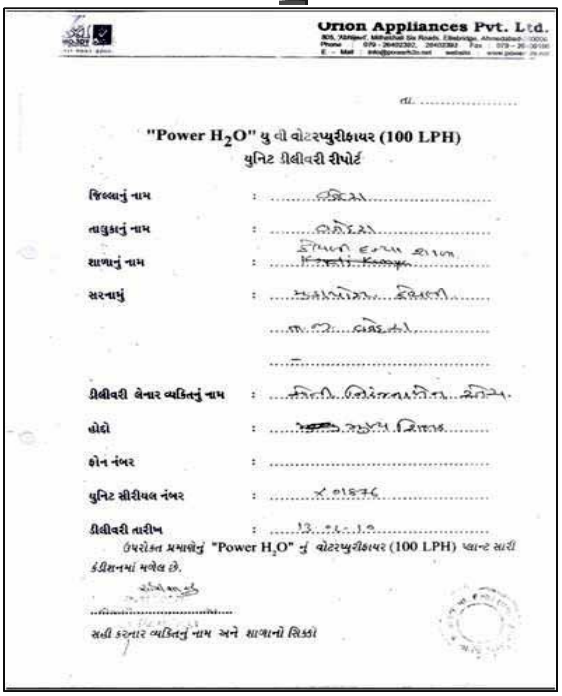


Chandauli, UP

Barabanki, UP

Chandauli, UP

Gujarat



Orion Appliances Pvt. Ltd.

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યુનિટ ડીલીવરી રીપોર્ટ

જિલ્લાનું નામ :

તાલુકાનું નામ :

શાળાનું નામ :

સરનામું :

ડીલીવરી લેનાર વ્યક્તિનું નામ :

હોદો :

ફોન નંબર :

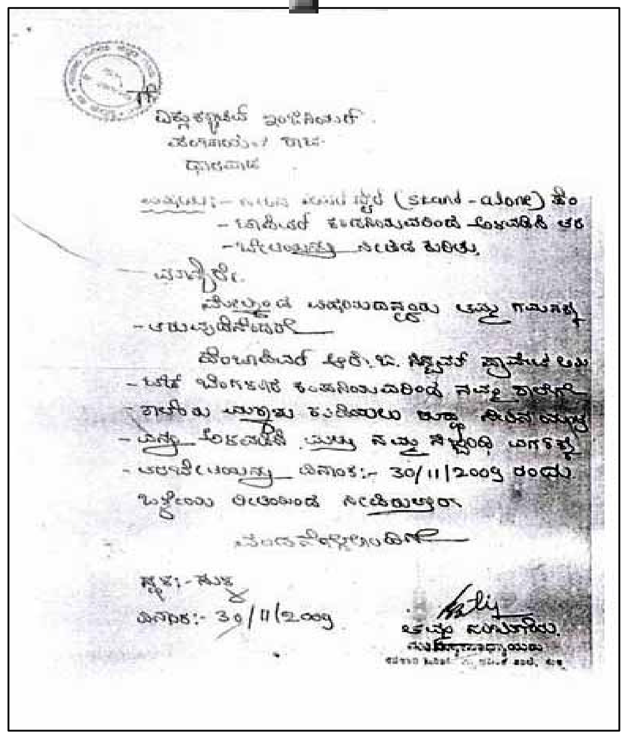
યુનિટ સીરીયલ નંબર :

ડીલીવરી તારીખ :

ઉપરોક્ત પ્રમાણેનું "Power H_2O" નું વોટરપ્યુરીફાયર (100 LPH) પ્લાન્ટ સારી કંડીશનમાં મળેલ છે.

સહી કરનાર વ્યક્તિનું નામ અને શાળાનો સિક્કો

Karnataka

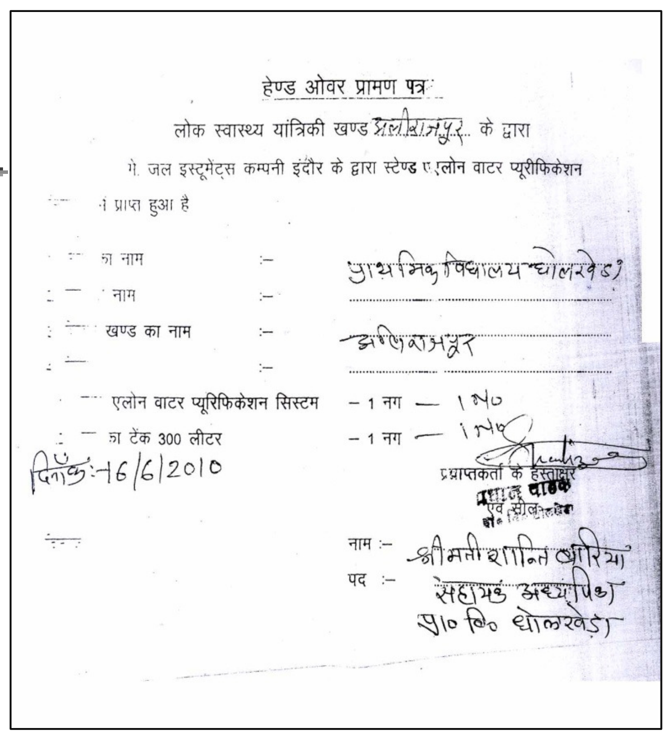


(stand-alone)

30/11/2009

30/11/2009

Madhya Pradesh



हेण्ड ओवर प्रामण पत्र

लोक स्वास्थ्य यांत्रिकी खण्ड अलीराजपुर के द्वारा

मे. जल इस्ट्रूमेंट्स कम्पनी इंदौर के द्वारा स्टेण्ड एलोन वाटर प्यूरीफिकेशन

प्राप्त हुआ है

का नाम :- प्राथमिक विद्यालय धोलखेड़ा

नाम :-

खण्ड का नाम :- अलिराजपुर

:-

एलोन वाटर प्यूरिफिकेशन सिस्टम – 1 नग

टेंक 300 लीटर – 1 नग

दिनांक:-16/6/2010

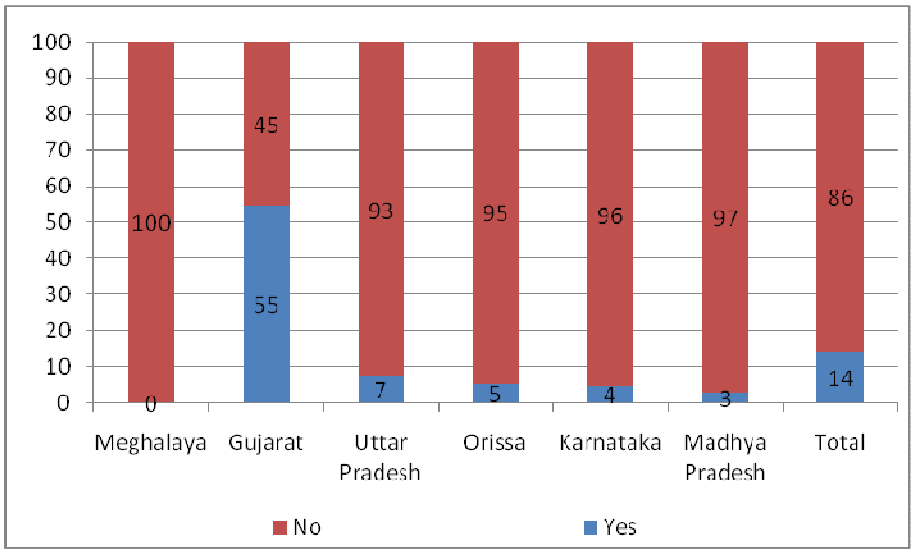
प्राप्तकर्ता के हस्ताक्षर

नाम :- श्रीमती शान्ति

पद :- सहायक अध्यापिका

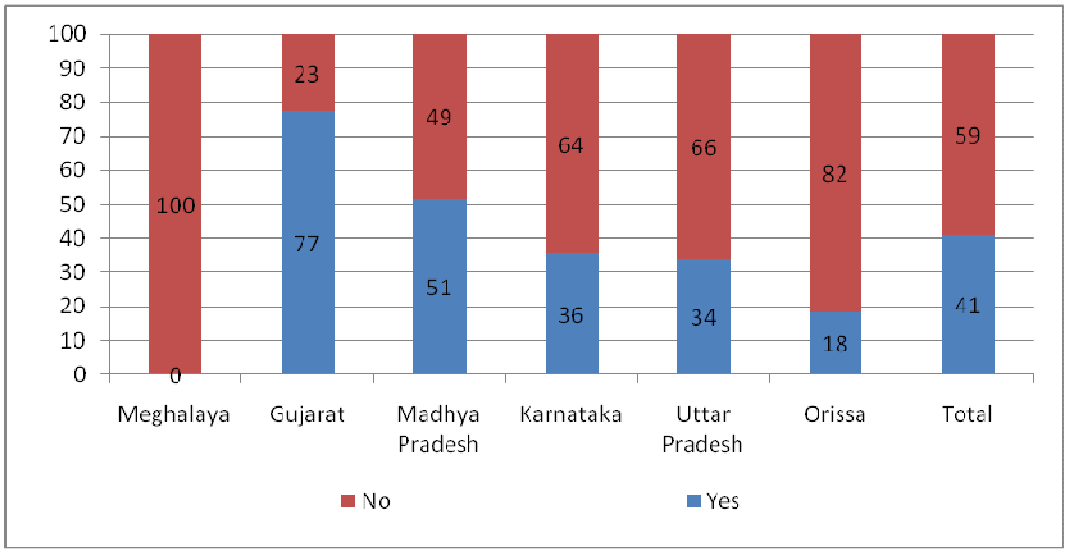
6.2.2 Schools' Awareness about Supplier' O & M Services

Figure 6.2: Schools reported awareness about suppliers' O & M service contract (in percentage)



Out of the total schools where the SAWPS have been installed, 86% of the school teacher in charge/ principal were not aware that supplier has to maintain the SAWPS for five years. In Gujarat , 55% of the schools knew about the supplier's scope of work for five years. None of the 11 schools of Meghalaya had any information about the five year operation and maintenance agreement with the supplier. It has emerged during the series of discussions with all stakeholdres that no formal process of informing the school about suppplier's five years agreement is in place.

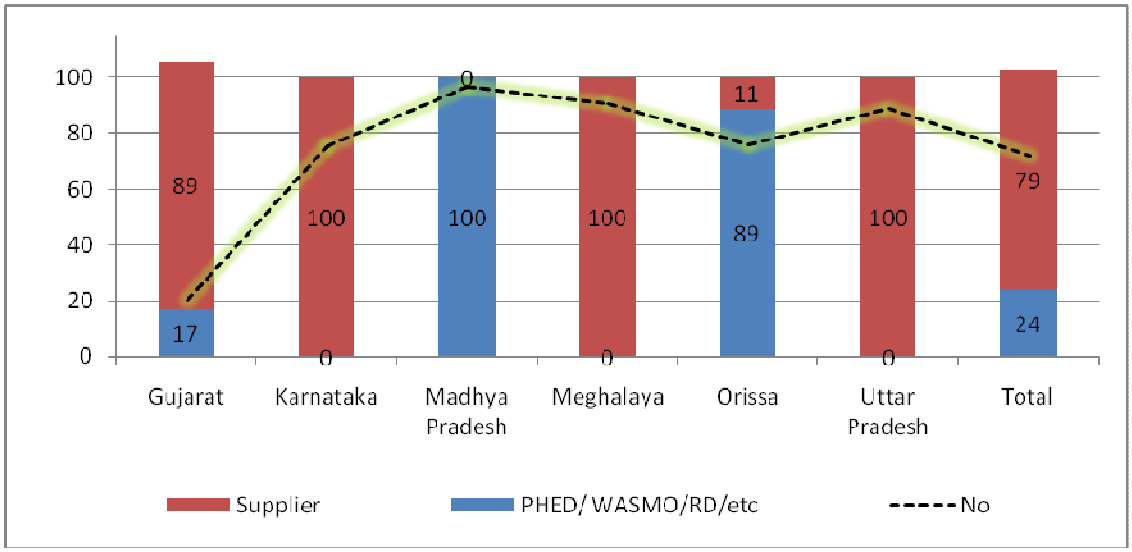
Figure 6.3: Schools briefed about routine process of operations of SAWPS (in percentage)



Out of the total sample schools where SAWPS were installed, 41% of the schools were given information about the routine process for opeartion of the system (reported by the teachers). In Gujarat 77.3% of the 44 schools were informed about the routine operational process of the SAWPS. Whereas none of the schools in Meghalaya were informed about the routine operational process.

6.2.3 Schools' Awareness about Suppliers/ Implementing Agency Details

Figure 6.4: Schools having knowledge about the contact details of the suppliers and who provided the information (in percentage)

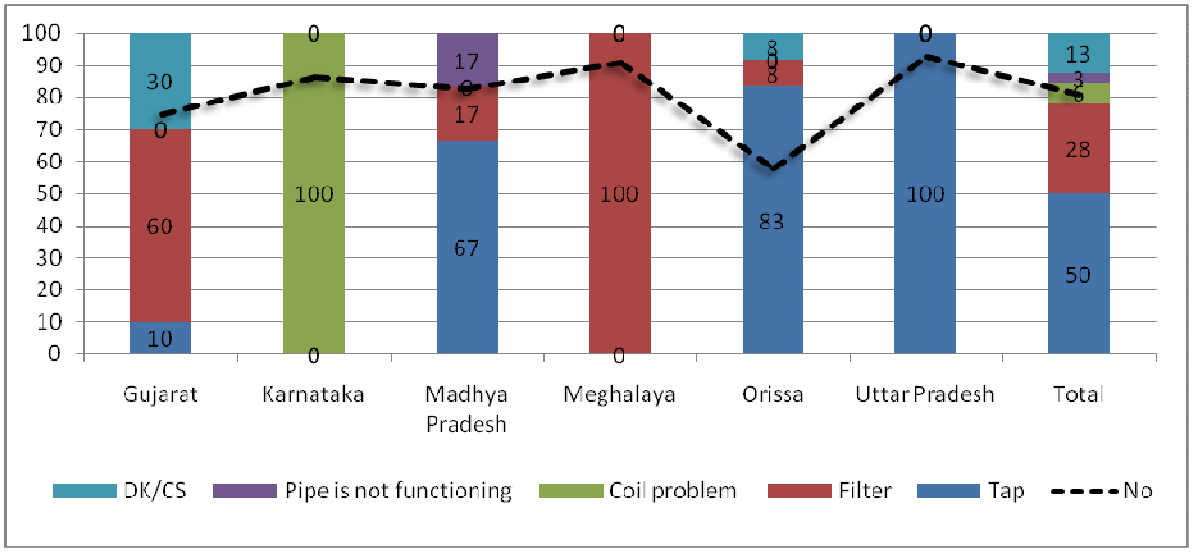


In the sample schools where SAWPS were installed, only 28% schools were reported to be aware about contact details of the suppliers. Gujarat showed the highest percentage (80%) and Meghalaya lowest (3%) where schools were aware about contact details of the suppliers (the toll free help line number given for any queries or complaints).

Out of the sample where awareness about suppliers' details was found, in 77% such cases suppliers themselves informed about their contact details. While in 23% cases the information about the suppliers was given by the implementing agency to the school.

6.2.4 Repair and Replacement

Figure 6.5: Repair/ replacement of parts of SAWPS in schools (in percentage)

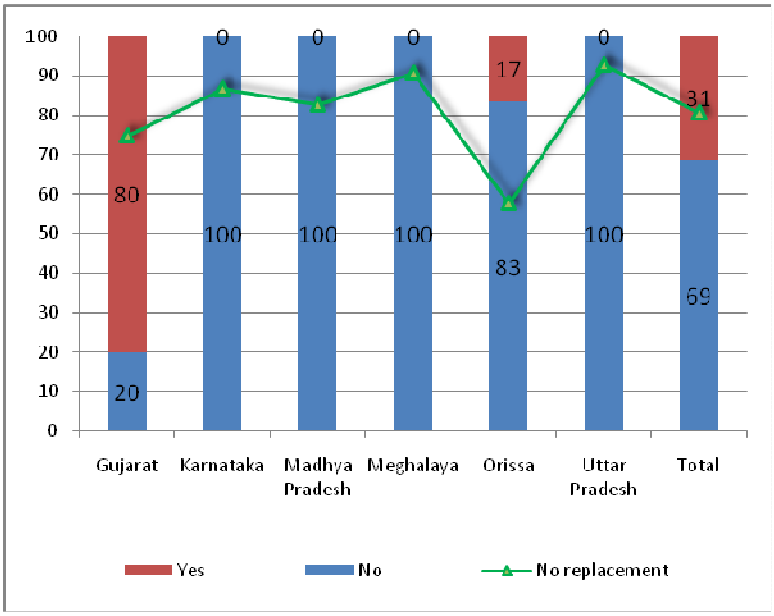


The schools where SAWPS were functional, only 14% of them needed replacement of part/ component. The maximum need for replacement of SAWPS' parts (32%) was reported in Orissa, followed by Gujarat (23%) and Madhya Pradesh (17%). Uttar Pradesh showed the lowest percentage (2%) for any such need of replacement of part/ component of SAWPS filters.

Out of schools where replacement/ repair was done, in 50% cases taps were required to be replaced while in 28% schools filters were changed/ repaired. Coils were replaced in 6% SAWPS while pipe in 3% cases. Nearly 13% schools had no idea about what parts of SAWPS were replaced/ repaired.

Out of the 14% schools where SAWPS' parts were required to be replaced/ repaired, in 31% cases only schools reportedly approached the suppliers. The key reason was the non availability of contact details of the suppliers with school authorities. Gujarat again showed a better scenario with 75% schools having approached the suppliers in case of any repair required and Uttar Pradesh was at the bottom where none of the schools had approached the suppliers for any such need. Another reason for not availing services from the supplier is the doubt that supplier will charge for its services.

Figure 6.6: Schools approached suppliers or implementing agencies in cases of repair/replacement needed (in percentage)



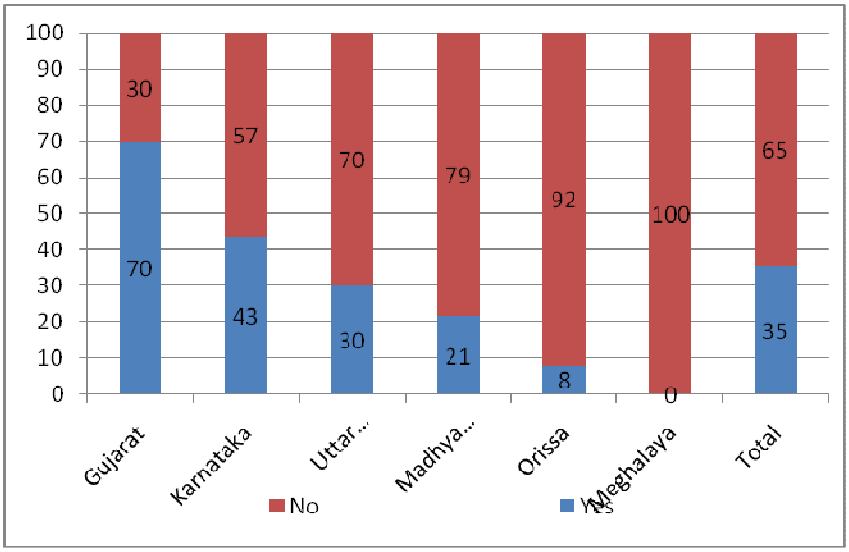


Figure 6.7: School authorities skilled enough to maintain the SAWPS (in percentage)

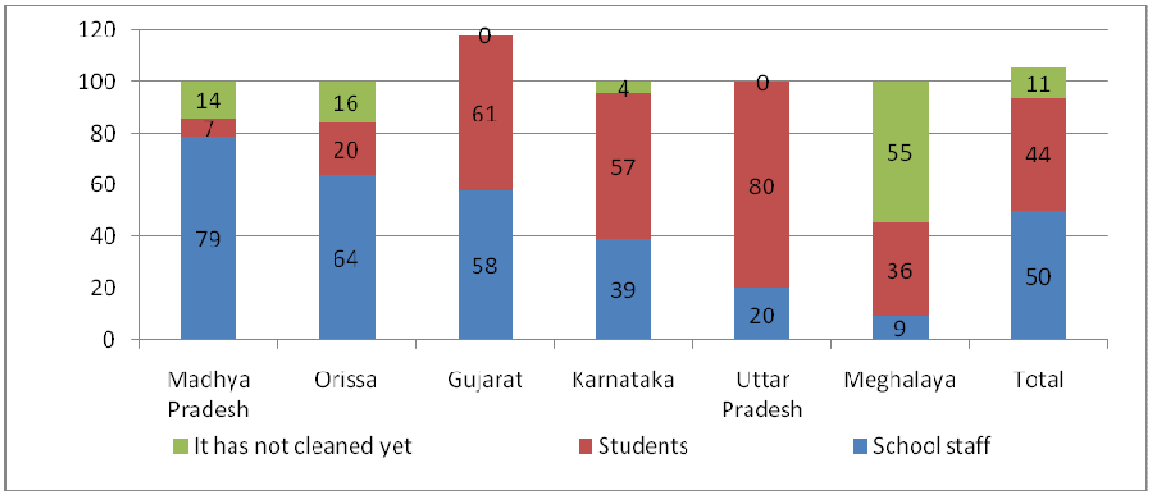
In 41 schools (35%) out of total schools where SAWPS were functional, the school authorities reported that they are skilled enough to maintain the SAWPS. Looking at the state wise data, it was interesting to note that 70% of the school authorities in Gujarat are skilled enough. Whereas in Orissa 8% school authorities affirmed they are skilled to maintain the SAWPS.

6.3 SCHOOLS ROLE IN SUSTAINING SAWPS

6.3.1 Daily Upkeeping

Overall across the sample states, schools have been responsible for daily upkeeping of the SAWPS. In 88% schools, it was known to them that it is overall school's responsibility for daily operation of the SAWPS.

Figure 6.8: Who cleans the water storage tank/filter in schools (in percentage)

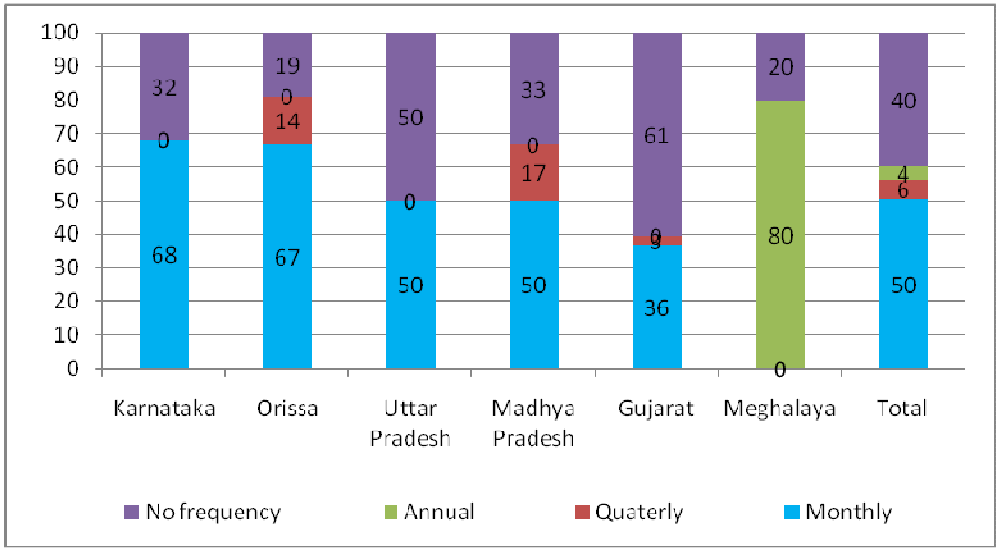


As reported in nearly 42% of the total schools where SAWPS were functional, students have been given the responsibility of cleaning the water storage tank. It was reported by the principal/ teacher in-charge that in around 48% of the schools, teachers clean the water storage tank. Almost 10% of the schools haven't cleaned the water storage tank since installed. In Orissa, in most of the schools tanks were not yet cleaned after installation and school authorities were not aware of the tank cleaning process. Cleaning of the tank has been the major O & M issue faced by the school authorities.

Although it was reported by the schools, that teachers (48%) clean the filter/ storage tank, however based on the FGDs with children and observations that followed during the field work , it can be concluded that in majority of the schools, children are responsible for cleaning the water storage tank and wherever required they pump the water in the filter which takes at least 25-30 minutes in a day.

Role of children			
State: Uttar Pradesh	District: Ghaziabad	Block: Dhaulana	GP: Narayanpur Baska
Primary School of Milak Madhaiya is an example of involvement of the school children in daily up keeping of the SAWPS. Total enrolled student in this school are 52 with equal number of boys and girls. Under the Jalmani scheme filter were supplied in July 2010 and installed in September 2010. The main water source of the school is hand pump. The major quality problem in raw water of school was Iron and Turbidity. For removing these impurities, Ultra filtration technology based SAWPS was installed. In this technology water pumping is a problem because it is not directly attached with the hand pump, which has been the case of all SAWPS installed in Ghaziabad. Pumping water in the filter is the responsibility of the students. School authority has made a group of four students for water pumping in the system on daily basis. Pumping (nearly half hour) water once in a day is sufficient for the entire day for school with such strength. School management committee through children has taken the responsibility for overall monitoring and cleaning of system.			

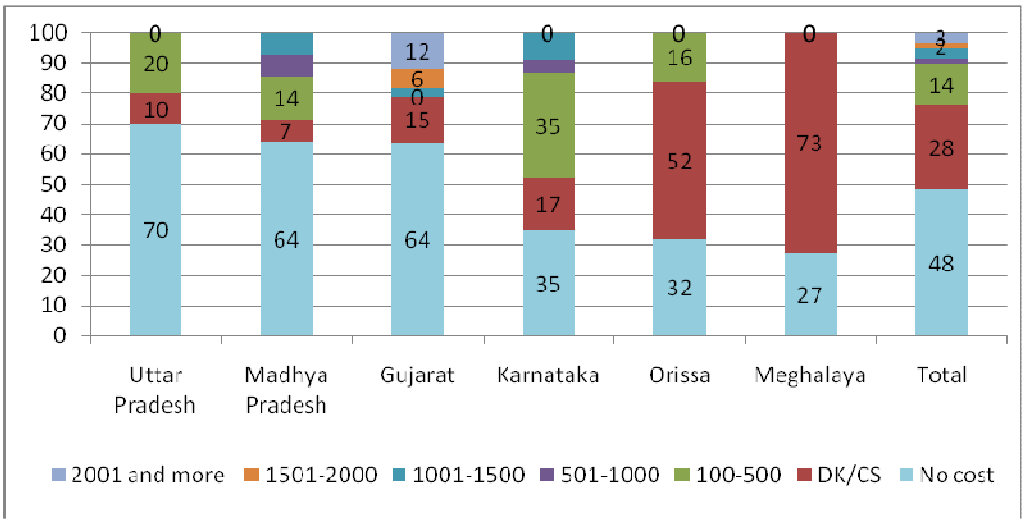
Figure 6.9: Frequency for cleaning the tank/ filter (in percentage)



In the schools where SAWPS are functional, the water storage tank is being cleaned monthly in approx 49% of the sample schools. Nearly 42% schools stated that there is no set frequency for cleaning the tank and is being cleaned usually whenever required. Quarterly cleaning was reported in approx 6% of schools while in 4% schools annual cleaning was reported by the schools authority.

6.3.2 Running Cost of the Filter/ SAWPS

Figure 6.10: Schools reported annual running cost for routine maintenance of filter (in percentage)



As most of the SAWPS were installed during the year 2010 and have not yet completed one year, hence annual running cost were neither calculated as yet nor even incurred by the schools. In the overall sample schools where SAWPS were functional, approx 48% of them have not incurred any running cost for the maintenance of SAWPS. Nearly 14% schools reported annual running cost of the filter in ranges of Rs 100 to Rs 500. The annual running cost of above Rs 500/- was very negligible in overall sample. Approx 28% schools had no idea about the annual running cost of the routine maintenance of the SAWPS.

Out of the 28 schools where the annual cost was reported, in 85% such schools there was provision in the school budget to meet the running cost of the filter. It was reported that in some cases token fees was collected from the students to meet the cost.

6.4 EXISTENCES OF PANCHAYAT LEVEL COMMITTEES

The involvement of the panchayat level committees was not found in any of the sample states except for Gujarat. In Orissa, Village Education Committees (VECs) exist but they have no role in the Jalmani scheme. The district officials are planning to involve VECs in the Jalmani programme once the scheme is scaled up. It was felt by some of the officials that involvement of panchayat and too many committees in Jalmani scheme will not be of much help and would not lead to smooth implementation of the scheme due to multiplicity of the stakeholders.

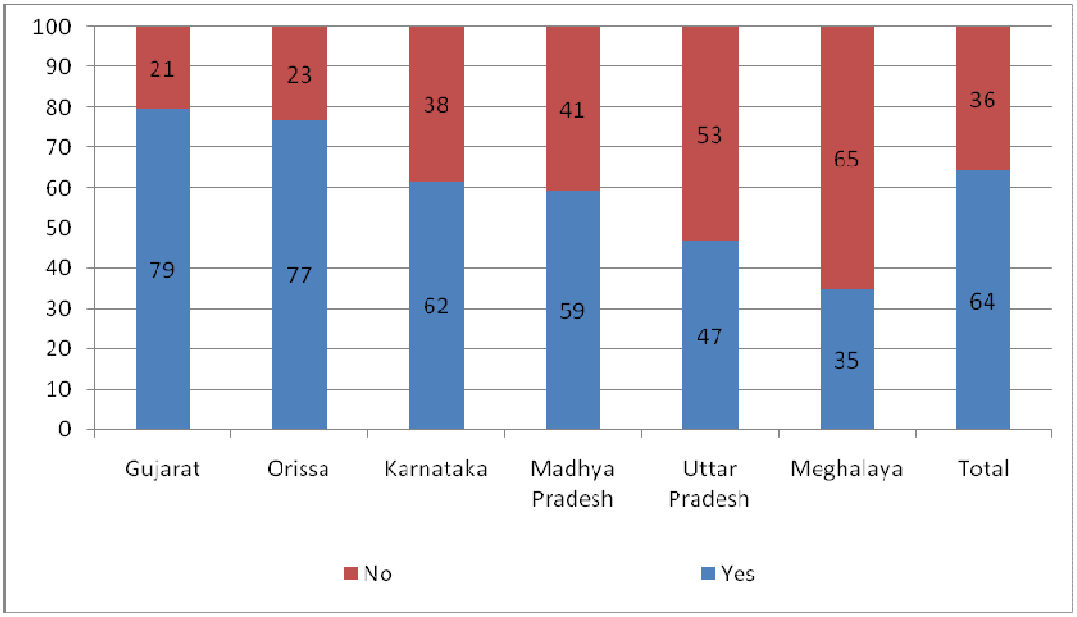
In Karnataka, School Development and Monitoring Committee (SDMC), is responsible for overall developmental activities of the school. But it was observed in the most of the cases that neither the committee has been playing any role in Jalmani scheme nor they are aware about it. Village Water and Sanitation Committee (VWSC) also exist in some of the GPs but some VWSC are not functioning well and the active ones have no role in Jalmani. Parents Teachers Associations (PTA) exist in all the schools visited but they have also not been playing any role in the Jalmani scheme. Though as per the official reporting the committee is responsible for post installation monitoring of SAWPS in schools.

In Gujarat, committees like VWSC, Pani Samiti, village education committee (VEC), School Management Committee (SMC), Parent Teachers Associations (PTA) existed in villages. Mainly Pani Samiti and VEC are looking after village water supply, putting chlorine tablets in village storage tanks apart from involvement in Jalmani. The main responsibility of these committees includes preparing site for the installation of the filter, daily upkeep (by SMC) and monitoring. Cleanliness of water storage tank is being done by PTA in few schools. They also inform the suppliers in case of any problem in the filter.

In Meghalaya, all the sample schools have School Management Committee (SMC), but it has not been playing any role in the Jalmani scheme.

6.4.1 Awareness about SAWPS

Figure 6.11: SAWPS Awareness among committee member (in percentage)



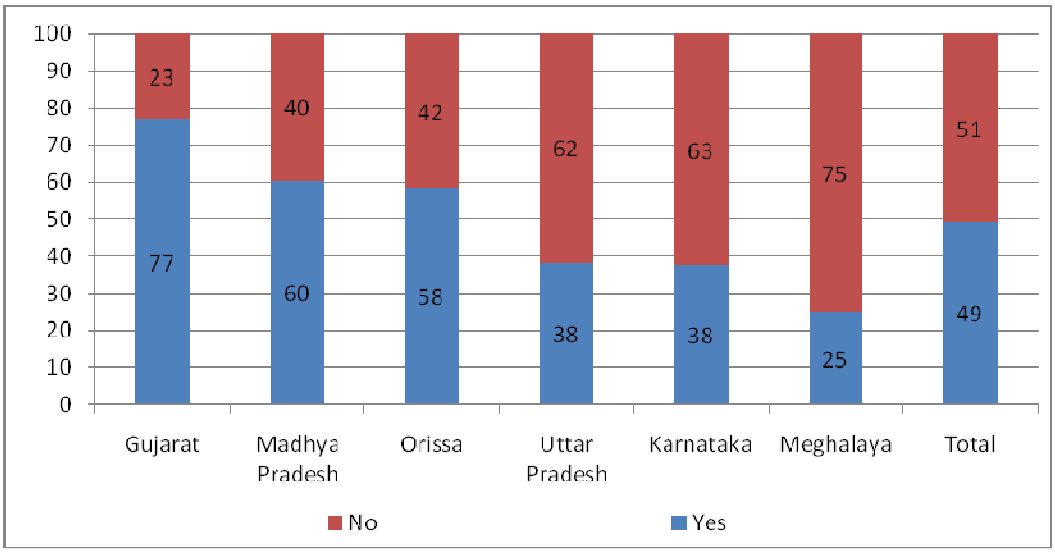
Out of the total committee members interviewed, around 64% were aware about the SAWPS provided in the schools of their panchayats. In Gujarat and Orissa nearly 80% and 77% respectively, while in Meghalaya only about 35% of the committee members were aware about the SAWPS installation.

6.5 INVOLVEMENT OF PRI IN THE JALMANI

PRI in most of the states were not involved in the Jalmani scheme. They were not even part of the selection process of schools in their panchayats. However, while installation, in some states; panchayats were informed about the scheme.

6.5.1 Awareness about SAWPS Installation

Figure 6.12: PRI members' awareness about SAWPS installation in schools (in percentage)



Out of 313 PRI members, nearly 49% of the respondents were aware about the SAWPS facility in the schools of their panchayat. While looking at the state data in Gujarat around 77% is the highest number of PRIs members who were aware of the SAWPS. On the contrary Meghalaya has the lowest number of the PRIs (head man) who were aware of the SAWPS.

CHAPTER 7 IMPLEMENTATION GAPS, RECOMMENDATION AND FUTURE OUTLOOK

The chapter 7 reflects on implementation gaps and key recommendations to strengthen the scheme. The sustainability of the Jalmani programme depend lot on the role of stakeholders. The efficiency, working and sustainability of SAWPS are based on the proactive approach of all the stakeholders. Sections 7.1 gives detail account of the implementation gaps and section 7.2 elaborates on the sustainability of the scheme.

7.1 IMPLEMENTATION GAPS

7.1.1 Huge gap between installation and usage

Huge gap (59%) was found between installation and usage of SAWPS. Out of 229 installed SAWPS only 94 were observed to be in use. The key reasons of such gap were poor performance of suppliers, ownership among schools, and lack of monitoring mechanisms.

7.1.2 Limited knowledge and awareness on significance of SAWPS among key stakeholders

In most of the schools it was found that students were not aware of the significance of the SAWPS and they were using SAWPS water as just another water source. In 94 SAWPS that were in use, water of 55% SAWPS were used only for drinking purpose and 23% used for cooking purpose apart from drinking. Approx in 15% schools SAWPS water was used for hand washing purpose other than drinking and 4% each for toilets and washing utensils. In one of the school in Angul district of Orissa, the terafil installed was said to be used for only washing utensils.

7.1.3 Selection of schools

The criteria for selection of schools varied from state to state. Contamination was not always the leading reason for SAWPS installation and in 27% sample schools raw water was found without any contamination during the testing done by the team. The study data also reveals that only in 26% schools raw water was tested before installation and in 10% schools after installation by the implementing agency. The selection of schools also depend on availability of various facilities i.e. regular water supply, power supply, overhead tank place to put system and testing of raw water in schools etc. However even these parameters were not followed very strictly and some of the SAWPS were not installed due to incomplete sites at the time of visit by suppliers. Schools strength was not taken into consideration in any the sample states (except for Gujarat) and filters with similar capacity were installed in all the schools.

7.1.4 SAWPS technology inefficiency major concern

SAWPS installed were not enough efficient in eliminating water contamination and still after treatment faecal coliform, turbidity and iron were found above permissible limit in 17%, 25% and 41% schools respectively. In overall 39% treated water samples were found without any contamination.

7.1.5 Lack of communication

Lack of communication between different stakeholders was observed more or less in all the sample states especially at schools and panchayats level. The schools were not clearly aware about their roles & responsibilities in daily upkeep and maintenance of SAWPS and what roles have to play by suppliers in this regards. Only very few schools were having communication that suppliers have to maintain the SAWPS for five years (14%) without any

financial obligation to the schools. In Orissa and Meghalaya where suppliers were not engaged, schools were not even briefed about the process of basic routine operation of SAWPS. Most of the panchayat level functionaries (pradhan/saprpanch, committees, etc) were not involved in the process of selection of schools, installation and maintenance of SAWPS. Nearly 50% of them were aware of SAWPS installed in their panchayat's schools.

7.1.6 Suppliers' performance

Performance of suppliers is the major concern in all the sample states. At present no system exists to monitor the performance of the suppliers at any stage of installation in the sample states except to some extent in Gujarat. It was observed and even the water testing report of raw and treated water also reveals that in many cases filters installed by suppliers are not efficient in removing water contamination. In Orissa, terafil SAWPS installed in few schools found without cakes. Incomplete installation, dumped at the school premises, improper connections were some of the facts reflecting on the inefficient performance of the supplier. In Ghaziabad supplier has not come back even once after installation for any operation and maintenance and such has been the case in other districts too.

7.1.7 Jalmani guidelines not followed

- **Village Panchayat** in most of the cases were not assigned/have not taken the responsibility to ensure that drinking water available in schools meets the minimum prescribed standards in terms of quality, potability and quantity.
- **Gram Panchayats/Committees/PTAs** were not engaged in Jalmani scheme in any of the sample states except for involvement of Pani Samiti in Gujarat. No Jalmani specific committee was formed in the sample states.
- **BCC Activities:** No capacity building, awareness generation or publicity activities were undertaken under Jalmani programme in the sample states.
- **Certification of the technology:** After installation neither the supplier nor the implementing agency got the installed filter and treated water quality certified by NABL accredited laboratories.

7.2 RECOMMENDATIONS AND FUTURE OUTLOOK

7.2.1 Recommendations for DDWS

- **Revising Jalmani guidelines:** DDWS shall revise the Jalmani guideline based on the CMS study findings and the proposed recommendations. The guidelines shall also elaborate on:
  - School selection process
  - School orientation process
  - Handing over of SAWPS
  - Post installation monitoring
  - Pre and post installation water testing
- From the Jalmani Corpus, DDWS should utilise certain percentage of the total funding for awareness and education on water quality in general and SAWPS in particular.
- From the Jalmani Corpus, DDWS should keep aside 5% of the total funding for awarding suppliers for excellence in O&M services.
- Build and develop a robust and dynamic Jalmani Web Portal. It shall also be used as vehicle to disseminate information about the achievements at various levels in Jalmani Programme. The portal may

also have case studies and other relevant information. Suppliers and schools shall also be encouraged to visit the portal to access the case studies and best practices.

7.2.2 Implementing agency at state and district level

The implementing agency is the most important link in the entire Jalmani programme. The success of the programme thus depends to a great extent on how this agency delivers its responsibilities. Based on the findings of CMS study, we are recommending the following for implementing agency.

The implementing agency, under the leadership of its senior most officials shall play the role of sheet anchor for successful implementation of the Jalmani Programme. It should clearly have a structure and system in place with clear division of roles and responsibilities of various other stakeholders in this initiative.

Dedicated resource: The implementing agency should make provision for dedicated resource for coordination of Jalmani Programme.
Quarterly monitoring: After installation it is proposed the implementing agency conduct quarterly assessment of the status of SAWPS.

7.2.3 Role of Education Department

- **Communication to the schools:** The schools must be given a letter from education department clearly mentioning about the scheme, scope of work of supplier, implementing agency, panchayat and role of the schools/ SMCs (in daily upkeep of SAWPS, testing of raw and treated water by teachers, and fully owning of school over SAWPS). Road map shall be laid down specifying key dates of supply and installation along with proposed dates for orientation.
- Providing school list and detail information on capacity and infrastructure
- Awareness generation activities about SAWPS and significance of SAWPS

7.2.4 Convergence of the Jalmani scheme

The Jalmani programme may be converged with schemes like SSA, ICDS, SHHE. The education department shall consider mainstreaming Jalmani programme in their existing schemes. Close coordination shall be considered with education department in the state and districts for selection of schools and post installation ownership of SAWPS. The proposed convergence of Jalmani scheme with education department will facilitate:

- Collating information on schools with/ without water source, electricity, water test reports
- Providing funds from the existing schemes for getting site ready (water supply, electricity supply if required, overhead tank, place for keeping filter safe, pipe connections etc) which is highly required for installation of SAWPS.
- The education department can assigned the roles and responsibilities to the schools/ SMCs on ownership of the SAWPS for its daily upkeep, running cost etc. like other assets in the school.

7.2.5 Selection of schools

A system should be developed at the central (DDWS) level on process of school selection. The study reveals that school selection process was different in different states. The water testing criteria for installation of SAWPS was followed only in some schools. Taking into consideration the issues flagged in the study and keeping in view the 'Mission Statement' of the Jalmani programme – "to provide value and quality addition to the ongoing Rural

Drinking Water Supply Programme", **block wise (100% schools coverage)** installation of SAWPS shall be considered in phased manner in the district.

For example (Ghaziabad, Uttar Pradesh):

Blocks	Phase 1 - Yr 1	Phase 2 - Yr 2	Phase 3 - Yr 3	Phase 4 - Yr 4
Bhojpur	✓			
Rajapur	✓			
MuradNagar		✓		
Loni		✓		
Dhaulana			✓	
Hapur			✓	
Simbhaoli				✓
Garh Mukteshwar				✓

- **Step one:** Identification of blocks (1-2 per year) in the district with higher content of water contamination based on the water testing reports from the district laboratories
- **Step two:** All the schools under selected blocks shall be covered
- **Step three:** Collate the list from the education department including school strength, power supply; overhead tank and water source.
- **Step four:** Meeting the requirements of the supplier for installation of the SAWPS and keeping the school site ready before supply process starts in the school.
- **Step five:** Inform the school about contract arrangements with the supplier and role of school and other stakeholders.

The proposed plan will bring efficiency in the implementation of Jalmani programme:

- Providing SWAPS to every school without any bias and ambiguous selection criteria
- Easy monitoring, service providing and follow up of water testing results, O and M issues
- Panchayat level committees shall be responsible for SAWPS in all schools of their panchayats.
- Experience and problem sharing can happen among the schools management committees
- Grass root workers can comprehend the testing results of all schools and compare the efficiency of the technology in their panchayats.

7.2.6 Selection of the supplier

Database: The implementing agency shall periodically update its database of suppliers of water treatment systems with information categorised by location of the supplier, annual turnover, number of staff, communication infrastructure such as phone, fax and internet.

Selection of supplier: The state or district specific procurement norms shall be followed. If possible the suppliers shall be selected at district level.

Criteria for selection of suppliers: The study has observed that the suppliers are cutting corners while installation of SAWPS to match the financial criteria (to be LI). Besides the price offer, the implementing agency shall also

consider the technical expertise and competence of the company.

Certification: Mandatory product water quality based on the certification from the accredited laboratory for the given water input quality as already mentioned in the guidelines.

O&M contract: The implementing agency should also sign a mandatory O&M contract with the supplier that may be developed by DDWS to keep uniformity. The school authority should have direct access to the supplier and be authorised to call upon the supplier for any kind of O&M related issues. The toll free shall be provided by the supplier to the schools/ SMC at the time of installation for addressing complaints. The O&M schedule should be given to the school at the time of installation of the system.

Adequate measures should be taken to prevent unfair practices by the supplier. System shall be created to ensure that the supplier lives up to his/ her commitment as regards the installation, training and O&M

Payment schedule: Uniformly the DDWS can decide on the payment schedule of the supplier. Given below proposed schedule:

- 40% after successful installation, water testing of treated water, school orientation and signing of handing over forms of all the sanctioned schools
- 10% after second year O & M services (after endorsement by the SMCs)
- 15% after year third O & M services (after endorsement by the SMCs)
- 15% after year fourth O & M services (after endorsement by the SMCs)
- 20% after fifth year and overall satisfactory services (after endorsement by the SMCs)

7.2.7 Technology selection and installation

- **Selection of water contamination parameters:** The parameters for selection of technology shall not be restricted to iron, turbidity, faecal coliform and total coliform but other parameters shall also be added according to the water quality conditions in the state. It has been observed that apart from iron, coliform, and turbidity other contaminants (fluorides, arsenic etc) also have direct health impacts on the children. While technology is selected it may also be considered.
- **Technology should be demand driven:** The decision on SAWPS technology for the selected schools should be based on ground reality.
- **Spare parts of the filter:** While deciding on technologies options, it may also be considered that the selected technologies spare parts will be available locally or not and even after five years of installation

Selection decision: HLTC shall time to time relook at the other important parameters and update its list of technologies options. The states may also be asked prior to the HLTC meetings to send their recommendations on technologies as per the state water quality issues and implementation experiences.

DDWS or HLTC may also be required to develop uniform technical specifications of a particular technology. It shall be used by the implementing agency during tendering process for enhanced uniformity. For example specifications of cartridge filter, raw water feed pump with its capacity, auto shout arrangements.

Process for installation To avoid a mismatch between SAWPS technology proposed and relevant infrastructure

available at school, the implementing agency shall depute an officer, not less than the rank of Junior Engineer (JE) to make a field visit of the proposed schools. The implementing agency official, based on his/ her visit to the school, will propose the gaps in school readiness for installation. In remote areas of Karnataka electrically driven SAWPS were selected for installation without knowing the ground conditions of electricity supply, water supply timings in the school. Regular power supply throughout the school timing was not feasible. Hence many SAWPS were lying unused due to power cut.

In Orissa, production centre unit for terafil cakes shall be established at the district level also. Currently the only one central unit at the state capital has not able to meet the demand and it leads to delay in installation of the SAWPS. In Meghalaya, it is proposed to procure the filters directly from the manufacturers which may also reduce the cost further.

The implementing agency should provide complete contact details of the beneficiary school and its contact person to the supplier.

Identification and finalisation of site for SAWPS installation: The JE, responsible for the block, shall with the help of the school principal/ SMC, identify the spot where the SAWPS will be fitted (keeping safety and accessibility also in view) in the school premises and earmark the same for the supplier's convenience.

7.2.8 SAWPS Design

The need for modifications in the design of the SAWPS was felt based on field observations. In Uttar Pradesh many ultra filter SAWPS (portable technology) were unused and kept locked despite being functional because of the burden felt by the school authority to take the heavy machine out and keep it back every day (also led to damaging the filter). In Madhya Pradesh Ion exchange technology and in Uttar Pradesh ultra filter require lot of manual effort to fill the storage tank and in most of the cases students fill the water tank. Taking all these issues into consideration below suggested measures could be helpful;

- **Water feeding:** The complete installation of SAWPS may include the direct connection of SAWPS from water source to the water storage tank to avoid the physical exertion of school students.
- **For greater accessibility**: The SAWPS can be fitted in pantry or class room for security reasons. The water connection with 4-5 taps can be given outside in common place for better accessibility. This will also reduce the damage caused by the daily shifting of portable SAWPS.
- **Height of the taps**: The height of the filter taps shall be in accordance with the average height of the students of that particular school. It was seen that while installing the filters the height of the taps was not kept in mind in some schools and students face difficulty in direct access to water from SAWPS.
- **Drainage/ reject management**: While installing the filters, draining of the waste water should be kept in mind as in some cases it was observed that water gets accumulated around the filter which leads the place around the filter filthy and breeding ground for mosquitoes. It is recommended to build a pucca platform for the drainage of the waste water to avoid the water logging around SAWPS.
- **Terafil:** For draining the waste water after cleaning the filter cakes, a tap in appropriate location shall be provided to drain such water.
- **Theft and labour free:** The design shall consider the fact the schools may not have very high security systems and availability of labour for pumping water in the tank.
- **Plumbing and electrical work**: It may be given to one contractor in the district to maintain the evenness.

7.2.9 Third party evaluation

There is need to ascertain that suppliers shall install the filter as per the specification given in the agreement. At present it is observed that no such mechanism is in place in the sample states except for Gujarat. Supplier performances need constant monitoring by the third party. In Gujarat third party evaluation of the SAWPS is done at the production site itself. This practice may be followed in other states. Supply and installation to be done only after third party evaluation as specified below:

- The first lot of purification system shall be subjected to a thorough pre-dispatch inspection. All the other drinking water purification system shall be subjected to a random pre-dispatch inspection. The pre-dispatch inspection will be carried out by third party (accredited agencies empanelled by the implementing agency)
- During inspection the supplier should produce all the documentary evidences having procured and used new and quality components which go in the drinking purification system to be supplied under this contract. These documents including guarantees/ warrantees/ test certificate of the component manufacturer will be verified and authenticated by the inspection agencies. Such authenticated document should be part of the total document required for claiming the bill for payment as per the schedule of payment.
- The supplier shall offer total facility for pre-dispatch inspection.

7.2.10 School orientation

The suppliers may organise the orientation programme for schools at panchayat level for school representatives (school principals/teacher–in charge). The training modules may include; significance of SAWPS, checklist of items of SAWPS, demo on daily upkeep, O & M services including timelines and consumables replaceable and its cost, complaint registration process, knowledge about repair and maintenance cost, availability of spare parts, and reject management and drainages system. The panchayat, grass root workers and the committees may also be involved. At the time of orientation, the supplier should provide and also explain the following:

- User manual
- O&M schedule
- Contact details of the supplier
- Basic troubleshooting method

7.2.11 SAWPS (ASSET) handing over process and school ownership

Within the school, the School Management Committee (SMC) in-charge should be held accountable for the smooth functioning (daily upkeep and maintenance) of the SAWPS. The SAWPS handing over process shall be followed only between the implementing agency and SMC preferably. The process shall only be followed after satisfactorily running of SAWPS for a period not less than one month and complete orientation process as specified above.

The process between school and supplier may only be of receiving the SAWPS. It may be mandatory for the supplier to take receiving (in the formats provided by DDWS) from the school authority while delivering the SAWPS in school and subsequently after its installation also.

Ownership and Accountability: To discharge the daily up keeping and routine maintenance responsibility, the schools SMC shall be given a certain degree of control over the supplier by linking their payment to the feedback

from the school authority. The SMC in-charge should sign, clearly also mentioning his/her name, school telephone number or his/her personal mobile number. The implementing agency must verify the signature and also call the school principal for a confirmation.

7.2.12 Behavioral change communication

Through Interpersonal Communication, print and electronic media the Jalmani scheme shall be promoted for:

- Visibility of the Jalmani scheme
- Enhancing significance of SAWPS and potable water

The school shall organise a small function to mark the inauguration of the SAWPS by involving school children, teachers, SMC and PTA members.

7.2.13 Water quality testing

The implementing agency may either get the testing done in its laboratories or NABL accredited labs may be contracted.

Baseline test data: The baseline results need to collected by testing the raw water on the selected parameters in the schools where SAWPS to be installed. The results may be entered in the web based monitoring system.

After installation: The treated water sample after SAWPS satisfactory installation shall also be conducted on similar parameters. The test results may be compared with the baseline data for checking the efficiency of the filters. The results if within the permissible limit may be the key factor in releasing the payment to the suppliers.

Post installation regular test: At regular frequency (quarterly) testing of raw and treated water may be conducted by the school teachers. The results may shared by schools through panchayats. It may be entered by the implementing agency in the web based monitoring. The implementing agency may also conduct its spot testing to keep a tab on the efficiency of the SAWPS.

Capacity building and providing kits: The teachers and other concerned stakeholders capacities may be developed in the testing the water and reporting the results. The capacity building and skills enhancement programme shall be organised at regular interval. The framework for sharing the results shall also be developed by DDWS. The kits and consumables shall be also given for enabling the teachers and others to conduct the water testing for checking potability of raw and treated water.

7.2.14 Involvement of Panchayat/Committee

The participation of Panchayat/Panchayat level committee needs to be encouraged which is presently lacking in all the sample states except for few districts in Gujarat. Efforts need to be galvanised towards orientation and awareness about the scheme among panchayat level functionaries. The role and responsibilities of the panchayat and the panchayat level functionaries may be clearly defined and communicated by the implementing agency.

7.2.15 MIS for Jalmani Programme

Discrepancies were found in the physical and financial progress data. The data reported by the officials during the study and the data given in the MIS were different. Efforts must be taken to streamline the discrepancies. Further the MIS data shall also include:

- **Name of the schools where SAWPS were installed, technology used and suppliers' details:** Currently the habitation level data is provided in the MIS. For the study, list of schools where SAWPS were installed were not available at the states as well as even at districts level. Due to this reasons some districts has to be changed and field work schedule got delayed. The names of the schools, technology and suppliers details where SAWPS were installed shall be readily available on MIS.
- **Dates for supply and installation of SAWPS:** The data validation process shall be done by the implementing agency before updating on the MIS. The physical achievement data in MIS may only be entered after satisfactorily installation and functioning of the SAWPS in schools (not merely after sanctioning of the SAWPS to the suppliers). Timely updating MIS with validated information will be the key for information management.

7.2.16 Web based monitoring system (Web Portal)

Build and develop a robust and dynamic Jalmani Web Portal. This portal will be one single place to generate information relevant to the smooth functioning of the scheme. The portal will have separate modules for the following identified stakeholders;

- DDWS
- State Implementing Agency
- District Implementing Agency
- Supplier

Each of the above stakeholders should be given their role specific rights to enter data, generate report and download information. The portal should have section dedicated to best practices in implementation of Jalmani. The recommendations for best practices should be part of district administration module. The state implementing agency will endorse/ reject the district level recommendations. DDWS will have the right to publish it on the website.

The system may also include the water quality testing status of SAWPS schools i.e. baseline of the raw water, treated water test results post installation). This may be uploaded by the implementing agency.

For installation the supplier shall update the following information:

- District, block, panchayat, habitation, village and school name and technology used
- Total number of SAWPS allotted
- SAWPS delivered status
- Partly installed status
- Installation completed status

For O & M:

The suppliers shall update the monthly progress report, complaints and servicing details of the filters. Also update on:

- School wise type of complaints registered, complaints resolved with dates, time taken to rectify the complaint
- O and M issues addressed, key dates of previous inspections and date of next visit/ inspection

The proposed web based monitoring system will provide easy access to information and facilitate monitoring of

suppliers performance, SWAPS status and test results. It will lead to:

- Easy interface among the implementing agency, supplier and education department.
- Openness in governance
- Access to supplier, implementing agency and education department which will enhance the economic competitiveness of business to improve service and delivery and also government decision making.
- This will help to manage affairs of the state, at national as well as local level.

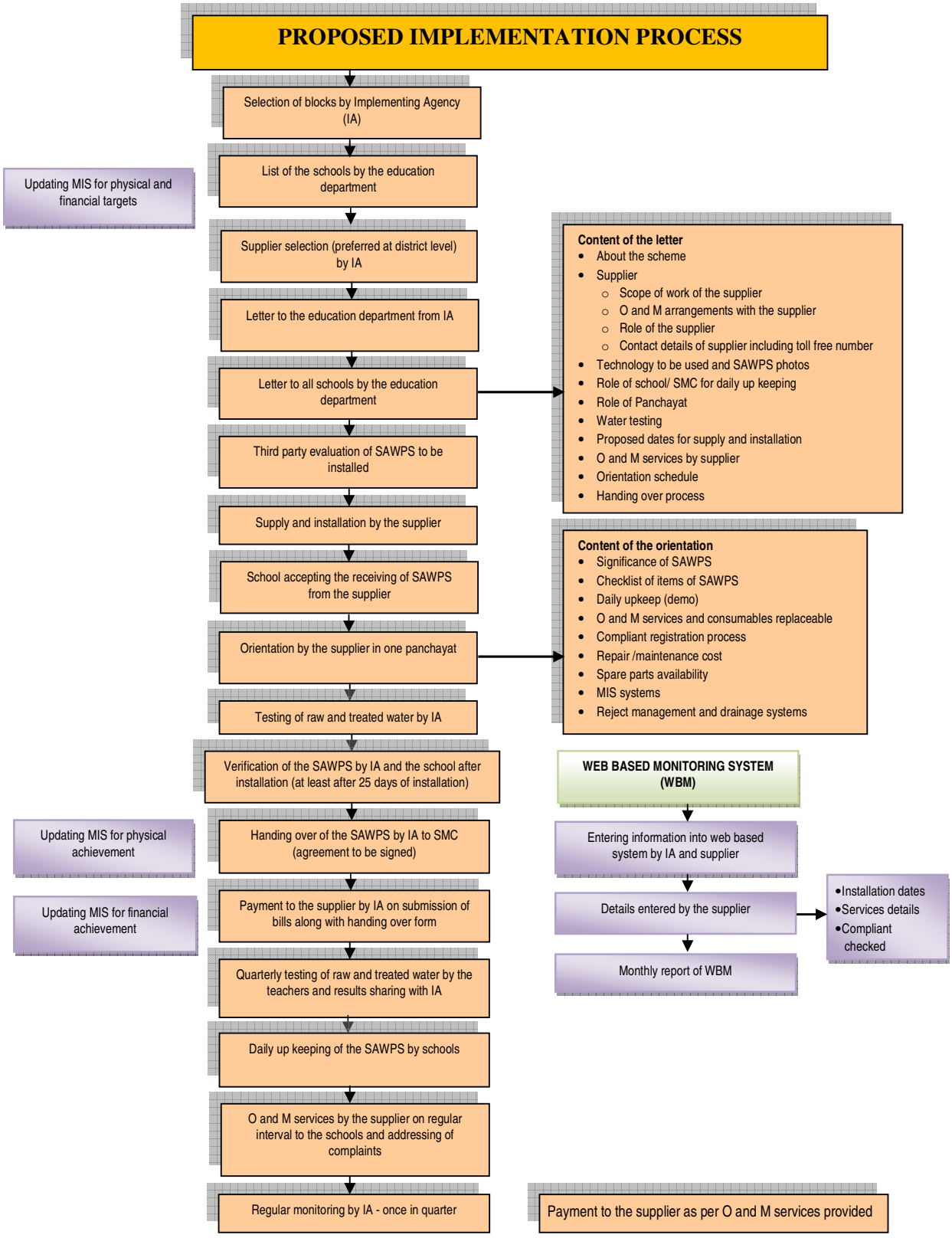
7.2.17 Proposed Timeline

DDWS should give a clear instructions with regards to the time within which each of the activities need to be completed, as stated below;

S. No	Activity	Days
1.	Developing formats and systems	Within 60 days of the launch of the project/ beginning of the financial year.
2.	Selection of Schools	Within 60 day of developing formats and systems. The list of selected schools should also be made available online in MIS.
3.	Selection of Supplier (tendering process/ re-contracting existing supplier/ empanelment)	Within 30-60 days of developing formats and systems. The list of selected suppliers should be made available online
4.	Implementation of the Project (School site preparation, pre-dispatch third party evaluation, supply of SAWPS to school, installation, orientation water testing)	Within 90 days of the finalisation of the supplier. The portal should be kept updated as the implementation progresses. The Portal should be dynamic enough to generate report with various queries.
5.	Installation Report (water testing, NABL certification by supplier and handing over of SAWPS to SMC)	Within 45 days of the implementation of the project
6.	Awards for Excellence in O&M	Annual
7.	O&M	As per the technology over a period of five years

7.2.18 In nutshell

The proposed implementation process is given below:



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