MAHARASHTRA RURAL WATER SUPPLY AND SANITATION PROJECT : HEALTH EDUCATION IMPACT ASSESSMENT STUDY

(November 1999 to February 2000)

Final Report

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Contents

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Abbreviations

ANM	Auxilliary Nurse Midwife
AWW	Anganwadi Worker
BDO	Block Development Officer
CDB	Community Development Block
DFID	Department for International Development
DHO	District Health Officer
DPPMU	District Project Planning and Monitoring Unit
ESR	Elevated Supply Reservoir
FGD	Focus Group Discussion
FMR	Foundation for Medical Research
FRCH	Foundation for Research in Community Health
GOM	Government of Maharashtra
GP	Gram Panchayat
GS	Gramsevak
IDA	International Development Agency (of World Bank)
IEC	Information, Education, Communication
MJP	Maharashtra Jeevan Pradhikaran
MO	Medical Officer
MPN	Most Probable Number
MPW	Multi-Purpose Worker
MRWSESP	Maharashtra Rural Water Supply & Environmental Sanitation Project
MRWSSP	Maharashtra Rural Water Supply & Sanitation Project
NGO	Non-Governmental Organization
OBC	Other Backward Classes
ODA	Overseas Development Administration
ORG	Operations Research Group
O&M	Operation and Maintenance
PHC	Primary Health Centre
PHD	Public Health Department
PRA	Participatory Rural Appraisal
PS	Panchayat Samiti
SC	Scheduled Caste

SIECB	State Information, Education and Communication Bureau
SS	Sample Survey
ST	Scheduled Tribe
TARU	TARU Leading Edge, NGO
TISS	Tata Institute of Social Sciences
TOR	Terms of Reference
UK	United Kingdom
VWC	Village Water Committee
WB	World Bank

List of Annexures

Executive Summary

1. ***Water will be the most scarce natural resource in coming decades.*** With increasing population, urbanisation and industrialisation, it requires an increasing effort to secure safe drinking water. The main issues relating to potable water are its storage and contamination. It is now imperative to treat and purify available water before piping it to distant places, at great expense, for final consumption. This raises a number of economic questions about water management policies.

2. Rural India, despite five decades of planned development, continues to suffer multiple problems of access. Its primary needs to potable water, health care, sanitation, elementary education, etc. are unmet. Whatever is planned and achieved today impacts the future. Conversely, what was planned but not achieved yesterday is impacting us today.

3. The problems staring at us today call for rethinking and a radical change in the concept, planning and methodology of rural development in general. Specifically, the upgradation of rural potable water supply and its environmental sanitation need particular attention.

4. Between 1991-1998, the Government of Maharashtra launched two rural potable water supply and sanitation related projects viz. Maharashtra Rural Water Supply and Environmental Sanitation Project (MRWSESP) and Maharashtra Rural Water Supply and Sanitation Project (MRWSSP) with financial support from IDA (WB) and DFID (UK) respectively. The inclusion of 'Health Education Activities' was a unique component of both projects.

5. The scope of this report is confined to assessing: (a) the levels of fulfilment as well as the impact of the health education components included in the 3 districts each of both MRWSSP (DFID) and MRWSESP (WB) projects. (b) the relative efficiency of both projects (c) behavioural changes among the beneficiary populace with special reference to the six specific health messages on which health education activities were focussed, viz.:

    - Drinking/cooking water must always be covered.
    - Drinking/cooking water must be stored on an elevated area.
    - Long handled ladles should be used to access drinking/cooking water.
    - Hands should be washed with soap/ash before meals.
    - Hands should be washed with soap/ash after defecation.
    - Hands should be washed with soap/ash after washing a baby's bottom.

6. To pursue the objectives of this study, the generation of an appropriate primary database was called for; a mix of Sample Survey (SS) and Participatory Research Appraisal (PRA) approaches was adopted. This was supplemented by Direct Observation based on notes taken during fieldwork, after extensive discussions with Government and other officials involved in project implementation.

collection. In most of the villages, water pipelines run along drains which will lead to contamination as and when leakage occurs.

19. Community drainage is inadequate and poorly maintained. Liquid waste from households reach choked drains; this filthy water usually spills over onto the roads.

20. Solid wastes from the households usually end up in designated compost pits.

21. Over 82% of rural households are non-users of latrines. People prefer to use open spaces for defecation.

22. The consensus emerging from interaction with government officials involved in implementation of both projects, at various levels, highlighted the following points:

- The distinctive feature of this project lay in its integrated approach to developmental activity as laid-down in the framework for implementation and continued activity.
- The new/specific focus of the six health related messages was not perceived. It was felt that these were already a part of traditional practice
- The local population feels alienated from the project because of their minimal involvement.
- Purchasing drinking water i.e. tariffed water is an alien concept.

23. People's attitude towards Water Supply:

- There is unequal water distribution.
- Frequent electricity failure affect water availability/pressure.
- There is misuse and vandalism of the pipelines to divert water for irrigation.
- Water pipelines run close to choked drain polluting the piped water.
- Tariffed potable piped water supply should be freely available, 24 hours, as promised. Under the present circumstances of interrupted and inadequate supply, beneficiaries are unwilling to pay the water tax.
- Government or DFID schemes are alien.
- The appointed watermen should be taught estimation of the quantity of water in tanks and how to adjust the quantity of TCL powder for appropriate chlorination.
- Workers should also be deployed for the maintenance of sanitary conditions in the area to clean drains and toilet blocks.

24. Social, political, economic as well as environmental factors are not conducive to discernible and successful development. A fundamental attitudinal change needs to take place at political, administrative and societal levels to bring about sustained change.

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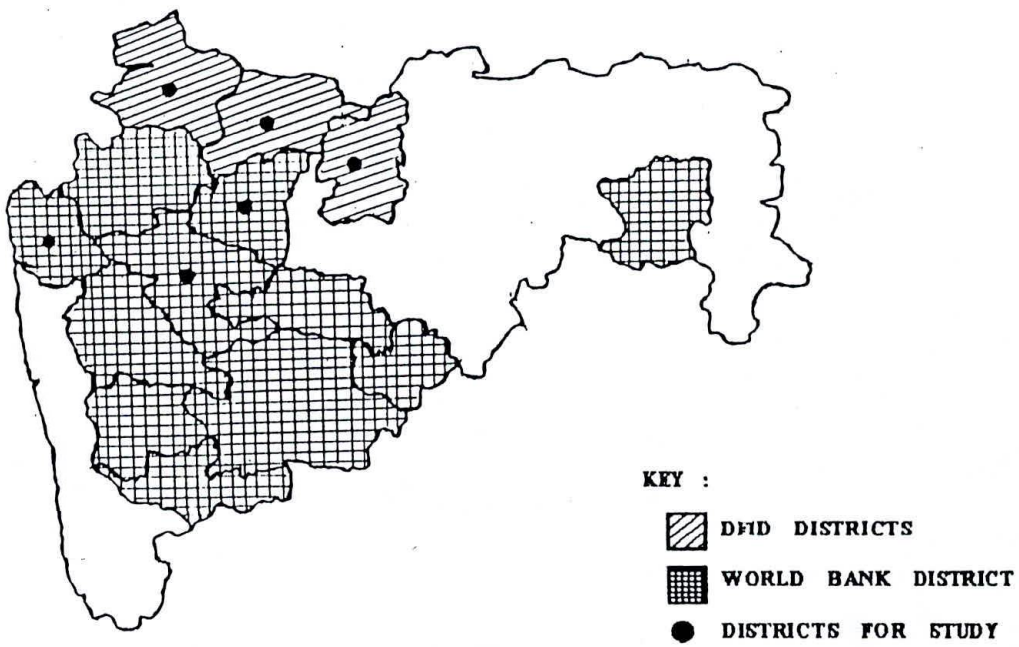
I
Introduction

1.1 In the beginning ..... MRWSESP and MRWSSP:

MAP OF INDIA SHOWING MAHARASHTRA

MAP OF MAHARASHTRA DETAILING MRWSSP/MRWSESP AREAS



1.1.1 During 1991-1992, the Government of Maharashtra embarked on the Maharashtra Rural Water Supply and Environmental Sanitation Project (MRWSESP) with the financial support of the International Development Agency (IDA) of the World Bank. This project covered a total of 10 districts. While the water supply engineering works were planned and executed by the Maharashtra Jeevan Pradhikaran (MJP), the health education programmes were conceived and implemented by the Information, Education and Communication Bureau (IEC) as part of the Public Health Department (PHD) of the Government of Maharashtra. The project also aimed at building up village institutions viz. Village Water Committees (VWC) to look after the operation and maintenance (O&M) aspects of the piped water supply systems in the best interests of all village communities. Health education activities to influence change in the behaviour of people in beneficiary villages, based on six messages related to water usage and personal hygiene were subsequently added to its purview.

1.1.2 Later, in 1992 - 1993, the Maharashtra Rural Water Supply and Sanitation Project (MRWSSP) funded by the Department for International Development (DFID) was launched in 3 neighbouring districts, covering a population of approximately 3.5 lakh people. Both projects attempted to integrate community development and health education activities with the supply of potable piped water and sanitation engineering activities through various activities and programmes for the people in the project areas.

1.1.3 A total of 13 districts in Maharashtra (3 with DFID and 10 with W.B. support) were covered under both projects. These aimed at providing community based water supply services concurrently with demand based sanitation facilities. Promotion of community based potable water supply; water quality monitoring and health education coalesced to bring about change in behaviour. Usage and maintenance of latrines and other such sanitary facilities in a hygienic manner was included in the overall objective of both these projects.

1.1.4 The modes used for communication of health education related messages included personal contacts, Mahila Mandals, meetings with savings groups, school children, poster making, folk-dances, religious/market events, TV shows etc.

1.1.5 The personnel involved in health education activities were largely from the health department in the DFID supported districts and from local NGOs in the W.B. covered districts.

1.2 The Study:

1.2.1 The Department for International Development (DFID) New Delhi, requested The Foundation for Research in Community Health (FRCH), a Pune based multidisciplinary voluntary organisation, **to make an objective and independent assessment of the impact of the health education activities on the change in behaviour of the people in MRWSSP and MRWSESP areas.** The findings of this study are expected to reflect on areas of behavioural change, motivational factors, sustainability issues and the modifying effect of the quality of water.

1.2.2 The specific objectives of this study were as follows:

a) Assess the impact of health education activities in project areas.
b) To assess relative influence of the six health messages on health behaviour of people in the project areas.
c) To identify motivational factors triggering behavioural change.

d) To assess efficacy of the potable water supply services on a sustained basis i.e. medium/ long term basis.

e) To attempt a comparison between the DFID and WB project districts in terms of their approach to implementation and its impact on health related behaviour with respect to six health related messages delivered as a part of the MRWSSP and MRWSESP projects viz.

- Drinking/cooking water must be stored on an elevated area.
- Drinking/cooking water must always be covered.
- Long handled ladles should be used to access drinking/cooking water.
- Hands should be washed with soap/ash before meals.
- Hands should be washed with soap/ash after defecation.
- Hands should be washed with soap/ash after washing a baby's bottom.

1.2.3 Grass root data collection was made using a mix of Sample Survey (SS) and Participatory Research Appraisal (PRA) approaches. The available secondary information from published/ unpublished sources e.g. review documents from ORG, TISS, DFID, PHD etc. was used to set a benchmark for assessing the change in health related behaviour of the people in project areas. The procedure adopted for collection and laboratory testing of water samples for bacteriological analysis were devised by an experienced team of microbiologists from The Foundation for Medical Research (FMR) Mumbai, an organisation having over 2 decades of experience in microbiological testing.

1.2.4 Results emerging from the field survey and PRA approaches and the bacteriological tests with respect to potability of piped water to project area are presented separately.

1.2.5 A summary of discussions between the principal and co-investigator, with the officials/ non-officials involved in the implementation of the two projects at the state, district and block levels and with the field staff at village levels are presented to reflect their distinct viewpoints.

Finally the conclusions and inferences emerging from the study are presented.

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II
Scope and Methods

2.1 Introductory Remarks:

2.1.1 Maharashtra's two rural potable water supply and sanitation projects viz. MRWSSP and MRWSESP, implemented with financial support of the DFID and WB respectively are conceptually unique and in some ways precursors to integration of potable water supply, environmental sanitation, and health education components. The projects also endeavour to put in place village level institutions for ensuring rural community participation to promote its sustainability. The thrust areas of the implementation strategy have been (i) promoting personal and family hygiene, (ii) promoting construction and use of latrines and other sanitation facilities and (iii) achieving community participation in operation and maintenance of water supply sources/ systems. This study undertakes the objective assessment of health education activities on the change in behaviour of the people in beneficiary villages; especially vis-à-vis the six health related messages delivered as part of the project strategy. An attempt is also made to compare results emerging from the DFID and WB supported project districts.

2.1.2 As indicated in the preceding chapter, the primary database generated in this study arises from three independent sources of information/data via **sample survey, participatory research appraisals** and **direct observations** based on notes of field investigators. Data/information emerging from these independent modes pinpoint misleading/inaccurate responses (if any) and permit re-canvassing of such responses to eliminate respondent and interviewer biases. More importantly it also supplements and authenticates the database emerging from each source. The generation of a reliable primary database is an important consideration in this study.

2.1.3 Socio-economic conditions (status) of rural households can be the single most important variable that impacts the performance level and success (or failure?) of the three thrust areas indicated above. Consequently it has a bearing on fulfilling the main objective of putting in place adequate, equitable and sustainable potable water supply services. In view of this and for the reader's convenience, tabular analyses in annexures are presented in terms of socio-economic status of sample households as the principal control variable. The areas covered in the tabular presentation are:

- basic-household features
- sources and uses of water
- potable water collection and its pattern of usage
- environmental and household level sanitation practices.

2.1.4 Results emerging from the first set of tabulations establish inter-links between economic, social, occupational and household/individual level parameters in the study area. The second and third sections link up these parameters with the potable water use and sanitation related behavioural patterns thrown up by the survey data. Results emerging from PRA exercises and direct (personal) observations based on qualitative information supplement the tabular analysis for drawing meaningful inferences.

2.2 Scope of the Study:

A The DFID supported MRWSSP covered 210 villages, spread across three districts of Maharashtra, namely Jalgaon (127 villages) Dhule (27 villages) and Nasik (56 villages)

B The WB funded MRWSESP is operative in ten districts of Maharashtra. However for the purposes of this study, fieldwork is confined to three districts, broadly similar to the three DFID districts in geo-physical and socio-cultural terms. Totally 176 villages were covered. These include the districts of Thane (69 villages) Ahemadnagar (78 villages) and Buldhana (29 villages).

C Bacteriological testing of potability and quality of water at the reservoir, common supply and private utilisation points forms a significant part of this study in the context of sustainability of positive outcomes.

D The reporting covers the impact/assessment of health education in terms of change in behaviour of beneficiaries vis-à-vis six health messages on which health education activities were focused. Certain other issues/factors having a bearing on the central objective, emerging during fieldwork were also probed to unravel linkages between such factors and the change in behaviour and/or sustainability of the positive outcomes.

2.3 Household Survey:

2.3.1 It may be clarified at this stage that data was aggregated over the entire MRWSSP (DFID) districts whereas in the case of MRWSESP (WB) however only 3 out of 10 districts, forming part of the project areas were selected for fieldwork. Care was taken to make the selection of areas comparable in terms of populace, geo-physical conditions as well as electricity and water supply. Findings flowing therefore reflect conditions obtained in MRWSESP areas of the 3 districts covered in the study. *This data set and findings emerging from it are neither expected to reflect results of MRWSESP as a whole nor is such a claim made or implied.*

2.3.2 Further, it may be in order to state that *approximated data presented* vis-à-vis water supply to beneficiaries *reflect an average of averages rather than an accurate statistical estimation and should hence be taken as such.*

2.3.3 While caste alone is no longer the only pivot for socio-economic interventions, strong bonds exist and operate between economic status (classes) and social groups (castes); as well as between occupations and educational levels attained (literacy levels) by different population groups. These factors, in tandem, exert a good deal of influence on access of people to potable water and its use pattern, significantly influencing behaviour patterns of people living in the study area. The tabular analyses presented in this report examine this hypothesis by presenting emerging aggregated data in terms of economic status (well being) of sample households as a common control variable so as to examine and evaluate the inferences flowing from the presented data sets.

2.3.4 The most important task was operationalisation of data/information collection in selected sample units as well as the bacteriological testing of water from multiple specified sources, for generation of a fresh qualitative database within the specified time frame.

2.3.5 Primary data emerging from the field survey are subjected to tabular analyses and results are presented at aggregated levels for the MRWSSP (DFID) and MRWSESP (W.B.) districts. *District wise tabular data included in the main text do not use socio economic statistics as a constant variable against which data is measured. Here, multiple variables have been included to give a broad overview of the project areas under study. The specific details are appended in the annexures,* if required for reference/detailed examination. This presentation format is opted for to ensure clarity, objectivity and meaningful comparative assessment of the key issues on which focus of the study is centred.

2.4 Sampling:

It was decided *apriori* on time and cost considerations, to select at least four villages per district and a minimum of two clusters per village for the field survey. Sangrampur was the only exception where only 1 village cluster was selected for study.

Project	Distt Selections	*Cluster Selections	Household Selection	Respondants Interviewed
MRWSSP	Dhule	Dhule SS = 2/11	SS = 40	
3 Districts	SS = 4/27 Villages	SindKheda SS = 2/16	SS = 39	SS = 79
210 Villages	Jalgaon	Bhusaval SS = 6/78	SS = 120	
	10/127 Villages	Amalner SS = 4/41	SS = 80	SS = 200
	Nasik	Malegaon SS = 2/17	SS = 40	
	6/56 Villages	Nandgaon SS = 4/39	SS = 80	SS = 120
MRWSSP Sub Totals	20/210	SS = 20/202	SS = 399	SS = 399
MRWSESP	Thane	Palghar SS = 2/3	SS = 43	
	5/69 Villages	Bhiwandai SS = 3/7	SS = 60	SS = 103
3 Districts	Ahmednagar	Srirampur SS = 5/10	SS = 100	
	7/78 Villages	Akole SS = 2/3	SS = 50	SS = 150
176 Villages	Buldhana	Malkapur SS = 5/14	SS = 100	
	6/29	Sangrampur SS = 1/4	SS = 19	SS = 119
MRWSESP Sub Totals	18/176 Villages	18/41	SS = 372	SS = 372
MRWSSP + MRWSESP Totals 6 Districts	**38/386 Villages**	**38/243**	**771**	**771**

SS = Sample size
* = From total villages

All MRWSESP and MRWSSP districts were stratified into homogenous village clusters in terms of their geo-physiological characteristics, nature of potable water sources, population compositions and general development levels as reflected in health care, educational infrastructure, literacy levels, extent of electrification, roads/public transport facilities etc. The allocation of the sample size was proportional to the share of each district in the total number of village clusters covered under the projects. Similarly, within each district the allocation of sample household clusters was proportional to villages in the respective districts. Random sampling was employed to select sample household clusters in each of the villages /districts. The procedures were identical in both project areas.

2.5 Basic Features:

2.5.1 It is an established fact that variations are marginal in surveys conducted within village clusters as compared to the inter-village responses. In view of this, it was decided to limit the sample size of beneficiary households to those receiving piped water supply (The list was obtained from Gram Panchayat (GP) records). Only 15 to 20 households per village, representative of the beneficiary households, were covered. They were grouped into (i) private connection holders and (ii) stand post users and further sub-grouped according to socio-economic/ethnic factors. Investigators used pretested structured questionnaires for canvassing household level data; mainly female respondents were met. Personal interview methods were adopted for this purpose and the field-staff camped in the sample villages during the field-work.

2.5.2 Along with canvassing structured questionnaires from beneficiary households, PRA approaches were employed for eliciting significant opinions, perceptions and qualitative/quantitative information from almost all village inhabitants. Semi-structured (open ended) **focus group discussions** and **key informant interviews** were the main modes of data collection in the PRA related fieldwork. FGDs were conducted separately for men/women which included socio-economically weak viz. SC/ST households. Additionally separate discussions were conducted for mahila mandals, VWC members etc. Discussions at the village level were also carried out with the personnel involved in the health education activities viz. multipurpose health workers/ guides, ANMs, anganwadi workers etc. The FGDs, key informant interviews and discussions with village level functionaries are expected to provide a strong information base for the assessment of the prevailing state of the issues under scrutiny.

2.5.3 **Direct Observation** comprises another important component of the primary data/ information collection. **Transact Walks,** a highly effective PRA method were conducted along village boundaries/outskirts and through the village wadi/wasti itself. These offered opportunities to observe and seek information from villagers accompanying the study team during such walks and also from those who interacted at different spots during the walk. Notes made during such walks reflect the prevailing ground situation at the time of visit with respect to the condition of water reservoirs, water supply systems/services, sanitary services viz. soak-pits/drainage conditions, usage of latrines, behavioural pattern of people etc. These walks throw up very useful information on all aspects of rural life. Direct observations by field-investigators were made during household canvassing sessions. These observations on specific issues under probe and notes based on such observations represent household level realities. Both are very useful information sources for cross checking data.

2.6 Testing of Water samples:

Collection of water samples was undertaken between 15th January and 2nd March, 2000

2.6.1 The methodology for collection of water samples for bacteriological testing had two principal components viz. (i) number of villages to be selected for water sample collection and (ii) the number of water samples to be taken and their spread across end-user households in villages selected for this purpose. The procedures adopted at both the levels were as follows.

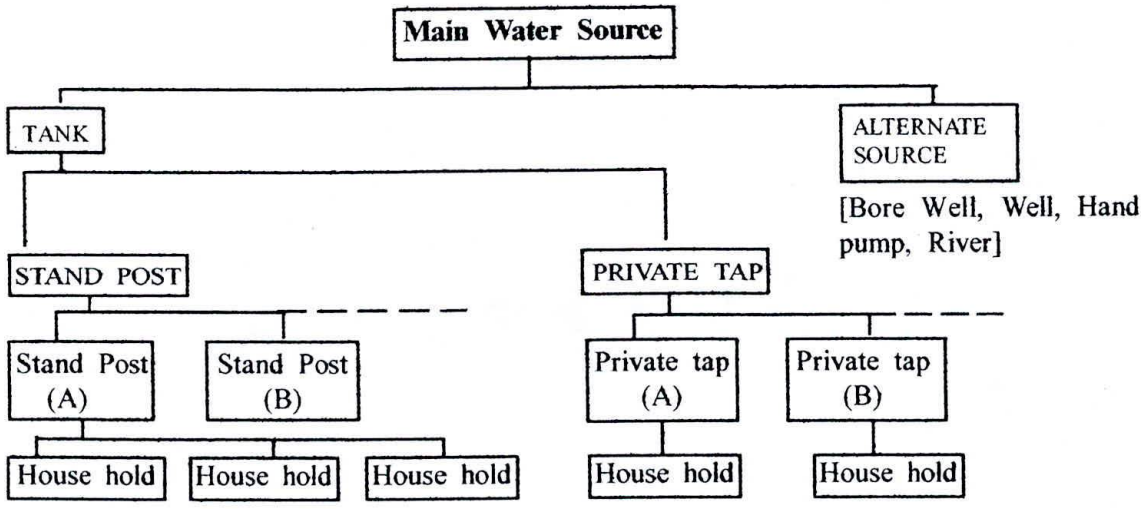
2.6.2 Field work for this study was conducted in 40 villages selected from homogenous clusters of all villages forming part of the MRWSSP and MRWSESP rural piped water supply schemes. In each homogenous cluster, piped water supply services to all villages are more or less linked to a common water source like river/canal. In view of this and since all sample villages drawn from a homogenous cluster receive piped water supplies from the same source, on technical grounds it is not necessary to draw water samples from all sample villages. Therefore on technical, statistical as well as on time and cost considerations it was decided to collect water samples from about one third (33%) of the sample villages covered in the field survey earlier. A random selection of one third sample villages spread across all homogenous clusters/ districts is an optimum number for testing of water sample to yield representative bacteriological test results reflecting trends in the potability of piped water supplies.

2.6.3 The following criteria formed the basis for selection of villages for collection of water samples.

- Villages with alternate in-use water sources along side piped water supplies.
- Distance of user households/stand post from main water source.
- Total number of sampled villages in a cluster/district.
- Wadi/wastiwise piped water supply taps/stand posts.

Based on the above criteria and in consultation with field workers involved in sample survey, sample villages were grouped together. A requisite number of villages were selected randomly. Following is a schematic presentation of village section for bacteriological testing.

2.6.4 It was decided to collect water samples from the following locations in adequate number per location to yield reliable bacteriological test results reflecting potable quality of piped water supplied. The locations from where water samples were collected are as follows :



- Elevated supply reservoirs (ESR) /tanks in the village
- Water delivery points (a) Private tap connection (b) Common taps/Stand Posts (c) On socio-economic considerations SC/ST households from (a) and (b) categories.
- Water delivery points at various distances from ESR. These may be private connections or stand posts (common taps) used by multiple households.
- Water samples from alternative water sources in use like open wells, hand pumps, river etc.

The following standard procedure (Cheeseborough, 1989) was adapted for collection of water samples by trained staff of the Foundation for Medical Research.

2.7 General Procedure:

a) Autoclave sterilized 500 ml. water bottles used for collection of sample.
b) Wash hands with soap before taking sample
c) Fill only 3/4 bottle capacity with water leaving 1/4 empty.
d) Close the lid tightly and cover it with clean paper
e) Label the sample bottle properly giving all identifications of location, village name, time and date of sample etc. and name of the person taking sample.
f) Close the bottles tightly and pack using the adhesive tapes.
g) Send the water sample to the testing lab within **24 hours** of sample collection at controlled temperatures of $15^{\circ}C \pm 5^{\circ}C$ with the use of freezer packs.

2.7.1 Samples taken from water tanks: (Capacity 15,000 - 30,000 litres)

- Entry into the high rise water tanks was effected through the provided trap door and subsequent descent into the tank through a ladder. The hands of the sample collector were cleaned prior to descent in the tank.
- After unscrewing the lid, the bottle was dipped mouth facing downward, 6-8 inches below the water surface level and jacked, mouth upwards when 3/4th full. Sealing and labeling was as described above.
- Samples were collected after a minimum of 1 hour following application of TCL to the water tanks.

2.7.2 For samples taken from Water taps: (Private taps and standposts)

- Wash and clean the tap externally with 70% alcohol.
- Run the tap for 2 to 3 minutes.
- Take sample in sterilized bottle taking care not to touch the mouth of the tap.
- Tightly close the lid/cover and label the bottle.

2.7.3 Household water samples:

- A family member from each sampled household collected water from the vessel

(matka) as normally practised, with the help of a smaller, designated collecting vessel (not a ladle) and filled the water collection bottle upto 75% of its capacity as explained in A above.

- All household water sampled, had been stored for a period between 3-27 hours.
- Vessels used for storage of piped water supply in households ranged from 5-10 litre capacity.

2.7.4 Samples from hand pumps / tube wells:

- Wash and clean the hand pump/tube well outlet externally
- Run the hand pump/tube well to exclude stagnant water collected in the pipe line.
- Collect water sample in the sterilized bottle as explained in A above.
- Close the bottle tightly with lid and seal with adhesive tape.

2.7.5 Water well/reservoir water samples:

- First wash and clean the bucket/water vessel.
- Tie the bucket/vessel with rope/chain and lower it in the tank/well.
- Draw water 2 or 3 times and discard it.
- Again draw water and fill the sterilized bottle as described in A above, closing the lid tightly.

The water samples collected were examined for a) physical characteristics such as turbidity and pH (by paper strips) at the time of collection b) bacteriological potability. The sample form (Annexure 18) demonstrates other relevant qualitative observations on the water samples, their location and environment.

2.8 Bacteriological testing:

2.8.1 A team of three staff members of The Foundation for Medical Research were selected for collection of water samples.

Orientation of the team was conducted before field work. This included training in the following procedures:

- General objectives of the project
- Water collection from different water sources like tanks, taps, wells, rivers etc.
- pH and temperature measurement of the water sample at the time of collection.
- Recording the water sampling details along with the description of the surrounding area.
- Proper labelling of the sampling bottles.

2.8.2 After collection, the water samples were transported to the laboratory within 24 hours. The temperature maintained with the use of freezer packs was 15°C $\pm$ 5°C.

2.8.3 Bacteriological testing was carried out in the laboratory. This included a) the determination of the Most Probable Number (MPN) of the coliform organisms present in the original water sample. The procedure for the water samples taken from chlorinated water sources varied slightly from the untreated water samples in that the latter was inoculated into sterile MacConkey's

Single Strength broth.

2.8.4 After the incubation at 37°C for 24 hours, the results of the MPN test were recorded as the number of MacConkey's broth tubes giving a positive result i.e. acid production, which is indicated by a change in colour of broth. Further with the help of a reference chart, the MPN of coliform organisms was determined.

2.8.5 **A negative control** was maintained by inoculating sterile MacConkey's broth with sterile phosphate buffered saline.

2.8.6 A known human derived concentrated **E.coli** culture was inoculated into the MacConkey's broth and at the same time also streaked onto sterile MacConkey's agar plate and sterile Brain Heart Infusion agar plate. This served as the **positive control**.

2.9 Interpretation of the results of MPN test:

The suggested bacteriological criteria for drinking water as per Monica Cheeseborough, (1989, ELBS publications) is as follows.

2.9.1 Treated samples

Mean Coliform count per 100 ml. water sample	Comments
0	Excellent
1 - 5	Acceptable
More than 5	Grossly polluted

Untreated water sample

Mean Coliform count per 100 ml. water sample	Comments
0	Excellent
1 - 10	Acceptable
More than 10	Grossly polluted

For qualitative analysis, the water samples were streaked on sterile MacConkey's agar plates and sterile Brain Heart Infusion agar plates for detection of different species of coliform organisms. Microorganisms present in the water samples were further identified on the basis of their colony characteristics, Gram staining and standard biochemical test results. (J. F. MacFaddin, 1980, Bergey's Manual, Vol.I and II, 1984).

2.9.2 Additional Measures undertaken for Quality Control:

Besides those mentioned in the procedures previously, the following measures were undertaken.

Each person from the team spiked one water sample selected randomly with a concentrated human derived **E.coli** culture at the time of water collection. This was undertaken to determine if transportation had any effect on isolation of bacterial species from water samples. Further treatment of the spiked samples remained the same as for the other samples.

Around 20% water samples randomly chosen were sent to an external referral laboratory for potability testing. The results were compared with the observations obtained at the Foundation for Medical Research.

2.9.3 Project Areas for Water Sampling:

Districtwise distribution of villages selected for taking water samples are as follows :

Name of District	No. of Villages	Name of District	No.of Villages
1. Dhule 2. Jalgaon 3. Nasik	5 6 2	1. Thane 2. Ahmednagar 3. Buldhana	2 2 3
DFID Total	13	W. B. Total	7

A total of 20 villages were selected for taking water samples.

Three teams of two persons each visited the selected villages. Each team comprised of a trained staff member from FMR and a field investigator for guidance to appropriate locations.

2.9.4 Limitations of the Study:

Perhaps it is necessary to explicitly state constrains/limitations under which the study has been completed. The Focus of the study is on assessing the impact of health education related inputs on behavioural changes among beneficiary households. Apart from an inadequate time frame within which the study was planned and completed, two other principal limitations related to (i) methodological considerations and (ii) longitudinal comparisons with baseline data need to be borne in mind while pursuing the findings presented in subsequent chapters.

It is worthwhile to note that non-availability of basic data on the Universe of each scheme did not permit adoption of 'probability sample' based approach for the field survey. Since the study does not call for generation of quantitative estimates, it was possible to opt for homogenous cluster based selection of villages adopting pure random sampling methods for sample selection at village as well as household level. Therefore selected sample units could not be assigned village/household weights. Even in beneficiary villages covered in the MRWSSP and MRWSESP projects all households were not receiving piped water supplies and total universe was unknown. Therefore tabular analysis was mainly adopted for presentation of simple ratio-estimates on variables of interest.

2.9.5 General comments on sampling of water for potability testing:

- **Frequency of sampling** : It is realized that contamination of water is often intermittent and may not be revealed by examination of a single sample or samples tested at lengthy

intervals. There was also a concomitant need to widen the investigation to the greatest possible proportion of the village. In view of the limited time span a minimal analysis of water samples from at least 5 standposts and private connections was undertaken in all sampled villages. In the case of standposts, samples from at least three households drawing water from that standpost was obtained.

- Fifteen percent of the standposts and private connections were sampled twice within the span of one month for concordance in observations.

- A 500 ml (0.5 litre) sampling from household sources was deemed sufficient since it represented 5-10% of the volume stored in a container and hence reflected substantially variations if any within the storage container.

- A palpable resistance to taking of larger water samples from households was evinced.

- Deviations in water quality are most likely to occur in the large volume storage tanks where multiple samples could not be collected or repeated. Again in view of the time factor stated previously this limitation maybe acceptable.

As regards bacteriological testing of water samples it may be noted that water sample collection and testing was a one time affair and repeat samples could not be collected or analysed due to constrains imposed by shortage of time. The water sample test results presented in this study at best indicate a particular day's result and need to be treated as such for drawing inferences. With repeat samples, over a period of time or in different seasons would provide definitive results/conclusions. One time water sample test results however, do point to potable/ non-potable nature of piped water supply possibilities and serve the purpose of altering the concerned functionaries.

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III
Results of Bacteriological Testing

3.1 Introduction and Rationale:

3.1.1 Access to adequate and safe drinking water is the primary right of all people. This belief finds much emphasis in the mission statements of both Projects under scrutiny in this Report. The terms of reference for this study obviously link the impact of the health messages with improvement in quality of water at the household level. An isolated examination of water samples at the household level would be insufficient to explore this link without concurrent assessment of water quality at the points of storage and supply at village level (tank) and distribution points (either private or shared stand posts). The purpose of undertaking bacteriological testing of piped water supplies to beneficiary villages/households of the selected sample villages in MRWSSP (DFID) and MRWSESP (WB) areas is to provide a comparison of potability of water at supply, storage, distribution and utilization hubs. This would critically supplement the information base generated in the field survey particularly with regard to a) personal practices of the community with regard to personal hygiene, water collection and storage practices, b) environmental conditions engendered by community practices and for civil engineering approaches, c) adequacy, accessibility and utilization patterns of water supplies, d) end point water purification practices, e) perception of water quality by community, and f) experiences, recent and past of water borne diseases in the community.

3.1.2 The pattern of water collection at 3 levels as described in chapter 2 is in line with the requirements of the assessment as stated above.

3.1.3 The potability of water is dependent on the level of pollution by a) bacteriological/ virological/zoonotical b) chemical c) organic sources. This study is limited to assessment of potability with respect to only bacteriological contamination coupled with physical properties of water samples such as turbidity and pH. The methods followed for the bacteriological component have been detailed in chapter 2.

3.2 Logistics of Water Sample Collection:

3.2.1 Section 2.4 of the second chapter outlines in detail the methodology adopted for selection of villages and the type of water sources, user households etc. from where water samples need to be taken. Field visits for collection of water samples were organized between January and March, 2000. A team of three persons (comprising two trained workers from The Foundation for Medical Research, Mumbai and one experienced field investigator who had participated in field visits) facilitated collection of water samples from designated spots/households. Since the collected water samples needed to be delivered to the laboratory in Mumbai for testing within 24 hours of collection, one of the sample collectors returned to deliver the water samples to Mumbai while the second joined the field investigator to visit the next sample village for taking subsequent water samples. The necessary transport facilities were made available for rapid movement of the field staff. All water samples were thus collected and passed on to the testing laboratory at Mumbai. For every water sample taken, the identification particulars

and other necessary information were recorded in a prescribed format (sample form enclosed) prepared for this purpose. This was delivered to the laboratory along with water samples.

3.2.2 The procedures and standards used for bacteriological testing in the laboratory are outlined in section 2.5 of the second chapter. A team of two trained microbiologists at the Foundation for Medical Research carried out bacteriological tests in the laboratory. The laboratory testing included (a) determination of the MPN of the coliform organisms in the water sample and (b) qualitative analysis. Quality control measures adopted during laboratory testing are outlined in section 2.5.3 and others of chapter 2.

3.3 Distribution of Water Samples

Table 3.1 presents the distribution of water samples collected from the sample villages of 3 districts each from the MRWSSP (DFID) and MRWSESP (WB) aided project areas. Table 4.1 is self-explanatory and presents the number of water samples taken from the various locations district wise.

A total of 222 samples were collected from 20 selected villages from 6 districts under both the DFID and the WB projects. Whilst the subsequent observations are distinct for the DFID or the WB arms, a true comparison between the projects may not emerge due to a smaller sampling size particularly in the World Bank districts.

Table 3.1

District wise Distribution of Collected Water Samples

Sr. No.	Districts No.	Tank Water	Household Water	PrivateTap Water	Standpost Source	Alternate
I	**DFID Districts**					
1.	Dhule	4	18	1	5	18
2.	Jalgaon	5	25	5	13	10
3.	Nasik	2	14	3	5	2
	Total	**11**	**57**	**9**	**23**	**30**
II	**WB Districts**					
1.	Thane	2	10	7	3	5
2.	Ahmednagar	2	20	2	6	-
3.	Buldhana	2	14	5	4	10
	Total	**6**	**44**	**14**	**13**	**15**

Note : Total number of samples collected were 222 from 20 selected villages from 6 districts

3.4 Bacteriological Findings

Table 3.2
Percentage of unacceptable (polluted) water samples

Sr. No.	Districts	Tank	Stand post	Private tap	Household	Indication of problem
I	**DFID**					
1.	Dhule	75	40	100	83	EG & ED
2.	Jalgaon	40	39	100	76	EG & ED
3.	Nasik	0	0	0	21	ED
II	**World Bank**					
1.	Thane	0	0	14	50	EG & ED
2.	Ahmednagar	100	50	100	70	EG & ED
3.	Buldhana	100	50	80	71	EG & ED

Key : EG - Engineering
ED - Health Education

Village water storage tank samples:

3.4.1 A total of 11 tank water samples from the DFID supplied villages were collected. The results of the test showed that 45.4% samples were polluted. As compared to other districts, the tank water in Dhule seems to be highly polluted in 75% of the samples. In Nasik all water samples were within acceptable range while in Jalgaon only 60% were within the acceptable margin.

The purification of tank water by application of TCL is dependent upon tank size and the volume of water it holds. A prescribed quantity of TCL powder should be regularly added to the tank an hour before water is released into the villages. It is believed that pipe water is always free from organisms due to the application of TCL. TCL supply to villages within its jurisdiction is the direct responsibility of the Panchayat Samiti. In both DFID and WB arms of the project, a man from each beneficiary village has been given training for TCL application to tank and other water sources being used in his respective village.

3.4.2 Six tank water samples were collected and tested from 3 districts under the WB project. The findings were that 66.7% samples were within acceptable range (i.e. potable) and 33.3% were polluted. In Ahmednagar district, all tank water samples (100%) were polluted despite being claimed to be TCL treated. A failure to apply the prescribed TCL quantity and unsatisfactory cleansing of the storage tank could be responsible for the poor quality water from the storage tank which constitutes the main source for piped rural water supply.

These findings clearly point out the operational problems faced by all village water supply systems in DFID as well as WB aided areas. In two out of three districts (WB) covered in the study i.e. Ahmednagar and Buldhana, the proportion of polluted tank water is found to be rather high which is a cause of concern. There is a need to strengthen 0 & M activities all over but more so in these districts.

Alternate Sources of Water:

3.4.3 Alternative sources of water like open wells, hand pump, bore wells etc. are available

as alternate sources of water during emergencies such as failure of piped water supply. It was observed that hand pumps and bore well water samples were relatively potable than open well samples. It was noted that both bore well and open well samples were polluted to a great extent (63% - 75%) in both arms of the project. A supporting observation was the undertaking of various activities like washing clothes, cleaning of utensils and washing of animals, near open wells which also receive dirt droppings from the surroundings through their open mouths. Similarly, though hand pump water is clean, the surroundings were also invariably unhygienic. The infrequent use of these alternative sources and their lack of upkeep in the presence of piped water may be partially contributory to the load of water borne diseases in the community.

A. Stand-post water samples:

3.4.4 The second category of the water samples were drawn from stand posts which are common water delivery points for a group of households. A total number of 23 water samples from stand post taps from MRWSSP (DFID) villages and 13 water samples from stand post taps from MRWSESP (WB) villages were collected. Whilst 31% of stand post source of the DFID area were unacceptable, the WB figures of non-potable stand posts was 39%.

The reasons for polluted stand post samples include (a) water pollution at tank level and (b) leakages in the distributing pipe system coupled with unhygienic surroundings.

B. Private tap verses common taps:

3.4.5 In the World Bank area, 6 tank water samples were collected. Four out of six tanks were of acceptable quality and only these are included for the analysis below.

To these 4 acceptable tanks, in all, 14 taps were connected. Of these 5 were common taps and 9 were private taps.

Of the **5 common taps,** water samples from 2 were unacceptable and the remaining 3 were acceptable (60%). This finding has been discussed previously.

In contrast, of the **9 private taps**, only 2 water samples were unacceptable giving a potability of 77%.

It was noted that the surrounding areas of all the acceptable as well as the unacceptable private taps (bar one) were clean. This observation is in variance to the surroundings observed for the stand-post connections.

All taps connected to a **polluted main tank source** had unacceptable potability levels both in the World Bank and DFID areas.

C. Household water samples:

3.4.6 The third set of drinking water samples were collected from the storage vessels in the households. The test results in the DFID districts show that nearly 42% household water samples were polluted despite their tank sources being potable. In 3 districts of WB also 37.5% of the house hold samples were found polluted on testing though the main sources of water

(tank) were found to be within acceptable range. (See Table 3.2)

This may occur because for the following reasons, (1) Field survey data revealed that carrying drinking water vessels uncovered after filling from the stand post to residence is a normal practice in the study villages. (2) Similarly while drawing water from the storage vessel a large number of households do not use long handled ladles (vagrala) thereby increasing the chances of contamination of the stored water. (3) Liquid waste disposal drains are found to be in close proximity to water supply pipe lines. With the possibilities of leakages, the chances of pollution are increased. (4) Due to low pressure many households have placed their tap outlet below ground level (in pits) again close to drains thus inviting pollution.

However 18.7% and 30% of household samples were found to be potable in MRWSSP (DFID) districts and in MRWSESP (WB) districts respectively despite both tank and stand post sources being polluted.

This is attributed possibly to the precautionary steps taken by individual house holds while filling the water from tap and at household level. Field observations indicate that 80.2% and 50% of households in the DFID and WB project areas respectively filtered their collected water through cloth before storage and in some cases the use of alum was noted. The number of households professing no endpoint purification of water was significantly higher in the WB area (31.4%) as compared to 7% in the DFID area.

3.4.7 Water samples were collected specifically from SC/ST households to test the potability of water. It was found that collectively 80% house hold water samples were polluted and only 20% were within acceptable limits compared to the cumulative potability water of 45% in the general population. It was also observed that water sources in these areas were often found to be polluted.

3.4.8 Four discrete patterns of potable/unacceptable water samples reveal themselves during analysis.

Table 3.3
Multilevel Patterns of Water Samples

(% Representation of sample villages)

	Overall	DFID	WB
a) Tank clean, stand posts and house hold clean	10.5	8	14
b) Tank polluted stand post and household polluted	42.0	50	29
c) Tank clean, stand post and household polluted	15.7	—	43
d) Tank clean, stand post clean, household unclean	31.5	42	14

The carry over of polluted water from the storage tank to distribution points and household is the majority pattern in the study (b) contributing to the greatest extent of pollution at the household level. Pattern d) in Table 3.3 is a close second signifying unsatisfactory collection and storage practices at the household level. Around 15.7% (pattern c) of villages appear to indicate a flaw in the engineering component of the project. The contribution of the WB arm to this category is significant.

3.4.9 The overwhelming presence of polluted water in storage tanks and its percolation to the household level renders the impact assessment of the health messages doubly difficult. Hence it is not sufficient merely to determine the contamination of water at different levels but also to compare the **relative load** of contamination between them. It was thus noted that generally households when taken singly demonstrated the highest load of contamination viz. > 18 coliforms / 100 ml of water. However from the bacteriologically sampled area, 4 villages (Hingankaji, Sangrampur, Savarai, Galnimb) from the World Bank arm of the Project showed up six exceptional households where household water was potable despite being drawn from contaminated private taps / standposts. The small sample size precludes generalization but is indicative of the expanding contamination load from source to household and reflects to some extent the lack of practice of the health messages imparted to the communities. On the other hand, the finding of exceptions is a reflection of use of end point water purification practices by some households through filtration or use of alum. A knowledge of the purification practices in these households and other hygiene related practices would be beneficial for recording.

3.4.10 Identification of bacteria in Water samples

Table 3.4
List of organisms isolated in the water supplied by the main piped water supply : - (n = 179)

Type of organisms	% Frequency
Gram negative coccobacilli/short rods (couldnot be identified upto species level)	35.7%
Acinetobacter calcoaceticus	28%
Gram negative slender long rods (couldnot be identified upto species level)	20.1%
Micrococci	10.6%
Enterobacter cloacae	5.0%
Enterobacter sp.	3.3%
Bacillus sp.	2.2%
Pseudomonas sp.	2.2%
Kingella kingae	2.2%
Vibrio sp.	2.2%
Acinetobacter sp.	2.2%
Citrobacter sp.	1.7%
Actinobacillus sp.	1.7%
Eikenella corrodans	1.7%
Achromobacter sp.	1.7%
Serratia sp.	1.1%
Citrobacter freundii	1.1%
Alcaliganes faecalis	0.5%
Proteus mirabilis	0.5%
Proteus sp. (unidentified)	0.5%
Enterobacter aerogenes	0.5%
Gram positive rods	0.5%
Enterobacter agglomerans	0.5%

A total of 23 different species (Table 3.4) of bacteria were identified from water samples. In 2/23 types, it was not possible to identify the genus. **A. calcoaceticus** was the most frequently found species in the water samples. **The findings indicate the overall of atypical coliforms probably derived from environmental contamination from mud, soil and animal sources.**

A codominance of A. calcoaceticus along with gram negative coccobacilli was noted in piped water supply as well as alternative sources. The spectrum of species detected in piped

water supply was higher in piped water suppy (23 species) as compared to alternative sources (16 species). Furthermore in a majority of the villages sampled, there appeared a consistant difference in the flora detected in samples from tanks and water distribution points as opposed to households. The number of species detected in households was invariably more.

The highest breadth of species from the alternative sources was from the wells (n=14). Unlike the above, most of these were reflected in the household water supplies. Nevertheless, fecal coliforms remained undetectable.

The presence of fecal coliforms in all the 222 water samples was prima facie nil. The conditions of transportation of samples from field to laboratory had no bearing on this finding since water samples spiked with **E.coli** at time of collection demonstrated these organisms in ample numbers during culture. Whilst this reflects a lack of fecal contamination of water samples and is thus an indicator of a positive impact of the health messages and consequently good personal hygiene, **this interpretation cannot be viewed as absolute**.

Recent advances in microbiology indicate that identification of environmentally derived organisms maybe affected by the stresses experienced by them. For bacteria in water supply distribution systems, this indicates stress from chlorine even at sub lethal concentrations **(Sartory D.P. and Watkins J. 1999; Journal of Applied Microbiology, 85 : 2255-2355).** The switching off of even a single enzyme in the bacterium due to chlorine inducted stress would render the identifying test negative. Since chlorination of the source water tank is reportedly undertaken in the projects, extrapolation of the above mentioned possibility to our observations is reasonable.

3.4.11 Physical quality of water:

Table 3.5
Turbidity in the water sample

Source	DFID	World Bank
Tank	1 (0)	-
Stand Post	3 (3)	1 (1)
Private Tap	-	1 (1)
Household	1 (0)	8 (4)
Well	2 (2)	2 (1)
Hand Pump	2 (0)	3 (0)

Key : Total No. of turbid samples, ( ) - No. of unacceptable samples

Turbidity : Table 3.5 shows the frequency of visibly turbid water samples in the DFID and World Bank project areas. A chi-square statistical analysis however revealed no correlation between turbidity and contamination of water supplies.

pH : A majority of the samples (197/204) of the samples collected recorded an acceptable pH of 6-8 excluding the possibility of contamination with chemical effluents. The details of the seven samples that showed an acidic pH range of 4-6 are presented in Table 3.6.

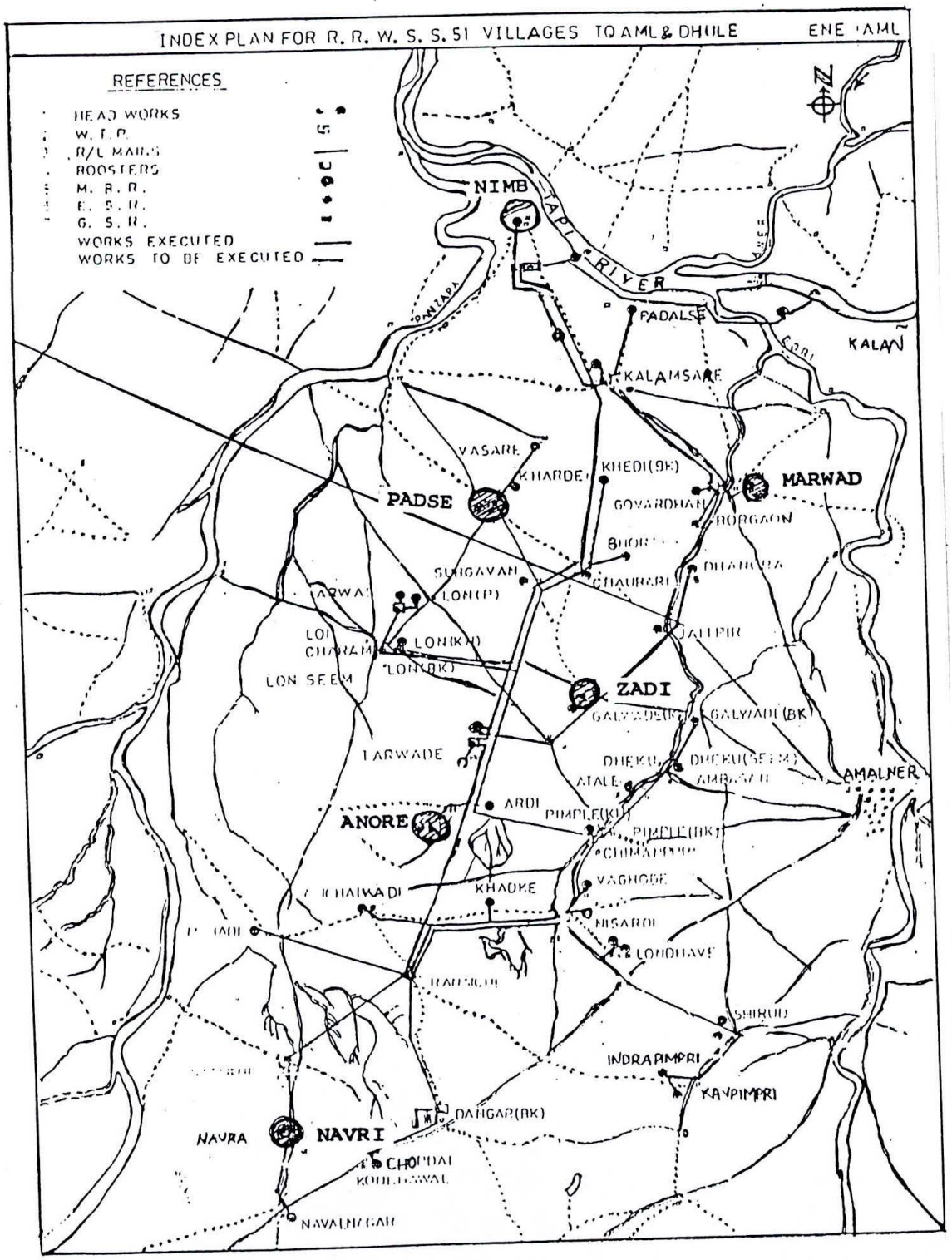
Table 3.6
Number of water samples with low pH 4-6 (n = 7)

Type of water samples	DFID	World Bank
Tank	1 (0)	2 (1)
Stand Post	2 (1)	0 (0)
Private Taps	0 (0)	0 (0)
Household	1 (0)	1 (0)

Note : Figures in brackets indicate the number of polluted samples.

IV
Project Prototypes

Map showing the 50 village water scheme in Amalner, a prototype of the MRWSSP scheme sponsored by DFID:



District : Jalgaon
Tehsil : Amalner

Villages	:	Anore	Zadi	Padse	Marwad	Total
H/H Interviewed	:	(20)	(19)	(19)	(21)	(79)

Table 4.1

Community Composition of villages in Amalner Tehsil

(% household)

Villages HH Interviewed	Anore Vill (20)	Wadi (19)	Padse (19)	Marwad (21)	Total (79)
Caste Hindu	55.0	84.2	52.6	76.2	67.1
Scheduled Castes	20.0	5.3	31.6	19.0	19.0
Scheduled Tribes	20.0	10.5	0	0	7.6
OBC	5.0	0	15.8	4.8	6.3
Total	25.3	24.1	24.1	26.6	100

Table 4.2

Quality and adequacy of water

(% household)

Name of Village	Quality of water						Adequacy of water	
	Main source			Secondary source			Yes	No
	G	A	P	G	A	P		
Anore	100.0	-	-	35.0	65.0	-	100.0	-
Zadi	84.2	15.2	-	26.3	73.7	-	68.4	31.6
Padse	63.2	26.3	10.5	26.3	57.9	15.8	31.6	68.4
Marwad	81.0	14.2	4.8	19.0	81.0	-	95.2	4.8

G = Good, A = Acceptable, P = Poor

Table 4.3

Average water supply/collection
Project area

(% household)

Name of village	HH size	Lit/HH	Lit/person
Padse	8.3	226.0	27.4
Marwad	6.0	138.7	23.0
Zadi	7.5	176.1	23.5
Anore	7.5	170.0	22.7
Nhavri	6.8	106.6	15.7

In **World Bank districts**, various water sources were chosen to supply an increased volume of water to villages by Maharashtra Jeevan Pradhikaran. e.g.

Buldhana (Malkapur & Sangrampur)	-	Dam water
Ahmadnagar Shrirampur (5 village scheme)	-	Canal water
Akole	-	Well-water
Thane (Bhivandi & Palghar)	-	Dam water from Nasik District

As each district had differing plans, presenting a prototype is difficult.

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V

Field Survey Results

5.1 The Location:

5.1.1 The MRWSSP/MRWSESP both covered districts in northern Maharashtra in the regions traditionally referred to as Khandesh, Vidharbha, Nashik and Western Maharashtra. Agriculture and animal husbandry are the traditional means of livelihood in these areas. The hilly terrains are mostly arid which makes water supply, and especially the piped supply of potable water a pivotal issue for all people in this region.

Community Profile:

Table 5.1

Pecentage distribution of respondents by caste and by occupation

District	*Caste Hindu	S.C.	S.T.	O.B.C.	Others
	*Agri	Business	Service	Skill Wkr	Daily Wage
D	34.0	17.5	14.0	6.5	28.0
	56.0	1.0	11.5	2.5	29.0
J	53.0	21.5	11.0	8.5	6.0
	63.5	3.0	9.5	1.5	22.5
N	60.5	14.0	12.5	6.0	7.0
	70.0	5.0	11.0	2.5	11.5
T	65.0	7.0	23.5	5.0	-
	64.0	12.7	2.0	8.7	12.6
A	28.0	17.0	28.0	7.0	20.0
	77.3	6.0	4.7	8.7	3.3
B	47.0	13.5	7.5	30.0	2.0
	63.9	10.9	5.9	8.4	10.9

D = Dhule, **J** = Jalgaon, **N** = Nasik - **DFID/MRWSSP**
T = Thane, A = Ahmednagar, B = Buldhana - W.B./MRWSESP
Caste Hindu = Brahmin, Maratha, Kunbi etc.
S.C. = Mang, Matang, Chamar, Bhangi, Ramoshi etc.
S.T. = Bhilla, Mahadev Koli etc.
O.B.C. = Dhangar, Gurav, Shimpi etc.
Other = Muslim, Christian, Jain etc.
***** = Both are independant variables for each district denoting % of the sampled population from a district

5.1.2 The community composition is more or less similar. Both project areas and comprised of 46-50% Caste Hindus, 12-20% Scheduled Castes (SC), 12-14%, Scheduled Tribes (ST), 11-13% Others which included Muslims, Christians, Jains, Parsees, Buddhists etc... People from this region primarily live a rustic agrarian life. Agriculture is the dominant occupation among the landed as well as the many (10.5%) daily wage-earning people. The other means of livelihood are animal husbandry, skilled/semi-skilled jobs, business, blue-collar service etc...

Collective and comprehensive perusal of the data presented in Tables clearly reveals the inter-linkages between caste, occupation, literacy levels and economic status of households.

For the purposes of this study, ***all sample units reporting schooling up to primary levels and beyond are clubbed together as literate. The ability to read and write acquired without formal schooling is classified as semi-literate. Those who cannot read or write and depend on the spoken word for communication of ideas/views form the category of illiterates.*** The educational attainment of an individual is an important factor in the awareness and acceptance of a message. As regards MRWSESP districts covered in the study, overall trends with respect to literacy levels are similar to MRWSSP trends, though the low and middle-income group's proportions interchange their positions

Table 5.2

Percentage distribution of sample households by income and literacy level

District	*High Income	Mid. Income	Low Income
	*Literate	Semi Literate	Illiterate
D	12.5	54.5	33.0
	46.5	33.0	20.5
J	19.5	47.0	33.5
	40.5	37.0	22.5
N	35.0	47.5	17.5
	31.5	46.0	22.5
T	18.4	62.2	19.4
	57.5	27.0	15.5
A	21.0	57.0	22.0
	54.0	27.0	19.0
B	28.6	48.7	22.7
	54.0	25.0	21.0

High income = earning above Rs. 36,000 p. a., Midd. Income = earning income between Rs. 18,000 to Rs. 36,000 p.a., Low income = earning below Rs. 18,000 p.a.
* = Both are independant variables for each district denoting % of the sampled population from a district

In economic terms, 53% people belong to the middle-income group (Rs18,000/- toRs36,000/-) 22.5% fall in the high-income category (earning more than Rs.36,000/- per anum) and the remaining 24.5% comprise the low-income strata (earning below Rs.18000/- per anum). ***Households in SC/ST category largely pursue daily wage earning as their occupation and mainly belong to the low-income group.***

5.2 Water related facts:

5.2.1 The **common sources of water** are from taps, open wells, bore wells, hand pumps. Rivers are sometimes a secondary source of water as well.

The now easier **accessibility of water** was universally acknowledged. It appears that the Caste Hindu households seem to have overwhelmingly higher share than the socially disadvantaged SC/ST household user groups. Their presence among all piped water users ranges between 62% in DFID areas to about 54% in W.B. areas. The combined share of SC/ST sample

households ranges between 30 to 32% in the MRWSSP and MRWSESP areas, whereas the share of OBC beneficiary households rises from 7.3% in DFID areas to 13.7% in W.B. areas.

Table 5.3
Differential patterns of water source and usage by % of households

Use / Purpose	DFID Districts				W. B. Districts			
	Main source	Supp-sources			Main source	Supp-sources		
	Piped water	H. P./ B. W.	Tank/ River/ Canal	Open well	Piped water	H. P./ B. W.	Tank/ River/ Canal	Open well
Adequate Water Supply								
Drinking + cooking	91	6	1	2	90	8	...	2
Bathing + hand wash	91	5	1	3	89	2	1	6
Cloths + utensil wash	74	10	9	7	84	6	2	8
Cattle drinking	36	5	19	17	61	6	2	6
Others	76	15	1	7	86	6	...	6
Inadequate Water Supply								
Drinking + cooking	59	37	...	4	71	1	...	28
Bathing + hand wash	59	34	...	7	64	2	...	34
Cloths + utensil wash	54	35	2	11	57	2	4	36
Cattle drinking	30	29	3	19	42	...	7	25
Others	55	34	...	11	62	2	2	34

Notes : Supp : Supplementary sources of water
H.P. = Hand Pump, B.W. = Bore Well
Others includes water used for sprinking in courtyard

Seventy four to 91% of sample households routinely used piped potable water for sprinkling in courtyards across DFID and WB supported areas

5.2.2 Availability of water: As many as ***76.3% in WB aided schemes and 79% in DFID supported districts reported availability of adequate piped water. Approximately 17 to 19% of the respondent households disagreed.*** Another interesting fact observed was that while people in a **group situation** always reported an inadequate availability of water, those spoken to **individually** said that water supply was adequately received by them!

Taps, whether private or the common stand post variety, are at an approximate distance of between 50m to 200m from the beneficiaries homes now as opposed to the earlier mean distance of 400m traversed to procure water.

Studies conducted prior to commencing of both projects recorded water availability at approximately 24lit/person/day. This was expected to rise to 40 lit/person/day and be available continuously on tap throughout the day. By taking an approximation of the **average of the averages** reported by the beneficiaries interviewed, it appears that the current supply/consumption

of water remains at 24lit/person/day. In villages at the tail end of the water supply schemes this dropped to 15lit/person/day. The fall in water pressure was seen as being responsible for this. Water is received for approximately 10-15 minutes once daily. However the timings for supply are not constant/fixed and this makes water collection a continued problem.

Table 5.4
Showing different water related information

(% of Households)

District	OWNERSHIP		ADEQUACY		QUALITY	
	Private	Public	Yes	No	Good	Bad
D	73.4	26.6	91.8	8.2	88.6	11.4
J	52.0	48.0	66.8	31.2	90.0	10.0
N	37.5	62.5	96.6	3.4	97.5	2.5
T	68.6	31.4	67.6	32.4	89.6	10.4
A	53.6	46.4	92.7	7.3	88.2	11.8
B	67.7	32.3	79.8	20.2	96.3	3.7

5.2.3 Quality of water: People are largely satisfied with the quality of water being supplied. There were some comments of dissent from Malkapur Taluka and Dhule Block where they said water was not of potable quality and was only used for purposes other than drinking. Water received at various points of the scheme was not standardized. Households nearer the supply plants complained of greater proportion of chlorine, which adversely affected the water's smell and taste. Certain areas of Dhule and Buldhana reported receiving green water. On grounds of inadequacy of water supply or refusal to pay the revised tariff villages in Jalgaon (3), Thane (2) and Buldhana (1) had discontinued use of water from these schemes since Dec.1999 at the time of this survey

5.2.4 Water tariff: Under the 'Bombay Village Panchayat Act' 1958, the G.P. had been empowered with the fixing and collection of water tariff. The G.P. could also plan, implement and maintain individual water supply schemes. On regional water supply schemes, the Z.P. was empowered to fix water tariffs and collect a share of water taxes from G.P. however, no system of sharing was fixed. At this juncture, water tariff payable by private connection users was between Rs.200/- to 250/- per anum and between Rs.50/- to 75/- annually by common stand post users.

In January 1997, the Govt. of Maharashtra passed a resolution establishing the 'Maharashtra Village Water Supply Fund' at the G.P. level. According to this, water tariff was raised to Rs.75/- per anum for all standpost users and Rs. 360/- annually for households with private tap connections. The system of sharing taxes was fixed at 80:20 ratio between the Z.P. and G.P. respectively.

At the time of conducting this study, 96% of the people in MWRSSP areas and 76% of people in MRWSESP areas expressed willingness to pay the water tariff provided an adequate and regular supply was insured. However, people voiced a reluctance to continue paying the larger revised tariff amount especially as this service was not being delivered to them as promised.

The continuous supply of potable water was not available. Moreover this was released at indeterminate times of the day for only 10-15 minutes at a stretch. Additionally, the water supply was affected by the weekly closures for electrical and water supply maintenance work, on two different days of the week as these departments did not, at present, coincide their maintenance activity.

5.2.5 When specifically asked about the earlier and currently prevalent incidence of **water borne illnesses.** There was a definite perception among the beneficiaries from both project areas that this had improved greatly since the inception of the project, especially over the past six months i.e. June-Dec.'99 coverings Summer and the monsoon when water related illnesses are at their worst.

5.3 Common water related practices pertaining to its storage and withdrawal:

5.3.1 Of the three **health messages** pertaining to storage and withdrawal of water for use, all had reached the beneficiaries. However, there was an observed lack of impetus on their part to put these into practice.

5.3.2 It is a common practice among a majority of beneficiaries in both project areas to **collect** water for storage in metallic vessels, 90% of sample households in DFID as well as WB districts use metallic vessels for collection and carrying potable water from source, 10% preferred the use of plastic or earthen vessels for this purpose. Water was carried home uncovered by almost all respondents. *(See Annexure A.4)*

5.3.3 Within the homes water was **stored** in earthen vessels by all households. Water for drinking and cooking was usually stored collectively in a common vessel by 61.2% people in MRWSSP areas and 52.9% people in MRWSESP areas. *(See Annexure A.4.B)*

5.3.4 95% of the families in the DFID areas kept their drinking water at a safe/ elevated place and 80% families in the WB areas followed this practice. While there were a significant number of people who did keep their water in a designated 'safe' place, this was merely kept at a distance from the 'mori' where bathing, washing of utensils and of clothes was done and not necessarily an elevated platform or stand. It was a common practice to wash vessels used for water collection/ storage with soap/ash on a regular basis either daily or on alternate days by a majority of the womenfolk. ***Further probe in this regard revealed that 36 to 40% sample households use soap/detergent powders for this purpose in MRWSSP and MRWSESP districts. Another 51% and 38% of sample households use ash for this purpose in MRWSSP and MRWSESP schemes respectively. Usage of mud/ wet soil as a cleaning agent is reported by 4.3% households in MRWSSP areas as against 18.8% reporting it in the MRWSESP districts.*** *(See Annexure A.8)*

5.3.5 Vis-à-vis the practice of **drawing water** from the storage vessel for use, As far as drawing drinking water from storage vessels is concerned, families from both project areas did not uniformly follow using long handled ladles. N***early 60% of sample households in MRWSSP as well as in MRWSESP areas reported using a designated, non-handled vessel for drawing water from storage vessels. The usage of long handled ladles to draw water from storage vessels was reported by about 18% sample households in DFID supported areas while nearly 26% in W.B. supported districts reported doing so.*** About 15% to 22% from both areas also reported drawing water directly from the pot by dipping any available vessel when required. *(See Annexure A.7)*

Table 5.5

Water withdrawal, storage and drawing practices

(% of Households)

District	Collecttion		Storage		Drawing	
	Covered	open	Safe	Unsafe	With Ladle	Without Ladle
D	64.8	35.2	97.4	2.6	15.2	84.8
J	70.1	29.9	93.5	6.5	19.6	80.4
N	67.6	32.4	95.7	4.3	16.0	84.0
T	62.1	37.9	94.8	5.2	24.4	75.6
A	75.4	24.6	88.7	11.3	18.7	81.3
B	73.2	26.8	85.4	14.6	26.1	73.9

5.4 Personal hygiene and sanitary practices:

5.4.1 Vis-à-vis **personal hygiene and sanitary practices** among residents of both project areas, traditional practices still prevail. Over 82% people prefer to defecate in open farmland spaces. Of the total number of toilets constructed, less than 17% in DFID areas and 29% in WB areas are in active use. A majority of respondents use this 'pucca' area as a storage space for grain and other articles needing shelter from the elements. The privileged 80% from DFID areas and 90% in WB project areas lived in pucca homes while the remaining village dwellings are largely thatched structures with 'kucha' walls and floors as well.

Table 5.6

Types of dwellings, their electrification and the frequency of female household heads

(% of Households)

District	Pacca Roof	Kacha Roof	All Kuccha Roof	% electrifed H.H.	Female H.H.
D	59.5	32.9	7.6	84.8	15.2
J	84.5	11.5	4.0	71.7	3.5
N	90.0	6.7	3.3	83.5	6.7
T	99.0	1.0	-	68.9	6.8
A	81.3	16.0	2.7	92.0	12.7
B	95.8	3.4	0.8	78.2	0.8

The **health messages** pertaining to personal hygiene, more specifically those about hand washing practices before handling food and after defecation or washing a baby's bottom elicited a range of responses.

Table 5.7
Personal hygiene practised by household members

(% of Households)

Sr. No.	Nature of Habits	Male		Female		Children		Aged	
		A	M	A	M	A	M	A	M
I. DFID / MRWSSP									
1.	Hand wash before meals	92	5	95	4	61	17	53	7
2.	Vessel wash before drinking water	73	8	91	5	48	19	45	10
3.	Hand wash before cooking	...	...	92	4	...	...	...	...
4.	Plate washing before serving food	...	...	92	5	...	...	...	...
5.	Washing hand/feet with soap after defeacating	88	7	93	5	57	18	51	8
II. W. B. / MRWSESP									
1.	Hand wash before meals	63	32	66	27	53	31	19	4
2.	Vessel wash before drinking water	35	20	59	14	28	24	13	5
3.	Hand wash before cooking	...	...	71	16	...	...	...	...
4.	Plate washing before serving food	...	...	80	13	...	...	...	...
5.	Washing hand/feet with soap after defeacating	85	9	95	3	68	15	19	4

Note : A = Always, M = More often but not always

5.4.2 90-95% from DFID and 60-65% from WB project areas reported **washing hands** before handling food (eating/cooking as the case may be). Hands were always washed vigorously with water before handling food. The use of soap/ash for hand washing is not a common practice, not even for hand washing after defecation or after washing a baby's bottom. People from both project areas reported the use of soap /ash for hand washing only in the early mornings when they were close to home. Once they were away at work, the use of wet mud/soil as a cleaning agent was most common. A few even reported rubbing their fingers against a dry rock after defecation.

Again, while the health /hygiene messages were known to all, adopting these was not yet a widespread phenomenon.

5.5 **Disposal of waste** in the village is done more or less similarly in the 394 villagers covered under study. As regards availability of **drainage facility** nearly 66% of households reported the existence of open drains across the MRWSSP areas against 24% stating non-existence of drainage in all parts of villages in MRWSSP. The MRWSESP areas covered in the study reported nearly 57% open drains and 25% no drains. In 63% households across MRWSSP (DFID) areas **household level liquid waste** is largely disposed off in village drains, the remaining households allow it spill over on roads or over nearby areas. Liquid household waste as well as that from cow sheds flows into shallow drains that are usually blocked and consequently flow over onto the roads and common village areas rendering unsanitary living conditions. The concept of soak-pit based kitchen gardens has not made much headway in MRWSSP areas. However, across MRWSESP districts a somewhat different picture appears to be emerging. About a quarter of the households reported usage of soak-pits for household's liquid waste disposal. The remaining 20% of WB sample households yet dispose off their household liquid waste into village drains while more than one half of the households allow household

liquid waste to spill over on to village roads or open spaces. As regards liquid waste disposal from cattle sheds, the behavioural patterns in the two areas are more or less similar to the household liquid disposal pattern. In MRWSSP (DFID) areas *low and middle income* households appear to be primarily responsible for liquid waste spillage over in open areas near homes or on roads while in the MRWSESP (WB) districts, the *middle and high-income* household do so.

5.5.1 As regards **disposal of solid waste** comprising mainly biodegradable household cooking wastes, nearly 85% of sample households, in MRWSSP (DFID) districts reported waste disposal in either in self owned compost pits or in common village compost pits referred to as '*UKIRDA*'. In MRWSESP (WB) districts, personal compost pits are used by approximately 37% of households and as many as 40% use common disposal pits. The low-income households are primarily responsible for spreading solid waste around homes in MRWSSP while in MRWSESP areas the middle-income households do so. As stated earlier, the study indicates that while the messages have reached people, they are slow to change their earlier practices and implementation of the messages is not yet widespread.

5.6 Beneficiary comments/perceptions:

People suggested that the watermen appointed to chlorinate water in the ESR be taught to scientifically estimate the quantity of water in the tanks in order to calculate the requisite proportion of trichlor powder needed for this purpose. At present, this is done on an ad-hoc basis. People living closer to the supply source complained of distasteful and smelly water.

Another request voiced by people was the appointing of additional personnel in the beneficiary villages to clean the drains/toilets and maintain proper sanitary conditions in the villages.

People also stated that the water supply pipes in/to the villages had not been buried at a uniform stipulated depth as a result of which many pipes were damaged during ploughing of fields. This was causing the water logging of fields.

At several places, unauthorized connections had been added which was adversely affecting the downstream supply of water. Some people felt that substandard materials had been used in laying pipelines these were already corroded causing leakage and water logging.

The mosquito menace has consequently risen dramatically they stated. Also, the stench from stagnant puddles with rotting vegetation and other filth was disagreeable and posed a health hazard.

At some places, water pipes were in close proximity to village drains; this could lead to contamination of drinking water over time rendering it unsafe for consumption. Even at present there were some families who were additionally filtering/boiling their drinking water before ingesting it.

Men folk complained that women were no longer agreeable to walk great lengths to fetch water from a secondary source and tended to wait for piped water to arrive. In a primarily daily wage earning society this adversely affected the family's income.

A solitary view aired suggested that the same money if invested in a watershed management approach would have resulted in greater long term good.

5.7 Comments from the official cadre:

Hand washing before handling food is a commonly observed traditional practice.

The use of soap/ash whilst washing hands is not yet commonly prevalent. Economic factors were considered responsible for this.

Health education activity among the populace is not a new activity either. It has been done in the past to inform the public about guinea worm eradication in the Naru Nirmulan Abhiyan scheme. Hand washing has also been specifically covered in the MCH camps that were conducted in the villages earlier.

It was felt that MHW/ANM/DHEO and other government appointed personnel were better equipped to cover this task of educating the people who identify them with health/hygiene related work. This would be beneficial to the acceptance of messages by the community it was felt. NGOs on the other hand would have their own acceptance by the community as a primary issue to contend with.

It was also reported that NGOs and governmental personnel alike faced some resistance from the beneficiaries whilst delivering the six health related messages. The performance of a street play had to be abandoned when villagers turned belligerent stating that their primary interest was in procurement of adequate water supply and not the add on health messages. "Where is the water to wash hands or flush toilets with?" They taunted.

Officials felt that beneficiaries would not be agreeable to paying the water tariff. Water like all other natural resources is expected to be freely available by the community.

There was a general feeling of alienation from the project among the people. The initial enthusiasm demonstrated in the formation and running of Village Water Committees (VWC) has died out. **Over 95% of VWCs in both project areas are now disbanded.** People refer to the piped water as 'British *Pani*' (water) demonstrating how far removed they felt from it.

In Dhule, delivery of the health messages had been done using city marathi and not in the colloquially prevalent *Airini* dialect.

The emphasis on kitchen gardens and soakage pits in both project areas was irrelevant to the ground reality situation of proximally located dwellings. Soakage pits that had been experimentally constructed are now rendered dysfunctional, broken with the passage of bullock carts over them.

Schemes implemented were not always relevant to the grassroots reality that prevailed but were thrust upon the people albeit experimentally, were half -heartedly executed and now lie abandoned.

5.8 According to newspaper reports (Lokmat/Sakal):

An inherent project defect was the use of ancient topographical charts of over 50 years in planning the laying of pipelines to the various villages in the DFID scheme. Ground reality was quite different and often the plans had to be abandoned in preference of another more in keeping with ground reality. Costs were adversely affected; quality control measures were less stringently adopted in these cases as whatever material could be procured was used.

5.9 Policy Implications:

The ultimate objective of this project was that people should take over the continued

maintenance and running of this scheme. However, as things stand, there is great reluctance to do so, as the present water supplies are inadequate and not as promised earlier. Even the governmental bodies viz. the ZP/GP expressed dissent on this issue. Of the water taxes collected, ZP currently keeps 80% of the total collected, leaving the GP with the balance 20% amount and the task of maintaining water/ sanitation services in the project areas. This they felt was grossly insufficient to cover the task at hand.

The political scenario also influences water supply. Villages with strong political connections had negligible water problems. Also, beneficiaries often mentioned that they had been instigated against payment of water tariff by persons with vested interests. It is only in the event of there being 20-22 hours continuous electric supply that water could be supplied continuously as promised during project inception. A more coordinated and concerted effort at multiple levels is required to synchronise this rural water supply scheme in order for it to truly deliver water supply on tap as envisaged.

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VI
Concluding Observations and Implications

6.1 Concluding Observations:

6.1.1 The inclusion of Health Education activities as an integrated part of The Maharashtra Rural Water Supply and Sanitation Project (MRWSSP) with financial support from DFID and The Maharashtra Rural Water Supply and Environmental Sanitation Project (MRWSESP) funded by the WB, in partnership with the Government of Maharashtra was a unique feature. This study makes an attempt to assess the impact of the six health messages on which health education activities were focused. Findings presented in this study are based on a wide quantitative and qualitative database. Hopefully academicians, administrators and planners would benefit from this report. This independent assessment has yielded some interesting findings at the planning/ implementation at the community levels.

6.1.2 The bacteriological testing of water samples to scientifically evaluate the quality of water being supplied in the project areas has been a distinctive feature of this study. The team hopes that such testing provides another dimension to this assessment.

6.2 Planning Implementation Level Implications:

The considerable degree of water pollution at source and at distribution points indicates significant problems of (i) unsatisfactory engineering inputs into the projects, use of outdated information and utilisation of sub standard material (ii) inadequate training of local personnel in maintaining potability of local water sources through chlorination, cleaning of tanks etc. (iii) failure of involving the beneficiaries i.e. people at every stage from planning to execution and maintenance of project. We feel that attention to these would have gone a long way in ensuring greater effectiveness and sustainability of the project. As such, the VWCs which originally had the mandate of ensuring equitable water supply and resolving functional problems are generally moribund. One prime reason for this is nepotism which has encouraged the sprouting of illegal connections and monopoly of distribution points. (Refer village map in Annexures 17-A and 17-B).

It is recommended that before concretizing such plans, a major effort at gauging the needs and perceptions of the target communities is essential. All engineering details should be planned using updated knowledge and technologies currently available to avoid unnecessary operational glitches. The continuous participation of target groups and the area officers needs to be advocated right from the pre-planning stage to ensure people's understanding, involvement and sustained participation. While undertaking projects, the emphasis on promoting its ownership/ Indianness should not be lost sight of since it resulted in the people considering it as "British/ World Bank Pani". Such alienation results in failure of successful implementation of the project and substantial loss of public resources in terms of time, energy and money.

6.3 Acceptance of the health messages by Community and Implications:

Prima facie **there seems to be a general lack of practice/implementation of the health messages. This impression becomes modified on closer questioning and it appears that people do follow the health messages in sometimes limited but distinct ways. The**

qualitative data by and large pinpoints this adherence to traditional practices already inherent in the community with minimal influence of project related activities. The latter appears to be further eroded by factors like unreliable availability of water, its unequal distribution and perpetuation of unhygienic environmental conditions around supply and distribution points aggravated by poor engineering. Though generally end point interventions in securing potability of water are most effective, **the very conceptualisation of the health messages, their unclear connection to local practices and their isolation from environmental/community factors needs consideration.**

The fact that contamination of water at the household has been demonstrated to be greater than at source and distribution points, is indicative of the lack of practice/implementation of the health messages. A study of health messages relating to storage/ drawing practices of potable water show that the two concerning water storage are fully adopted by most of the rural households whereas the third one regarding the use of long handled ladles for drawing of water from vessels is only partially accepted. A separate vessel kept close to the stored water is used for drawing out water for drinking/use ensures lesser contamination as compared to use of any available vessel for drawing out water for drinking. However fingers may be dipped whilst drawing water and subsequent contamination may occur.

Of the three messages related to personal hygiene, most of the households reported vigorous washing of hands with water before handling food whether for cooking or eating as the case may be. Washing of hands after defecating/washing a baby's bottom was done using soil especially when respondents were at a distance from their homes. Sometimes a piece of brick/stone was used. Washing with soap/ash is commonly practised but occurs only in the early morning when respondents are at home. The pattern in this regard was similar in DFID as well as World Bank areas.

The lack in detection of fecal coliform organisms must be accepted with caution since technical detection of fecal coliforms can be influenced by environmental stress (chlorine) that the organisms are subjected to. **Nevertheless the emergent finding was the presence of a wide series of atypical coliforms suggestive of environmental contamination from mud, soil and cattle commonly found in such households. The contamination was the greatest at the individual household level even in instances when the elevated source and taps at distribution points were contaminated.**

No direct inferences can be drawn between pollution levels in water and patterns of disease in the community which are modulated by immune mechanisms of the people as well as governed by perceptions. The notions of a "good quality" water supply by the communities as well as that of **perceived** decreasing morbidity from water-borne diseases implies that the contamination levels *prima facie* do not constitute a significant health hazard to the community who may be dealing currently with a relatively lighter load of organisms than previously seen. A comparison with control villages and a more detailed measurement of current disease load would have clarified the situation better.

The data presented shows that piped water supplies are used, apart from drinking and cooking purposes, for multiple household uses as is evident in the case of their urban counterparts. Wide use of non-metallic vessels for storing potable water, mostly in earthern containers is noted across all income groups as a result of age old cultural practices.

As regards environmental sanitation and drainage conditions, the overall picture in MRWSSP (DFID) and MRWSESP (WB) is not encouraging. Drains are generally open, filled

with filth, and choked with dirty water puddles forming on roadsides. This also increases the risk to the community from diseases like malaria. The disposal of liquid waste is wholly unsatisfactory in almost all sample villages of both project areas. With respect to solid waste disposal however, a relatively better picture emerges as a majority of households reported putting solid waste in compost pits near thier homes. As many as 82% sample households in MRWSSP and 70% in MRWSESP areas are non-users of latrines.

Some recommendations arising from this study include :

- Adoption of participatory approaches with people right from the onset.
- Maintenance of trasparency and accuracy in dialogue between the government and the people.
- Local civic bodies should be equipped to withstand interference from political parties and influential persons within their communities.
- Constant orientation and motivation of community based staff needs to be ensured.
- As opposed to piped water supply, it is felt that local water-shed management could have been far more cost effective and provided much greater community participation and self-reliance. It may have resulted in better utilisation of the DFID and World Bank project funds which was reportedly Pound Sterling 16 million and Rs. 600 crores respectively for the greater part of the last decade. We hope that the findings of this study will help in future attempts at providing drinking water to the rural areas.

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Legends to Photographs

Broken down drainage system near a standpost

A ground level private water tap

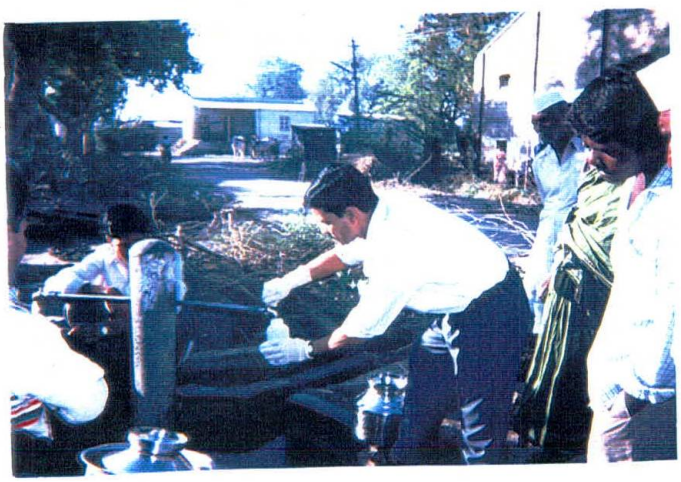
A local giving his inputs in the drawing up of a village map

An anganwadi worker explaining the six health messages

Participation of community in PRA activities

Collection of water sample from stand post for bacteriological analysis


स्वच्छतेचे सप्त संदेश
अंगणवाडी



Annexures

Annexure Table A-1
Distribution of Sample Households by Economic and Social Classes

(% of Households)

District	Economic Class	Social Classes				
		General	O.B.C.	S.C.	S.T.	All
D	1. Low Income	16.3(27.6)	75.0(10.4)	53.8(24.1)	91.7(37.9)	36.7(100)
	2. Middle Income	63.3(80.0)	25.0(2.5)	46.2(15.0)	8.3(2.5)	50.6(100)
	3. High Income	20.4(100)	—	—	—	12.7(100)
	4. All	100(63.3)	100(5.1)	100(16.4)	100(15.2)	100(100)
J	1. Low Income	13.7 (24.2)	27.8 (7.6)	62.8 (40.9)	81.8 (27.3)	33.0 (100)
	2. Middle Income	55.5 (67.7)	72.2 (13.5)	32.6 (14.6)	18.2 (4.2)	48.0 (100)
	3. High Income	30.8 (94.7)	—	4.6 (5.3)	—	19.0 (100)
	4. All	100 (58.5)	100 (9.0)	100 (21.5)	100 (11.0)	100 (100)
N	1. Low Income	7.6 (31.6)	14.3 (5.3)	41.2 (26.8)	33.3 (26.3)	16.1 (100)
	2. Middle Income	46.8 (64.9)	57.1 (7.0)	52.9 (15.8)	46.7 (12.3)	48.3 (100)
	3. High Income	45.6 (85.7)	28.6 (4.8)	5.9 (2.4)	20.0 (7.1)	35.6 (100)
	4. All	100 (67.0)	100 (5.9)	100 (14.4)	100 (12.7)	100 (100)
DFID	1. Low Income	12.2 (26.3)	31.0 (7.9)	56.2 (36.0)	69.4 (29.8)	28.7 (100)
	2. Middle Income	54.5 (69.4)	62.1 (9.3)	39.7 (15.0)	24.5 (6.3)	48.6 (100)
	3. High Income	33.3 (91.1)	6.9 (2.2)	4.1 (3.4)	6.1 (3.3)	22.7 (100)
	4. All	100 (62.0)	100 (7.3)	100 (18.4)	100 (12.3)	100 (100)
T	1. Low Income	19.6 (44.0)	11.1 (16.0)	37.5 (24.0)	44.5 (16.0)	21.0 (100)
	2. Middle Income	42.9 (44.8)	55.6 (34.5)	50.0 (13.8)	44.4 (6.9)	48.7 (100)
	3. High Income	37.5 (58.3)	33.3 (33.3)	12.5 (5.6)	11.1 (2.8)	30.3 (100)
	4. All	100 (48.7)	100 (30.3)	100 (13.4)	100 (7.6)	100 (100)
A	1. Low Income	13.4 (29.9)	20 (6.7)	30.8 (26.7)	28.9 (36.7)	20.0 (100)
	2. Middle Income	56.6 (48.8)	80.0 (9.3)	53.8 (16.3)	57.9 (25.6)	57.3 (100)
	3. High Income	30.0 (85.4)	—	15.4 (4.2)	13.2 (10.4)	22.7 (100)
	4. All	100 (50.7)	100 (6.7)	100 (17.3)	100 (25.3)	100 (100)
B	1. Low Income	4.5 (20.0)	—	14.3 (6.7)	45.8 (73.3)	14.6 (100)
	2. Middle Income	71.6 (70.6)	100 (7.4)	85.7 (8.8)	37.5 (13.2)	66.0 (100)
	3. High Income	23.9 (80.7)	—	—	16.7 (20.0)	19.4 (100)
	4. All	100 (65.0)	100 (4.9)	100 (6.8)	100 (23.3)	100 (100)
W. B.	1. Low Income	11.5 (32.9)	11.8 (8.6)	30.6 (21.4)	36.6 (37.1)	18.8 (100)
	2. Middle Income	57.7 (54.7)	64.7 (15.6)	57.1 (13.2)	49.3 (16.5)	57.0 (100)
	3. High Income	30.8 (68.9)	23.5 (13.3)	12.3 (6.7)	14.1 (11.1)	24.2 (100)
	4. All	100 (54.0)	100 (13.7)	100 (13.2)	100 (19.1)	100 (100)

Note : i. An earlier SS and PRA approaches based comparative study (NCAER 1996) showed that low (poor), middle and high income categories corrospond to annual HH incomes of up to Rs. 18,000, over Rs. 18,000 but less than 36,000 and over Rs. 36,000 respectively.

ii. Figures in paranthesis are row percentages

iii. D = Dhule, J = Jalgaon, N = Nasik, DFID = Department for International Development, T = Thane, A = Ahmednagar, B = Buldhana, W. B. = World Bank

Annexure Table A-2
Distribution of Sample Households by Economic Class and Occupation

(% of Households)

District	Economic Class	Occupation			
		Agriculture (Agri + Dairy)	Wage earner (Agri + Non Agri)	Business/ Service etc.	All
D	1. Low Income	18.6 (27.6)	84.4 (65.5)	14.3 (6.9)	36.7 (100)
	2. Middle Income	60.5 (65.0)	13.6 (7.5)	78.6 (27.5)	50.6 (100)
	3. High Income	20.9 (90.0)	—	7.1 (10.0)	12.7 (100)
	4. All	100 (54.4)	100 (27.9)	100 (17.7)	100 (100)
J	1. Low Income	14.9 (28.8)	93.5 (65.1)	14.8 (6.1)	33.0 (100)
	2. Middle Income	63.8 (84.4)	6.5 (3.1)	44.5 (12.5)	48.0 (100)
	3. High Income	21.3 (71.0)	—	40.7 (29.0)	19.0 (100)
	4. All	100 (63.5)	100 (23.0)	100 (13.5)	100 (100)
N	1. Low Income	4.9 (21.1)	92.9 (68.4)	8.7 (10.5)	16.1 (100)
	2. Middle Income	56.8 (80.7)	7.1 (1.8)	43.5 (17.5)	48.3 (100)
	3. High Income	38.3 (73.8)	—	47.8 (26.2)	35.6 (100)
	4. All	100 (68.6)	100 (11.9)	100 (19.5)	100 (100)
D F I D	1. Low Income	12.4 (27.2)	91.5 (65.8)	12.5 (7.0)	28.7 (100)
	2. Middle Income	60.9 (79.3)	8.5 (3.6)	51.6 (17.1)	48.6 (100)
	3. High Income	26.7 (74.5)	—	35.9 (25.5)	22.7 (100)
	4. All	100 (63.2)	100 (20.7)	100 (16.1)	100 (100)
T	1. Low Income	7.2 (20.0)	68.0 (68.0)	12.0 (12.0)	21.0 (100)
	2. Middle Income	55.1 (65.5)	32.0 (13.8)	48.0 (20.7)	48.7 (100)
	3. High Income	37.7 (72.2)	—	40.0 (27.8)	30.3 (100)
	4. All	100 (58.0)	100 (21.0)	100 (21.0)	100 (100)
A	1. Low Income	17.8 (53.3)	60 (20.0)	16.0 (26.7)	20.0 (100)
	2. Middle Income	66.7 (69.8)	30 (3.5)	46.0 (26.7)	57.3 (100)
	3. High Income	15.5 (41.2)	10 (2.9)	38.0 (55.9)	22.7 (100)
	4. All	100 (60.0)	100 (6.7)	100 (33.3)	100 (100)
B	1. Low Income	3.6 (13.3)	54.5 (80.0)	3.8 (6.7)	14.6 (100)
	2. Middle Income	76.4 (61.8)	36.4 (11.8)	69.2 (26.5)	66.0 (100)
	3. High Income	20.0 (55.0)	9.1 (10.0)	26.9 (35.0)	19.4 (100)
	4. All	100 (53.4)	100 (21.4)	100 (25.2)	100 (100)
W. B.	1. Low Income	10.8 (32.9)	61.4 (50.0)	11.9 (17.1)	18.8 (100)
	2. Middle Income	65.4 (66.0)	33.3 (9.0)	52.5 (25.0)	57.0 (100)
	3. High Income	23.8 (56.7)	5.3 (3.3)	35.6 (40.0)	24.2 (100)
	4. All	100 (57.5)	100 (15.3)	100 (27.2)	100 (100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages

Annexure Table A-3
Distribution of Sample Households by
Economic Class and household Head's Education Level

(% of Households)

District	Economic Class	Household Education Level			
		Illiterate	Semi Literate	Literate	All
D	1. Low Income	66.7 (41.4)	100 (3.4)	26.7 (55.2)	36.7 (100)
	2. Middle Income	33.3 (15.0)	—	56.6 (85.0)	50.6 (100)
	3. High Income	—	—	16.7 (100)	12.7 (100)
	4. All	100 (22.8)	100 (1.3)	100 (75.9)	100 (100)
J	1. Low Income	68.2 (45.5)	60.0 (4.5)	21.8 (50.0)	33.0 (100)
	2. Middle Income	25.0 (11.4)	40.0 (2.1)	55.0 (86.5)	48.0 (100)
	3. High Income	6.8 (7.9)	—	23.2 (92.1)	19.0 (100)
	4. All	100 (21.5)	100 (2.5)	100 (77.0)	100 (100)
N	1. Low Income	40.7 (57.9)	14.3 (5.3)	8.4 (36.8)	16.1 (100)
	2. Middle Income	48.2 (22.8)	71.4 (8.8)	46.4 (68.4)	48.3 (100)
	3. High Income	11.1 (7.1)	14.3 (2.4)	45.2 (90.5)	35.6 (100)
	4. All	100 (22.9)	100 (5.9)	100 (71.2)	100 (100)
D F I D	1. Low Income	59.6 (46.5)	38.5 (4.4)	19.0 (49.1)	28.7 (100)
	2. Middle Income	33.7 (15.6)	53.8 (3.6)	52.9 (80.8)	48.6 (100)
	3. High Income	6.7 (6.7)	7.7 (1.1)	28.1 (92.2)	22.7 (100)
	4. All	100 (22.4)	100 (3.3)	100 (74.3)	100 (100)
T	1. Low Income	45.8 (44.0)	—	15.1 (56.0)	21.0 (100)
	2. Middle Income	33.3 (13.8)	50.0 (1.7)	52.7 (84.5)	48.7 (100)
	3. High Income	20.9 (13.9)	50.0 (2.8)	32.2 (83.3)	30.3 (100)
	4. All	100 (20.2)	100 (1.7)	100 (78.1)	100 (100)
A	1. Low Income	33.3 (30.0)	16.7 (3.3)	17.1 (66.7)	20.0 (100)
	2. Middle Income	63.0 (19.8)	66.6 (4.7)	55.5 (75.5)	57.3 (100)
	3. High Income	3.7 (2.9)	16.7 (2.9)	27.4 (94.1)	22.7 (100)
	4. All	100 (18.0)	100 (4.0)	100 (78.0)	100 (100)
B	1. Low Income	35.3 (40.0)	100.0 (6.7)	9.4 (53.3)	14.6 (100)
	2. Middle Income	52.94 (13.24)	—	69.4 (86.8)	66.0 (100)
	3. High Income	11.8 (10.0)	—	45.2 (90.5)	35.6 (100)
	4. All	100 (22.9)	100 (1.0)	100 (82.5)	100 (100)
W. B.	1. Low Income	38.2 (37.1)	22.2 (2.9)	14.2 (60.0)	18.8 (100)
	2. Middle Income	50.0 (16.0)	55.6 (2.4)	58.6 (81.6)	57.0 (100)
	3. High Income	11.8 (8.9)	22.2 (2.2)	27.2 (88.9)	24.2 (100)
	4. All	100 (18.3)	100 (2.4)	100 (79.3)	100 (100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

iii. Illiterate - can't read/write's Semiliterate - can read and write without formal schooling, Literate - Formal Schooling - primary level and beyond.

Annexure Table A-4

Make of Vessels used for Carrying Water from Source to Residence

(% of households)

District	Economic Classes	Type of Water Carrying Vessel		
		Metallic	Non-metallic	Total
D	Low Income	39.1(93.1)	20.0(6.9)	36.7(100)
	Middle Income	50.7(87.5)	50.0(12.5)	50.6(100)
	High Income	10.1(70.0)	30.0(30.0)	12.7(100)
	All	100(87.3)	100(12.7)	100(100)
J	Low Income	33.7(94.0)	33.3(6.0)	33.7(100)
	Middle Income	47.1(93.6)	50.0(6.4)	47.2(100)
	High Income	19.2(94.7)	16.7(5.3)	19.1(100)
	All	100(93.9)	100(6.1)	100(100)
N	Low Income	14.2(78.9)	30.8(21.1)	16.0(100)
	Middle Income	49.0(91.2)	38.4(8.8)	47.9(100)
	High Income	36.8(90.6)	30.8(9.4)	36.1(100)
	All	100(89.1)	100(10.9)	100(100)
D F I D	Low Income	29.0(91.3)	28.6(8.7)	29.0(100)
	Middle Income	48.3(91.6)	45.7(8.4)	48.1(100)
	High Income	22.7(90.1)	25.7(9.8)	22.9(100)
	All	100(91.2)	100(9.8)	100(100)
T	Low Income	21.9(100)	—	21.0(100)
	Middle Income	49.1(96.6)	40.0(3.4)	48.7(100)
	High Income	28.9(91.7)	60.0(8.3)	30.3(100)
	All	100(95.8)	100(4.2)	100(100)
A	Low Income	20.6(96.7)	11.1(3.3)	20.0(100)
	Middle Income	57.4(94.2)	55.6(5.8)	57.3(100)
	High Income	22.0(91.2)	33.3(8.8)	22.7(100)
	All	100(94.0)	100(6.0)	100(100)
B	Low Income	15.0(100)	—	14.6(100)
	Middle Income	66.0(97.1)	66.6(2.9)	66.0(100)
	High Income	19.0(95.0)	33.3(5.0)	19.4(100)
	All	100(97.1)	100(2.9)	100(100)
W. B.	Low Income	19.4(98.6)	5.9(1.4)	18.8(100)
	Middle Income	57.2(95.8)	52.9(4.2)	57.0(100)
	High Income	23.4(92.2)	41.2(7.8)	24.2(100)
	All	100(95.4)	100(4.6)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

iii. Metallic - Brass + Steel + Copper

iv. Non-metal - Plastic + Earthen

Annexure Table A-4-B
Make of Water Storage Vessels

(% Households)

District	Economic Classes	Make of Water Storage Vessels		
		Metallic	Non-metallic	Total
D	Low Income	19.5(24.1)	51.2(75.9)	36.7(100)
	Middle Income	69.4(62.5)	34.9(37.5)	50.6(100)
	High Income	11.1(40.0)	13.9(60.0)	12.7(100)
	All	100(45.6)	100(54.4)	100(100)
J	Low Income	48.0(35.8)	28.9(64.2)	33.7(100)
	Middle Income	44.0(23.4)	48.3(76.5)	47.2(100)
	High Income	8.0(10.5)	22.8(89.5)	19.1(100)
	All	100(25.6)	100(74.9)	100(100)
N	Low Income	18.5(26.3)	15.4(73.7)	16.1(100)
	Middle Income	55.6(26.3)	46.2(73.7)	48.3(100)
	High Income	25.9(16.7)	38.4(83.3)	35.6(100)
	All	100(22.9)	100(77.1)	100(100)
D F I D	Low Income	31.9(31.3)	27.9(68.7)	29.0(100)
	Middle Income	54.9(32.5)	45.6(67.5)	48.2(100)
	High Income	13.2(16.7)	26.5(83.3)	22.7(100)
	All	100(28.5)	100(71.5)	100(100)
T	Low Income	18.8(48.0)	23.6(52.0)	21.0(100)
	Middle Income	46.9(51.7)	50.9(48.3)	48.7(100)
	High Income	34.3(61.1)	25.5(38.9)	30.3(100)
	All	100(53.8)	100(46.2)	100(100)
A	Low Income	15.9(43.3)	25.0(56.7)	20.0(100)
	Middle Income	58.5(55.8)	55.9(44.2)	57.3(100)
	High Income	25.6(61.8)	19.1(38.2)	22.7(100)
	All	100(54.7)	100(45.3)	100(100)
B	Low Income	10.0(33.3)	18.9(66.6)	14.6(100)
	Middle Income	66.0(48.5)	66.0(51.5)	66.0(100)
	High Income	24.0(60.0)	15.1(40.0)	19.4(100)
	All	100(48.5)	100(51.5)	100(100)
W. B.	Low Income	15.3(42.9)	22.7(57.1)	18.8(100)
	Middle Income	56.6(52.4)	57.4(47.6)	56.9(100)
	High Income	28.1(61.1)	19.9(38.9)	24.3(100)
	All	100(52.7)	100(47.3)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

iii. Metallic - Brass + Steel + Copper

iv. Non-metal - Plastic + Earthen

Annexure Table A-5
Distribution of Sample Households by Water Carrying Practices

(% Households)

District	Economic Classes	Private Tap				Stand Post			
		Tap	Covered	Un covered	Total	Tap	Covered	Un covered	Total
D	Low Income	16.7(14.3)	----	27.3(85.7)	24.6(100)	----	----	66.7(100)	66.7 (100)
	Middle Income	58.3(20.0)	100(2.9)	61.4(77.1)	61.4(100)	----	----	23.8(100)	23.8(100)
	High Income	25.0(37.5)	----	11.3(62.5)	14.0(100)	----	----	9.5(100)	9.5(100)
	All	100(21.1)	100(1.8)	100(77.0)	100(100)	----	----	100(100)	100(100)
J	Low Income	----	----	12.9(100)	10.1(100)	50.0(1.9)	----	55.9(98.1)	53.5(100)
	Middle Income	80.0(21.4)	100(1.8)	50.6(76.8)	55.4(100)	----	----	40.9(100)	38.3(100)
	High Income	20.0(8.8)	----	36.5(91.2)	34.5(100)	50.0(25.0)	----	3.2(75)	8.2(100)
	All	100(15.9)	100(1.0)	100(84.1)	100(100)	100(2.1)	----	100(97.9)	100(100)
N	Low Income	----	----	12.9(100)	4.3(100)	----	----	23.6(100)	23.6(100)
	Middle Income	44.4(21.1)	----	44.2(78.9)	42.2(100)	----	----	51.4(100)	51.4(100)
	High Income	55.6(21.7)	----	52.9(78.3)	53.5(100)	----	----	25.0(100)	25.0(100)
	All	100(20.9)	----	100(79.1)	100(100)	----	----	100(100)	100(100)
D F I D	Low Income	6.1(8.0)	----	15.6(92)	14.5(100)	50.0(1.4)	-----	40.6(98.6)	40.7(100)
	Middle Income	69.7(22.3)	100(1.9)	59.9(85.8)	59.8(100)	----	----	44.4(100)	43.9(100)
	High Income	24.2(18.2)	----	24.5(81.8)	25.6(100)	50.0(3.6)	----	15.0(96.4)	15.4(100)
	All	100(19.2)	100(1.2)	100(85.5)	100(100)	100(1.1)	----	100(98.9)	100(100)
T	Low Income	8.3(25.0)	----	7.0(75.0)	7.7(100)	----	----	22(100)	21.6(100)
	Middle Income	66.7(22.9)	----	62.0(77.1)	67.3(100)	100(3.0)	----	64(97.0)	64.7(100)
	High Income	25.0(23.0)	----	31.0(76.9)	25.0(100)	----	----	14(100)	13.7(100)
	All	100(23.0)	----	100(77.0)	100(100)	100(2.0)	----	100(98)	100(100)
A	Low Income	----	----	10.8(100)	9.4(100)	----	----	43.1(100)	43.1(100)
	Middle Income	45.5(7.1)	100(2.9)	67.7(90)	66.0(100)	----	----	40.9(100)	40.9(100)
	High Income	54.5(23.1)	----	21.5(76.9)	24.6(100)	----	----	16.0(10)	16.0(100)
	All	100(10.4)	100(1.9)	100(87.7)	100(100)	----	----	100(100)	100(100)
B	Low Income	19.4(36.8)	----	22.6(63.2)	21.1(100)	15.8(50)	----	50(50)	20.7(100)
	Middle Income	47.2(41.5)	100(2.4)	43.4(56.0)	45.6(100)	68.4(68.4)	75(15.8)	50(15.8)	65.5(100)
	High Income	33.4(40.0)	----	34.0(60.0)	33.3(100)	15.8(75)	25(25)	----	13.8(100)
	All	100(40)	100(1.1)	100(58.9)	100(100)	65.5(100)	13.5(100)	20.7(100)	100(100)
W. B.	Low Income	13.6(25)	----	15.5(75)	13.1(100)	15.8(8.6)	-----	33.7(91.4)	29.7(100)
	Middle Income	50.8(20.8)	100(2.1)	57.5(77.1)	59.0(100)	68.4(19.7)	75(4.5)	52.6(75.8)	55.9(100)
	High Income	35.6(30.9)	----	27.0(69.1)	27.9(100)	15.8(17.6)	25(5.9)	13.7(76.5)	14.4(100)
	All	(100)24.1	(100)1.2	(100)76.6	(100)100	(100)16.1	(100)3.4	80.5(100)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

Annexure Table A-6
Distribution of Sample Households
by Drinking Water Storage Method

(% of Households)

District	Economic Class	Drinking Water Storage Medhod			
		Pedstal	Elevated Place	On Floor	Total
D	Low Income	25.0(56.8)	36.2(36.3)	100(6.9)	36.7(100)
	Middle Income	37.5(7.5)	53.6(92.5)	—	50.6(100)
	High Income	37.5(30)	10.2(70)	—	12.7(100)
	All	100(10.1)	100(87.3)	100(2.5)	100(100)
J	Low Income	31.4(56.9)	26.3(30.7)	61.5(12.3)	32.7(100)
	Middle Income	51.7(64.9)	51.2(30.9)	30.8(4.2)	48.2(100)
	High Income	16.9(52.6)	22.4(44.7)	7.7(2.7)	19.1(100)
	All	100(59.3)	100(34.2)	100(5.5)	100(100)
N	Low Income	9.2(31.5)	20.4(52.6)	60(15.8)	15.9(100)
	Middle Income	41.5(47.4)	59.2(50.9)	20(1.7)	47.9(100)
	High Income	49.2(74.4)	20.4(23.3)	20(2.3)	36.2(100)
	All	100(54.6)	100(41.1)	100(4.2)	100(100)
D F I D	Low Income	23.6(39.8)	31.4(48.7)	65(11.5)	29.3(100)
	Middle Income	47.6(47.6)	54.3(49.7)	25(2.6)	49.5(100)
	High Income	28.8(67.0)	14.3(30.5)	10(2.4)	21.2(100)
	All	100(49.5)	100(45.3)	100(5.2)	100(100)
T	Low Income	28.1(36.0)	15.6(28.0)	21.4(36.0)	21.0(100)
	Middle Income	37.5(20.7)	53.3(41.4)	52.4(37.9)	48.7(100)
	High Income	34.3(30.6)	31.1(38.9)	26.2(30.5)	30.2(100)
	All	100(15.2)	100(15.2)	100(69.6)	100(100)
N	Low Income	20.0(40.0)	19.2(46.6)	23.5(13.3)	20.0(100)
	Middle Income	51.7(36.0)	60.3(51.2)	64.7(12.8)	57.3(100)
	High Income	28.3(50.0)	20.5(44)	11.8(6.0)	22.7(100)
	All	100(40.0)	100(48.7)	100(11.3)	100(100)
B	Low Income	—	13.6(80.0)	19.9(20.0)	14.6(100)
	Middle Income	—	69.3(89.7)	46.7(10.3)	66.0(100)
	High Income	—	17.1(75.0)	33.4(25.0)	19.4(36.1)
	All	—	100(85.4)	100(14.6)	100(100)
W. B.	Low Income	22.8(30.0)	16.0(47.1)	21.6(22.9)	18.8(100)
	Middle Income	46.7(20.2)	62.6(60.8)	54.1(19.0)	57.0(100)
	High Income	30.5(31.1)	21.4(48.9)	24.3(19.9)	24.2(100)
	All	100(24.7)	100(55.3)	100(19.9)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

Annexure Table A-6-B
Distribution of Sample Household by
Water Storing Practices

(% Households)

District	Economic Classes	Private Tap			Stand Post		
		DW + CW	DW & CW Separate	Total	DW + CW	DW & CW Separate	Total
D	Low Income	33.3(85.7)	9.8(14.3)	24.6(100)	64.3(64.3)	71.4(35.7)	66.7(100)
	Middle Income	52.8(54.3)	76.2(45.7)	61.4(100)	28.6(80.0)	14.3(200)	23.8(100)
	High Income	13.9(62.5)	14.0(37.5)	14.0(100)	7.1(50.0)	14.3(50.0)	9.5(100)
	All	100(63.2)	100(36.8)	100(100)	100(66.7)	100(33.3)	100(100)
J	Low Income	11.7(63.6)	9.8(36.4)	10.9(100)	57.9(62.3)	47.6(37.7)	53.5(100)
	Middle Income	63.3(67.9)	43.9(32.1)	55.4(100)	36.8(56.8)	38.0(43.2)	37.4(100)
	High Income	25.0(44.1)	46.3(55.9)	33.7(100)	5.3(33.3)	14.3(66.6)	9.1(100)
	All	100(59.4)	100(40.6)	100(100)	100(57.6)	100(42.4)	100(100)
N	Low Income	3.7(100)	—	2.3(100)	21.2(64.7)	27.2(35.3)	22.9(100)
	Middle Income	55.6(78.9)	25.0(21.1)	44.2(100)	57.7(81.1)	31.8(18.9)	50.0(100)
	High Income	40.7(47.8)	75.0(52.2)	53.5(100)	21.1(55.0)	40.9(45.0)	27.1(100)
	All	100(53.5)	100(46.5)	100(100)	100(70.3)	100(29.7)	100(100)
D F I D	Low Income	16.3(76.9)	7.7(23.1)	12.9(100)	43.1(63.1)	43.7(36.9)	43.3(100)
	Middle Income	58.5(65.5)	48.7(34.5)	54.7(100)	44.7(69.6)	33.8(30.4)	40.7(100)
	High Income	25.2(47.7)	43.6(52.3)	32.3(100)	12.2(48.4)	22.5(51.6)	16.0(100)
	All	100(61.2)	100(38.8)	100(100)	100(63.4)	100(36.6)	100(100)
T	Low Income	7.7(75)	7.7(25)	7.7(100)	20.5(88.9)	10.0(11.1)	18.4(100)
	Middle Income	61.5(68.6)	84.6(31.4)	67.3(100)	66.7(78.8)	70.0(21.2)	67.3(100)
	High Income	30.8(92.3)	7.7(7.7)	25.0(100)	12.8(71.4)	20.0(28.6)	14.3(100)
	All	100(75)	100(25)	100(100)	100(79.6)	100(20.4)	100(100)
A	Low Income	14.6(66.7)	4.9(33.3)	8.8(100)	53.3(88.9)	20.0(11.1)	45.0(100)
	Middle Income	63.4(38.2)	68.9(61.8)	66.7(100)	36.7(31.2)	50.0(68.8)	25.0(100)
	High Income	22.0(36.0)	26.2(64.0)	24.5(100)	10.0(50.0)	30.0(50.0)	30.0(100)
	All	100(40.2)	100(59.8)	100(100)	100(75)	100(25)	100(100)
B	Low Income	20.4(52.6)	22.0(47.4)	21.1(100)	16.7(33.3)	26.6(66.6)	22.2(100)
	Middle Income	42.9(51.2)	48.8(48.8)	45.6(100)	66.7(47.1)	60.0(52.9)	60.0(100)
	High Income	36.7(60.0)	29.2(40.0)	33.3(100)	16.6(50.0)	13.4(50.0)	17.8(100)
	All	100(54.4)	100(45.6)	100(100)	100(44.4)	100(55.6)	100(100)
W. B.	Low Income	14.7(59.4)	11.3(40.6)	13.1(100)	32.1(78.8)	20.0(21.2)	28.4(100)
	Middle Income	55.0(49.3)	63.5(50.7)	59.0(100)	55.6(68.2)	60.0(31.8)	56.9(100)
	High Income	30.3(57.4)	25.2(42.6)	27.9(100)	12.3(58.8)	20.0(41.2)	14.7(100)
	All	100(52.9)	100(47.1)	100(100)	100(69.8)	100(30.2)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

iii DW - Drinking Water

iv CW - Water for Cooking

v DW + CW - Drinking and Cooking water in same utensal

Annexure Table A-7
Distribution of Sample Households by
Drinking Water Drawing Practices

(% of Households)

District	Economic Class	Drinking Water Drawing Practices			
		Directly from pot any vessel	By long handled vessel/pot	Use of separate pot without handle	Total
D	Low Income	58.3(6.9)	25.0(86.2)	34.5(6.9)	36.7(100)
	Middle Income	33.3(10.0)	41.7(12.5)	56.4(77.5)	50.6(100)
	High Income	8.3(10.0)	33.3(40.0)	9.1(50.0)	12.7(100)
	All	100(15.2)	100(15.2)	100(69.6)	100(100)
J	Low Income	35.1(19.4)	20.5(11.9)	37.4(68.7)	33.7(100)
	Middle Income	43.2(17.0)	53.8(22.3)	46.3(60.6)	47.2(100)
	High Income	21.6(21.0)	25.7(26.3)	16.3(52.6)	19.1(100)
	All	100(18.6)	100(19.6)	100.(61.8)	100(100)
N	Low Income	30.0(63.2)	21.0(21.0)	5.0(15.8)	16.0(100)
	Middle Income	60.0(42.1)	21.0(7.0)	48.3(50.9)	47.9(100)
	High Income	10.0(9.3)	58.0(25.6)	46.7(65.1)	36.1(100)
	All	100(33.6)	100(16.0)	100(50.4)	100(100)
D F I D	Low Income	36.0(27.8)	21.4(13.0)	28.6(59.1)	28.9(100)
	Middle Income	49.4(23.0)	42.9(15.7)	49.2(61.3)	48.2(100)
	High Income	14.6(14.3)	35.7(27.5)	22.2(58.2)	22.9(100)
	All	100(22.4)	100(17.6)	100(59.9)	100(100)
T	Low Income	46.1(24.0)	13.8(16.0)	19.5(60.0)	21.0(100)
	Middle Income	46.1(10.3)	27.6(13.8)	57.1(75.9)	48.7(100)
	High Income	7.8(2.8)	58.6(47.2)	23.4(50.0)	30.2(100)
	All	100(10.9)	100(24.4)	100(64.7)	100(100)
A	Low Income	37.2(53.3)	21.4(20.0)	10.1(26.7)	20.0(100)
	Middle Income	55.8(27.9)	53.6(17.4)	59.5(54.7)	57.3(100)
	High Income	7.0(8.8)	25.0(20.6)	30.4(70.6)	22.7(100)
	All	100(28.7)	100(18.7)	100.(52.6)	100(100)
B	Low Income	—	12.5(33.3)	15.8(66.7)	14.6(100)
	Middle Income	—	62.5(36.8)	68.3(63.2)	66.0(100)
	High Income	—	25.0(50.0)	15.9(50.0)	19.4(100)
	All	—	100(38.8)	100(61.2)	100(100)
W. B.	Low Income	39.3(31.4)	15.5(21.4)	15.1(47.1)	18.8(100)
	Middle Income	53.6(14.2)	49.5(22.6)	61.2(63.2)	56.9(100)
	High Income	7.1(4.4)	35.0(37.8)	23.7(57.8)	24.3(100)
	All	100(15.1)	100(26.1)	100(58.8)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

Annexure Table A-8
Distribution of Sample Households by Water Storing Place

(% Households)

District	Economic Classes	Private			Stand Post		
		Safe	Unsafe	Total	Safe	Unsafe	All
D	Low Income	19.4(50.0)	33.3(50.0)	24.7(100)	60(42.9)	72.7(57.1)	66.7(100)
	Middle Income	61.2(62.9)	61.9(37.1)	61.3(100)	20(40.0)	27.3(60.0)	23.8(100)
	High Income	19.4(87.5)	4.8(12.5)	14.0(100)	20(100)	—	9.5(100)
	All	100(63.2)	100(36.8)	100(100)	100(47.6)	100(52.4)	100(100)
J	Low Income	9.1(54.5)	14.7(45.5)	11(100)	42.9(56.6)	79.3(43.4)	53.5(100)
	Middle Income	45.5(53.6)	76.4(46.4)	56(100)	45.7(84.2)	20.7(15.8)	38.4(100)
	High Income	45.4(90.9)	8.8(9.1)	33(100)	11.4(100)	—	8.1(100)
	All	100(66)	100(34)	100(100)	100(70.7)	100(29.3)	100(100)
N	Low Income	—	2.3(100)	2.3(100)	18.9(55.6)	38.1(44.4)	24.3(100)
	Middle Income	33.3(52.6)	44.2(47.4)	44.2(100)	52.8(73.7)	47.6(26.3)	51.4(100)
	High Income	66.7(86.9)	53.4(13.1)	53.5(100)	28.3(83.3)	14.3(16.7)	24.3(100)
	All	100(69.8)	100(30.2)	100(100)	100(71.6)	100(28.4)	100(100)
D F I D	Low Income	9.8(50.0)	19.1(50.0)	13.0(100)	34.5(49.4)	63.9(50.5)	43.8(100)
	Middle Income	46.9(56.4)	70.6(43.6)	55.0(100)	46.6(76.5)	31.1(23.5)	41.8(100)
	High Income	43.2(89.1)	10.3(10.9)	32.0(100)	18.9(89.3)	4.9(10.7)	14.4(100)
	All	100(66.0)	100(34.0)	100(100)	100(68.6)	100(31.4)	100(100)
T	Low Income	6.1(50.0)	10.5(50.0)	7.7(100)	24.2(72.7)	16.7(27.2)	21.6(100)
	Middle Income	60.6(57.1)	78.9(42.9)	67.3(100)	60.6(60.6)	72.2(39.4)	64.7(100)
	High Income	33.3(84.6)	10.5(15.4)	25.0(100)	15.2(71.4)	11.1(28.6)	13.7(100)
	All	100(63.5)	100(36.5)	100(100)	100(64.7)	100(35.3)	100(100)
A	Low Income	6.7(55.6)	14.8(44.4)	8.8(100)	38.5(55.6)	57.1(44.4)	45.0(100)
	Middle Income	66.7(73.5)	66.7(26.5)	66.7(100)	42.3(68.8)	35.7(31.2)	40.0(100)
	High Income	26.6(80.0)	18.5(20.0)	24.5(100)	19.2(83.3)	7.2(16.7)	15.0(100)
	All	100(73.5)	100(26.5)	100(100)	100(65)	100(35)	100(100)
B	Low Income	17.5(52.6)	27.3(47.4)	21.1(100)	14.2(33.3)	30.8(66.6)	22.2(100)
	Middle Income	52.6(73.2)	33.3(26.8)	45.6(100)	64.3(52.9)	61.5(47.1)	62.9(100)
	High Income	29.8(56.7)	39.4(43.3)	33.3(100)	21.4(75)	7.7(25)	14.9(100)
	All	100(63.3)	100(36.7)	100(100)	100(51.9)	100(48.1)	100(100)
W. B.	Low Income	10.3(53.1)	18.9(46.9)	13.1(100)	27.4(57.1)	33.3(42.9)	29.7(100)
	Middle Income	60.6(69.4)	55.7(30.6)	59.0(100)	54.8(60.6)	57.8(39.4)	55.9(100)
	High Income	29.0(70.6)	25.3(29.4)	27.9(100)	17.8(76.4)	8.9(23.5)	14.4(100)
	All	100(67.6)	100(32.4)	100(100)	100(61.9)	100(38.1)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

iii. Safe place : Kitchen, Dinning place etc.

iv. Unsafe place : Close to bathroom, sink or drain, outside in courtyard.

Annexure Table A-9
Water Storage Vessel Cleaning Frequency

(% Households)

District	Economic Classes	Private			Stand Post		
		Regular	Irregular	Total	Regular	Irregular	Total
D	Low Income	24.0(92.9)	33.3(7.1)	24.6(100)	70(100)	—	66.7(100)
	Middle Income	61.1(94.3)	66.6(5.7)	61.4(100)	20(100)	—	23.8(100)
	High Income	14.9(100)	—	14.0(100)	10(50)	100(50)	9.5(100)
	All	100(94.7)	100(5.3)	100(100)	100(95.2)	100(4.8)	100(100)
J	Low Income	11.7(100)	—	10.9(100)	53.2(94.3)	60(5.6)	53.5(100)
	Middle Income	53.2(89.3)	85.7(10.7)	55.4(100)	39.4(97.3)	20(2.6)	38.4(100)
	High Income	35.1(97.1)	14.3(2.9)	33.7(100)	7.4(87.5)	20(12.5)	8.1(100)
	All	100(93.1)	100(6.9)	100(100)	100(94.9)	100(5.1)	100(100)
N	Low Income	2.3(100)	—	2.3(100)	23.9(100)	—	23.6(100)
	Middle Income	44.2(100)	—	44.2(100)	52.1(100)	—	51.4(100)
	High Income	53.5(100)	—	53.5(100)	24.0(94.4)	100(5.6)	25.0(100)
	All	100(100)	—	100(100)	100(98.6)	100(1.4)	100(100)
D F I D	Low Income	13.1(96.2)	10(3.8)	12.9(100)	43.8(96.4)	42.9(3.6)	43.8(100)
	Middle Income	53.4(92.7)	80(7.3)	54.7(100)	42.7(98.8)	14.2(1.2)	41.7(100)
	High Income	33.5(98.5)	10(1.5)	32.3(100)	13.5(89.3)	42.9(10.7)	14.5(100)
	All	100(95.0)	100(49)	100(100)	100(96.4)	100(3.6)	100(100)
T	Low Income	9.5(100)	—	7.7(100)	21.6(100)	—	21.6(100)
	Middle Income	61.9(97.1)	100(2.9)	67.3(100)	64.7(100)	—	64.7(100)
	High Income	28.6(100)	—	25.0(100)	13.7(100)	—	13.7(100)
	All	100(98.1)	100(1.9)	100(100)	100(100)	—	100(100)
A	Low Income	8.9(100)	—	8.8(100)	47.4(100)	—	45(100)
	Middle Income	66.3(98.5)	100(1.5)	66.7(100)	42.1(100)	—	40(100)
	High Income	24.8(100)	—	24.5(100)	10.5(66.6)	100(33.3)	15(100)
	All	100(99.0)	100(1.0)	100(100)	100(95)	100(5)	100(100)
B	Low Income	21.1(100)	—	20.7(100)	37.5(100)	—	37.5(100)
	Middle Income	45.6(97.6)	50(2.4)	45.7(100)	50.0(100)	—	50.0(100)
	High Income	33.3(96.8)	50(3.2)	33.6(100)	12.5(100)	—	12.5(100)
	All	100(97.8)	100(2.2)	100(100)	100(100)	—	100(100)
W. B.	Low Income	13.2(100)	—	13.0(100)	33.6(100)	—	33.1(100)
	Middle Income	58.4(97.9)	100(2.1)	58.9(100)	54.1(100)	—	53.2(100)
	High Income	28.4(100)	—	28.1(100)	12.3(88.2)	100(11.8)	13.7(100)
	All	100(98.8)	100(1.2)	100(100)	100(98.3)	100(1.6)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

iii. Regular = Daily once or more i.e. as and when tap water is supplied.

iv. Irregular = Alternate days or less frequently.

Annexure Table A-10
Method of Disposal of Household Waste Water in Village

(% of Households)

District	Economic Class	Disposal of Waste Water				
		Near Home	Road	Kitchengarden Sockage pit	Drain	All
D	Low Income	83.3(17.2)	60(10.3)	—	30.9(72.5)	36.7(100)
	Middle Income	16.7(2.5)	40(5.0)	—	54.5(92.5)	50.6(100)
	High Income	—	—	—	14.6(100)	12.7(100)
	All	100(7.6)	100(6.3)	—	100(86.1)	100(100)
J	Low Income	67.6(34.3)	38.7(17.9)	33.3(9.0)	22.6(38.8)	33.8(100)
	Middle Income	20.6(7.5)	45.2(15.1)	50.0(9.7)	54.8(67.7)	47.0(100)
	High Income	11.8(4.5)	16.1(16.3)	16.7(9.3)	22.6(69.8)	19.2(100)
	All	100(17.2)	100(15.7)	100(9.0)	100(58.1)	100(100)
N	Low Income	26.7(21.1)	16.7(26.3)	25.0(10.5)	12.1(42.1)	16(100)
	Middle Income	60.0(15.8)	60.0(31.6)	25.0(3.5)	42.4(49.1)	47.9(100)
	High Income	13.3(4.7)	23.3(16.3)	50.0(9.2)	45.5(69.8)	36.1(100)
	All	100(12.6)	100(25.2)	100(6.7)	100(55.5)	100(100)
DFID	Low Income	58.2(27.8)	30.3(17.4)	30.8(7.0)	22.1(47.8)	29.0(100)
	Middle Income	30.9(8.9)	51.5(17.9)	42.3(5.8)	51.4(67.4)	48.0(100)
	High Income	10.9(6.6)	18.2(13.2)	26.9(7.7)	26.5(72.5)	23.0(100)
	All	100(13.9)	100(16.7)	100(6.6)	100(62.9)	100(100)
T	Low Income	42.9(24.0)	20.5(64.0)	20.0(4.0)	9.0(8.0)	21.0(100)
	Middle Income	50.0(12.1)	48.7(65.5)	60.0(5.2)	45.5(17.2)	48.7(100)
	High Income	7.1(2.8)	30.8(66.7)	20.0(2.8)	45.5(27.7)	30.3(100)
	All	100(11.8)	100(65.5)	100(4.2)	100(18.4)	100(100)
A	Low Income	29.5(43.3)	47.4(30.0)	5.3(10.0)	16.1(16.7)	20.0(100)
	Middle Income	59.1(30.2)	52.6(11.6)	64.3(41.9)	45.2(16.3)	57.3(100)
	High Income	11.4(14.7)	—	30.4(50.0)	38.7(35.3)	22.7(100)
	All	100(29.3)	100(12.7)	100(37.3)	100(20.7)	100(100)
B	Low Income	38.9(46.7)	13.0(20.0)	7.1(20.0)	10.0(13.3)	14.6(100)
	Middle Income	44.4(11.8)	69.6(23.5)	66.7(41.2)	80.0(23.5)	66.0(100)
	High Income	16.7(15.0)	17.4(20.0)	26.2(55.0)	10.0(10.0)	19.3(100)
	All	100(17.5)	100(22.3)	100(40.8)	100(19.4)	100(100)
W.B.	Low Income	34.2(37.1)	23.3(40.0)	6.8(10.0)	12.3(12.9)	18.8(100)
	Middle Income	53.9(19.3)	53.3(30.2)	65.0(31.6)	54.8(18.9)	57.0(100)
	High Income	11.8(10.0)	23.3(31.1)	28.2(32.2)	32.9(26.7)	24.2(100)
	All	100(20.4)	100(32.3)	100(27.7)	100(19.6)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

Annexure Table A-11
Method of Disposal of Cattleshed Waste Water in Village

(% of Households)

District	Economic Class	Disposal of Cattleshed Waste Water				
		Home	Road/land	Compost Pit	Drainage	Total
D	Low Income	100(6.9)	50.0(13.8)	50.0(13.8)	31.1(65.5)	36.7(100)
	Middle Income	—	37.5(7.5)	25.0(5.0)	57.4(87.5)	50.6(100)
	High Income	—	12.5(10.0)	25.0(20.0)	11.5(70.0)	12.7(100)
	All	100(2.5)	100(10.1)	100(10.1)	100(77.2)	100(100)
J	Low Income	50.0(7.5)	40.0(17.9)	16.7(4.5)	33.6(70.1)	33.8(100)
	Middle Income	40.0(4.3)	36.7(11.8)	61.1(11.8)	47.9(72.0)	47.0(100)
	High Income	10.0(3.0)	23.3(21.2)	22.2(12.1)	18.5(63.7)	19.2(100)
	All	100(5.1)	100(15.2)	100(9.1)	100(70.7)	100(100)
N	Low Income	13.3(10.4)	25.0(5.3)	14.3(26.3)	16.9(58.0)	16.0(100)
	Middle Income	53.3(14.0)	75.0(5.3)	45.7(28.0)	46.2(52.7)	47.9(100)
	High Income	33.4(11.16)	—	40.0(37.6)	36.9(50.8)	36.1(100)
	All	100(12.6)	100(3.4)	100(29.4)	100(54.6)	100(100)
D F I D	Low Income	42.4(8.3)	37.3(8.2)	22.3(15.8)	24.2(67.7)	28.2(100)
	Middle Income	46.7(8.9)	35.3(7.1)	43.6(14.7)	49.4(69.3)	47.8(100)
	High Income	10.9(7.3)	27.4(13.4)	34.1(25.3)	26.4(54.0)	24.0(100)
	All	100(6.6)	100(9.5)	100(14.3)	100(69.6)	100(100)
T	Low Income	—	16.2(44.0)	33.3(4.0)	21.2(52.0)	21.0(100)
	Middle Income	100(1.7)	52.9(62.1)	33.3(1.7)	45.3(34.5)	48.7(100)
	High Income	—	30.9(58.3)	33.3(2.8)	33.5(38.9)	30.3(100)
	All	100(0.8)	100(57.1)	100(2.5)	100(39.6)	100(100)
A	Low Income	32.1(30.0)	31.3(16.7)	7.1(10.0)	20.3(43.3)	20.0(100)
	Middle Income	60.7(19.8)	50.0(9.3)	59.5(29.1)	56.3(41.8)	57.3(100)
	High Income	7.2(5.9)	18.7(8.8)	33.4(41.2)	23.4(44.1)	22.7(100)
	All	100(18.7)	100(10.7)	100(28.0)	100(42.6)	100(100)
B	Low Income	12.5(20.0)	12.5(26.7)	—	24.2(53.3)	14.6(100)
	Middle Income	83.3(29.4)	81.3(38.2)	50(10.3)	45.5(22.1)	66.0(100)
	High Income	4.2(7.5)	6.2(7.5)	50(35.0)	30.3(50.0)	19.4(100)
	All	100(23.3)	100(31.1)	100(13.6)	100(32.0)	100(100)
W. B.	Low Income	22.6(17.1)	17.2(28.6)	7.3(5.7)	23.6(48.6)	18.8(100)
	Middle Income	71.7(17.9)	60.3(33.0)	52.7(15.6)	49.3(33.5)	57.0(100)
	High Income	5.7(3.3)	22.4(28.8)	40.0(24.4)	27.1(43.5)	24.2(100)
	All	100(14.2)	100(31.2)	100(15.9)	100(38.7)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

Annexure Table A-12
Method of Disposal of Solid Waste in village

(% of households)

District	Economic Class	Disposal of Solid Waste					
		Near Home	Compost	Common place in village	Any Where in village	Other Place	Total
D	Low	75.0(10.3)	31.9(51.7)	50.0(20.7)	—	31.3(17.2)	36.7(100)
	Middle	25.0(2.5)	48.9(57.5)	50.0(15.0)	—	62.5(25.0)	50.6(100)
	High	—	19.1(90.0)	—	—	6.2(10.0)	12.7(100)
	All	100 (5.1)	100 (59.5)	100(15.2)	—	100(20.3)	100(100)
J	Low	56.3(13.4)	34.0(77.6)	16.7(3.0)	100(1.5)	18.8(4.5)	33.8(100)
	Middle	31.3(5.4)	47.7(78.5)	50.0(6.5)	—	56.2(9.7)	47.0(100)
	High	12.4(6.1)	18.3(73.7)	33.3(10.5)	—	25.0(9.6)	19.2(100)
	All	100 (8.1)	100 (77.3)	100 (6.1)	100 (0.5)	100 (8.0)	100(100)
N	Low	33.3(5.3)	14.8(84.2)	25.0(5.3)	—	33.3(5.3)	16.0(100)
	Middle	66.7(3.5)	49.1(93.0)	—	—	33.3(3.5)	47.9(100)
	High	—	36.1(90.7)	75.0(7.0)	—	33.3(2.3)	36.1(100)
	All	100(2.5)	100(90.8)	100(3.4)	—	100(3.3)	100 (100)
D F I D	Low	56.5(11.5)	26.9(73.5)	32.1(8.0)	33.3(0.9)	21.2(6.2)	28.6(100)
	Middle	34.8(4.2)	48.4(77.6)	42.9(6.2)	66.6(1.0)	63.6(10.9)	48.6(100)
	High	8.7(1.8)	24.7(38.4)	25.0(6.3)	—	15.2(3.5)	22.8(100)
	All	100(5.8)	100(78.0)	100(7.1)	100(0.75)	100(8.4)	100(100)
T	Low	30.0 (48.0)	13.7 (28.0)	23.1 (12.0)	100 (8.0)	12.5 (4.0)	25.0 (100)
	Middle	37.5 (25.9)	51.0 (44.8)	53.8 (12.1)	—	62.5 (17.2)	48.7 (100)
	High	32.5 (36.1)	35.3 (50.0)	23.0 (8.3)	—	25.0 (5.6)	26.3 (100)
	All	100 (33.6)	100 (42.9)	100 (10.9)	100 (1.7)	100 (10.9)	100 (100)
A	Low	33.3 (30.0)	21.0 (56.7)	—	40.0 (6.7)	3.3(6.6)	20.0(100)
	Middle	55.6 (17.4)	54.3 (51.2)	16.7 (1.2)	60.0 (3.5)	76.7(26.8)	57.3(100)
	High	11.1 (12.5)	24.6 (58.8)	83.3(14.7)	—	20.4 (14.0)	22.7(100)
	All	100 (18.0)	100 (54.7)	100 (4.0)	100 (3.3)	100 (20.7)	100 (100)
B	Low	16.7 (80.0)	—	—	20.0 (6.7)	7.3 (13.4)	14.6 (100)
	Middle	62.5 (66.2)	50.0 (2.9)	100 (2.9)	80.0 (5.9)	78.9 (22.1)	66.0 (100)
	High	20.8 (74.3)	50.0 (9.9)	—	—	15.8 (15.8)	19.4 (100)
	All	100 (69.9)	100 (3.9)	100 (1.9)	100 (4.9)	100 (19.4)	100 (100)
W. B.	Low	23.7 (47.1)	18.6 (34.3)	14.3 (4.3)	41.6 (7.1)	11.4 (7.1)	20.3 (100)
	Middle	54.0 (39.3)	55.8 (37.6)	47.6 (5.2)	58.3 (3.6)	61.4 (14.1)	55.4 (100)
	High	22.3 (36.9)	25.6 (39.3)	38.1 (9.5)	—	27.2 (14.3)	24.3 (100)
	All	100 (40.3)	100 (37.4)	100 (6.1)	100 (3.5)	100 (12.8)	100 (100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

Annexure Table A-13
Villages openion about condition of drainage lines in the village

(% of households)

District	Economic Class	Condition of Drainage in the village					
		Closed Drainage	Open Drainage	Cleaned Drainage	Chocked Drainage	No Drainage	All
D	Low	—	32.3(79.3)	—	—	100(20.7)	36.7(100)
	Middle	—	53.5(95.0)	—	100(5.0)	—	50.6(100)
	High	—	14.2(100)	—	—	—	12.7(100)
	All	—	100(89.9)	—	100(2.5)	100(7.6)	100(100)
J	Low	11.1(1.5)	22.5(41.8)	54.5(9.0)	11.1(1.5)	68.9(46.3)	33.8(100)
	Middle	77.8(7.5)	50.0(66.6)	45.5(5.4)	88.9(8.6)	24.4(11.8)	47.0(100)
	High	11.1(2.6)	27.5(89.5)	—	—	6.7(7.9)	19.2(100)
	All	100(4.5)	100(62.6)	100(5.6)	100(4.5)	100(22.7)	100(100)
N	Low	—	12.8(47.4)	25.0(5.3)	—	22.5(47.3)	16.2(100)
	Middle	—	48.6(59.6)	—	50.0(1.8)	55.0(38.6)	48.7(100)
	High	100(3.2)	38.6(54.8)	75.0(9.7)	50.0(3.2)	22.5(29.0)	34.1(100)
	All	100(0.9)	100(59.8)	100(4.4)	100(1.7)	100(34.2)	100(100)
D F I D	Low	10(0.9)	23.5(55.0)	46.6(6.4)	9.1(0.9)	47.1(36.7)	28.2(100)
	Middle	70(3.6)	52.5(71.3)	33.3(2.7)	81.8(4.8)	38.8(17.6)	48.7(100)
	High	20(2.2)	23.9(79.8)	20.0(3.4)	9.1(1.1)	14.1(13.5)	23.1(100)
	All	100(2.6)	100(66.4)	100(3.9)	100(3.4)	100(23.7)	100(100)
T	Low	—	12.3(66.7)	25(33.3)	—	—	14.6(100)
	Middle	100(2.9)	65.4(77.9)	65(19.1)	—	—	66.0(100)
	High	—	22.2(90)	10(10)	—	—	19.4(100)
	All	100(1.9)	100(78.6)	100(19.4)	—	—	100(100)
A	Low	25(6.7)	17.8(33.3)	—	66.7(20)	16.4(40)	20.4(100)
	Middle	62.5(5.8)	64.3(41.9)	100(1.2)	33.3(3.5)	56.2(47.7)	58.5(100)
	High	12.5(3.2)	17.9(32.3)	—	—	27.4(64.5)	21.1(100)
	All	100(5.4)	100(38.1)	100(0.7)	100(6.1)	100(49.7)	100(100)
B	Low	—	21.1(60)	27.2(12)	25(12)	22.2(16)	21.4(100)
	Middle	80(6.9)	46.5(56.9)	45.5(8.6)	75(15.5)	38.9(12.1)	49.6(100)
	High	20(4.3)	32.4(67.6)	27.3(8.8)	—	38.9(20.6)	29.1(100)
	All	100(4.3)	100(60.7)	100(9.4)	100(10.3)	100(15.4)	100(100)
W. B.	Low	14.3(3.0)	14.6(52.2)	25.0(7.5)	42.9(13.4)	18.2(23.9)	19.1(100)
	Middle	71.4(4.2)	63.6(63.6)	59.4(7.9)	57.1(5.0)	52.3(19.2)	57.8(100)
	High	14.3(2.1)	21.8(55.9)	15.6(14.0)	—	29.5(28.0)	23.1(100)
	All	100(4.1)	100(56.7)	100(8.7)	100(5.7)	100(24.8)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

Annexure Table A-14
Uses of Latrine by Villagers

(% of Households)

District	Economic Class	Use of Latrine			
		User	Non user	Not Available	Total
D	Low Income	22.3(6.8)	36.8(86.4)	100(6.8)	36.7(100)
	Middle Income	66.6(15.0)	50.0(85.0)	—	50.6(100)
	High Income	11.1(10.0)	13.2(90.0)	—	12.6(100)
	All	100(11.3)	100(86.1)	100(2.5)	100(100)
J	Low Income	13.3(5.9)	37.5(94.1)	—	33.8(100)
	Middle Income	40.0(12.9)	48.2(87.1)	—	47.0(100)
	High Income	46.7(36.8)	14.3(63.2)	—	19.2(100)
	All	100(15.2)	100(84.8)	—	100(100)
N	Low Income	21.4(31.6)	13.0(68.4)	—	14.7(100)
	Middle Income	35.7(17.5)	46.0(80.7)	100(1.8)	44.2(100)
	High Income	42.9(22.6)	41.0(77.4)	—	41.1(100)
	All	100(21.7)	100(77.5)	100(0.8)	100(100)
D F I D	Low Income	17.9(11.4)	27.9(86.7)	66.6(1.9)	26.5(100)
	Middle Income	41.8(14.7)	49.4(84.7)	33.4(0.6)	47.8(100)
	High Income	40.3(26.7)	22.7(73.3)	—	25.7(100)
	All	100(16.9)	100(82.3)	100(0.8)	100(100)
T	Low Income	10.8(16.0)	25.9(84.0)	—	21.0(100)
	Middle Income	40.5(25.9)	51.9(72.4)	100(1.7)	48.7(100)
	High Income	48.7(50.0)	22.2(50.0)	—	30.2(100)
	All	100(31.0)	100(68.1)	100(0.8)	100(100)
A	Low Income	5.7(6.7)	24.3(90.0)	25.0(3.3)	20.0(100)
	Middle Income	48.6(19.8)	60.4(77.9)	50.0(2.3)	57.3(100)
	High Income	47.1(45.7)	15.3(50.0)	25.0(2.9)	22.7(100)
	All	100(23.3)	100(74.0)	100(2.7)	100(100)
B	Low Income	3.0(6.7)	20.0(93.3)	—	14.6(100)
	Middle Income	84.8(41.2)	57.1(58.8)	—	66.0(100)
	High Income	21.1(12.1)	78.9(77.9)	—	19.4(100)
	All	100(32.0)	100(68.0)	—	100(100)
W. B.	Low Income	6.7(10.0)	23.6(88.6)	20.0(1.4)	18.8(100)
	Middle Income	57.1(28.3)	56.7(70.2)	60.0(1.4)	56.8(100)
	High Income	36.2(41.7)	19.7(57.1)	20.0(1.1)	24.4(100)
	All	100(28.1)	100(70.5)	100(1.4)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

Annexure Table A-15
Knowledge of People about Water Committee Existance in Village

(% of households)

District	Economic Classes	Knowledge about Water Committee existance		
		Know	Don't Know	All
D	Low Income	32.4(74.2)	100(25.8)	39.2(100)
	Middle Income	53.5(100)	—	48.1(100)
	High Income	14.1(100)	—	12.7(100)
	All	100(89.9)	100(10.1)	100(100)
J	Low Income	17.9(14.9)	40.1(85.1)	33.8(100)
	Middle Income	53.6(32.3)	44.3(67.7)	47.0(100)
	High Income	28.5(42.1)	15.6(57.9)	19.2(100)
	All	100(28.3)	100(71.7)	100(100)
N	Low Income	—	22.0(100)	16.2(100)
	Middle Income	22.6(12.3)	58.1(87.7)	48.7(100)
	High Income	77.4(58.5)	19.8(41.5)	35.1(100)
	All	100(26.5)	100(73.5)	100(100)
D F I D	Low Income	22.2(28.2)	45.2(71.8)	35.0(100)
	Middle Income	50.7(47.5)	44.6(52.5)	47.3(100)
	High Income	27.1(67.8)	10.2(32.2)	17.7(100)
	All	100(44.3)	100(55.6)	100(100)
T	Low Income	—	14.7(100)	14.6(100)
	Middle Income	100(1.5)	65.7(98.5)	66.0(100)
	High Income	—	19.6(100)	19.4(100)
	All	100(0.9)	100(99.0)	100(100)
A	Low Income	5.9(3.3)	22.3(96.7)	20.4(100)
	Middle Income	64.7(12.8)	57.7(87.2)	58.5(100)
	High Income	29.4(16.1)	20.0(83.9)	22.1(100)
	All	100(11.6)	100(88.4)	100(100)
B	Low Income	—	22.5(100)	21.4(100)
	Middle Income	66.6(6.9)	48.6(93.1)	49.6(100)
	High Income	33.3(5.9)	28.9(94.1)	29.0(100)
	All	100(5.1)	100(94.9)	100(100)
W. B.	Low Income	4.2(1.4)	20.0(98.6)	18.9(100)
	Middle Income	66.7(7.5)	56.8(92.5)	57.5(100)
	High Income	29.1(8.0)	23.2(92.0)	23.6(100)
	All	100(6.5)	100(93.5)	100(100)

Note : i. Please refer to Table 3.1 footnote for income classification of economic classes.

ii. Figures in paranthesis are row percentages.

Annexure 16-A

Paper Clipping in *Daily Lokmat* (21.12.99)

दि. २१ डिसेंबर १९९९

ओडीएचा पाणीपुरवठा अखेर ठप्प

बोदवड, (वार्ताहर) - येथील ग्रामपंचायतीने ओ. डी. ए. योजनेअंतर्गत होणारा पाणीपुरवठा ठप्प येत्या आसून १५ डिसेंबरपासून दैनंदित पाणीपुरवठा पूर्णत: स्थानिक पातळीवरून करण्यात येत आहे. याबाबत गावात संमिश्र प्रतिक्रिया उमटत आहे.

सविस्तर वृत्त असे की, ७ डिसेंबर रोजी एका पत्राद्वारे या योजनेअंतर्गत होणारा पाणीपुरवठा बंद करण्याची सूचना जि.प.दिली होती. अनियमित व अपूर्ण पुरवठ्याबाबत नागरिकांच्या तक्रारी वाढल्या असून १५ डिसेंबरपासून या योजनेअंतर्गत होणारा पाणीपुरवठा बंद करण्याचा इशारा देण्यात आला होता व त्यानुसार तेव्हापासून कारवाई करून पाणीपुरवठा बंद करण्यात आला आहे. शहरातील दोन विहिरीवरून पाणीपुरवठा करण्यात येत आहे.

दै.लोकमतमधून २८ सप्टेंबर व ६ ऑक्टोबर रोजी ओ.डी.ए. योजनेची सदोष तांत्रिक आखणी व त्यामुळे होणारा अपूर्ण तसेच अनियमित पाणीपुरवठा होत असल्याच्या विषयावर प्रकाश टाकण्यात आला होता. पाणीपट्टी करापोटी मिळणारे उत्पन्न विनाकारण जिल्हपरिषदेच्या तिजोरीत जात असल्याचा उहापोह करण्यात आला होता. या वृत्तांची दखल घेऊन आ.जयप्रकाश साविस्कर व आ.शरद पाणी यांनी या संदर्भात तारांकित प्रश्न सुद्धा विधान परिषदेत उपस्थित केला. या प्रश्नावर सरकारकडून देण्यात आलेला लेखी खुलासा हा फसवा असल्याची तीव्र प्रतिक्रिया नागरिकांमध्ये उमटत आहे. एकीकडे शासनाने लेखी उत्तरात पाणीपुरवठा नियमित असल्याचे स्पष्ट केले आहे तर अनियमित पाणीपुरवठ्यामुळे त्रस्त होऊन व नागरिकांच्या वाढत्या तक्रारीमुळे हवालदिल होऊन प्र.पं.ने या योजनेअंतर्गत होणारा पाणीपुरवठा थांबविला आहे.

एकीकडे शासन योजना परीपूर्ण असल्याची माहिती देत आहे तर दुसरीकडे स्थानिक प्रशासन त्याच्याविरुद्ध कारणांवरून योजनेत सहभागी होण्यास नकार देत आहे म्हणजे शासन एकप्रकारे जनतेची व लोकप्रतिनिधींची दिशाभूल करीत असल्याचे येथे बोलले जात आहे. संतापजनक प्रतिक्रिया व्यक्त होत आहे. आ.एकनाथ खडसे यांनी तरी याबाबत जागरुकता दाखवून या प्रश्नावर सविस्तर चर्चा घडवून आणावी असे मत नागरिकांनी व्यक्त केली आहे. या मतदारसंघाचे प्रतिनिधीत्व करीत असताना जनतेच्या अति महत्त्वाच्या प्रश्नावर लोकप्रतिनिधींनी दाखविलेली उदासिनता व शासनाने घेतलेले वेळकाढू धोरण जनतेच्या हिताकरिता बाधक असल्याचा सूर उमटत आहे.

ODA WATER IS STOPPED !

Bodwad (Reporter):

The village Gram Panchayat, Bodwad has stopped taking water from ODA water supply scheme since December 1999. At present water is being supplied to the village from two wells in the area. There are mixed reactions about this news from villagers.

On 7th December 1999, Gram Panchayat had warned Zilla Parishad that they would stop drawing water from the ODA scheme w.e.f. 15th Dec. 1999. It was mentioned in the letter that the ODA water supply was inadequate and irregular.

Previously also, **Lokmat** had given a news about faulty technical structure and improper pipe lines, that resulted in inadequate and irregular water supply to the villagers. The news, further stated that though water tax was collected by Gram Panchayat the lion's share went to Zilla Parishad.

The local MLA's asked question about the ODA scheme in the State Assembly to which the Government answered saying that water supply was adequate and regular. But people were not satisfied about the scheme and at last the Gram Panchayat had stopped taking water.

On one hand, Government has the opinion that, ODA scheme is very good and no problems exist during its implementation. But local government i.e. Gram Panchayat is not ready to participate in the scheme. People are saying that local people and leaders are misguided by Government so no body is in favour of ODA scheme. People want a long and healthy discussion on this ODA water supply scheme. They further added that local leaders are not serious about this question and Government wants no discussion on this issue. But this is very much against people.

Annexure 16-B

Paper Clipping in *Daily Sakal* (22.1.2000)

पाण्याचा गंभीर प्रश्न

वार्ताहर
मुंबई

प्रशांत दीक्षित

रस्ते, पाणी, वीज आणि नागरी जीवनाला आवश्यक अशा सेवासुविधा वापरताना योग्य ते दाम मोजण्याची मानसिक तयारी आता महाराष्ट्रातील नागरिकांना करावी लागणार आहे, अर्थात यात अनुचित असे काहीही नाही. तथापि, अतिशय कमी दरात या सुविधा मिळविण्याची सवय झाली असल्यामुळे अशा निर्णयाच्या विरोधात तीव्र प्रतिक्रिया उमटण्याचा संभव आहे. राज्यातील एक मोठा वर्ग नेहमी अनुदान आणि बिलांमध्ये माफी मिळविण्याच्या मागे असतो. अशा फुकटच्या नागरिकांची संख्या सर्वत्र वेगाने वाढत आहे. यामुळे थकबाकी ही मोठी डोकेदुखी झाली आहे. तरीही थकबाकी भरण्याची सवय नागरिकांना लावण्याऐवजी मतांकडे लक्ष ठेवून थकबाकी माफ करण्याकडे सत्ताधाऱ्यांचा कल होता व आहे. मात्र राज्याची ढोलामासा झालेली आर्थिक स्थिती लक्षात घेता यापुढे फार काळ हे लाड चालविता येणार नाहीत. वीज आणि पाण्यासाठी उचित पैसा मोजण्याची तयारी गरीब नागरिकाला ठेवावी लागणार आहे.

महाराष्ट्र जीवन प्राधिकरणासमोर सध्या ज्या समस्या उभ्या राहिल्या आहेत, त्यातून हा प्रश्न पुढे आला आहे. पुती सरकारने जीवन प्राधिकरणाच्या माध्यमातून १५ हजार कोटी रुपयांच्या अवाढव्य योजना हाती घेतल्या. तथापि, 'बडा घर पोकळ वासा' हा अनुभव इतर प्रत्येक खात्याप्रमाणे याही खात्यात पुती सरकारने आणून दिला. आर्थिक व्यवस्थापनाचे तीनतेरा वाजले आणि १५ हजार कोटींऐवजी फक्त २४०० कोटींची कामे सुरू होऊ शकली. त्यातीलही १२०० कोटी फक्त पाइप खरेदीसाठी खर्च झाले. सुवर्ण अल्पबचतसारख्या योजना काढून १० हजार कोटी उभे करण्याचा संकल्प पुती सरकारने सोडला होता. ही योजना बरीच वादग्रस्त ठरली आणि जेमतेम चार हजार कोटी रुपये जमले. यातील ७५ टक्के रक्कम जीवन प्राधिकरणाकडे वळती होणार होती, पण ते पैसे भलतीकडेच खर्च झाले. आर्थिक गैरव्यवस्थापनामुळे बाजारात राज्याची पत घसरली, त्यामुळे बाजारातूनही पैसा उभा राहिला नाही. पैसा उभा होत नसतानाही कंत्राटदारांकडे लक्ष ठेवून अनेक योजना सुरू करण्यात आल्या.

जीवन प्राधिकरणाच्या योजनांची मोठी जाहिरातबाजी करण्यात आली आणि जनतेच्या अपेक्षा कमालीच्या वाढल्या. ही जाहिरातबाजी करीत असताना पुती सरकारने जनतेची मानसिकता बदलली. त्याचा फटका पुढील काही वर्षे राज्याला बसणार आहे. जनतेला खूश करण्याच्या नादात पुतीच्या राज्यकर्त्यांनी आर्थिक वस्तुस्थितीकडे पूर्णतः दुर्लक्ष केले. जागतिक तरावर पाण्याकडे बघण्याच्या दृष्टिकोनात बराच बदल झाला आहे. जागतिक बँक आता पाण्याला विक्रेय वस्तू मानते आणि पाणी मिळविणे हा नागरिकाचा हक्क असला तरी पाणीपुरवठ्यासाठी होणारा खर्च नागरिकाने उचलला पाहिजे, असा जागतिक बँकेचा आग्रह आहे. केंद्र सरकारनेही हा आग्रह मान्य केला आहे, परंतु पुती सरकारने हा दृष्टिकोनच नाकारला. पाणी योजनांतील लोकवर्गणीची अट काढून टाकण्यात आली. पूर्वीच्या काँग्रेस सरकारने फक्त 'क' वर्ग नगरपालिकांना ही सूट दिली होती. पुती सरकारने सरसकट ही सूट दिली. लोकांना फुकट पाण्याचे आमिष दाखविण्यात आले.

हे करीत असताना पुतीच्या राज्यकर्त्यांनी ज्या मार्गाने पैशाची उधळपट्टी केली ते पाहण्यासारखे आहे. पूर्वी पैशाची व्यवस्था आणि स्थानिक गरज लक्षात घेऊन पाणी योजना हाती घेतली जात असे. त्यातही छोट्या योजनांचे निर्णय घेण्याचे अधिकार स्थानिक पातळीवरील सरकारी अधिकाऱ्यांना असत. पुतीच्या काळात १० किलोमीटर पट्ट्यातील योजना एकत्र करून प्रत्येक योजना १० कोटींच्या वर नेण्यात आली. मोठी योजना झाल्यामुळे मंजुरीचे अधिकार मंत्रालयाकडे आले व सर्व नियंत्रण तेथून सुरू झाले. केवळ 'टोपोशीट' पाहून काही योजना आखण्यात आल्या. हे नकाशेही ब्रिटिश काळातील होते. योजना मंजूर करायची आणि कंत्राटदाराला पैशाचा पहिला हप्ता लगेच देऊन टाकायचा, हा प्रकार सुरू झाला. त्यातून एका गटाची धन होऊ लागली.

लोकशाही आघाडी सरकार सत्तेवर आल्यानंतर या गोष्टी उघड झाल्या. झपाट्याने कमी होत जाणारा भूगर्भातील पाण्याचा साठा आणि पाण्याची वाढती मागणी लक्षात घेता पुती सरकारच्या मार्गाने जाता येणार नाही, हे पाणी खात्याच्या लक्षात आले. मुख्य प्रश्न आहे तो भूगर्भातील मर्यादित पाणीसाठ्याचे उत्तम व्यवस्थापन करण्याचा. त्यासाठी काही कठोर निर्णय घेणे भाग आहे. नेमके तेथेच सरकार कच खाते. पाण्याचा सर्वांत जास्त वापर करणाऱ्या उद्योगांतदार, सधन शेतकरी आणि मोठे उद्योजक यांच्याबाबत कठोर निर्णय घेण्यास, विरोध असतो. याच मंडळींकडे मोठ्या प्रमाणात थकबाकीही असते. पाण्याचा गांभीरपणे विचार करायचा तर नदीपासून दूरवर उभी राहणारी शहरे, या शहरांची बेसुमार वाढ, अशा सर्वच बाबींचा विचार करून काही कठोर निर्णय घ्यावे लागतील. तेवढी धमक कोणत्याच सरकारमध्ये नाही. थकबाकीचा प्रश्न घेतला तर केवळ नगरपालिका आणि जिल्हा परिषदांकडे असलेली थकबाकीची रक्कम ६५० कोटी रुपये इतकी आहे. काही नगरपालिकांनी तर सरकारला स्पष्टच सांगितले, की 'काय वाटेल ती कारवाई करा. पैसे भरणार नाही.' मानवतेच्या दृष्टिकोनातून तुम्हाला पाणी द्यावेच लागेल, 'पाणी नाही तर मते नाहीत,' या वस्तुस्थितीकडे कोणत्याच राजकीय पक्षाला डोळेझाक करता येत नाही. त्यामुळे शहराची वाढ रोखण्याऐवजी लांबवरून महागडे पाणी उपलब्ध करून दिले जाते. मात्र त्याचा खर्च उचलण्याची जबाबदारी कोणीच घेत नाही.

तज्ज्ञांच्या मते, स्थानिक पातळीवरच योग्य नियोजन केले तर ८० टक्के भागाला उत्तम पाणीपुरवठा करता येईल. ऊस, द्राक्षे यांसारखी जास्त पाणी खाणारी पिके मर्यादित प्रमाणात घेतली आणि या पिकांसाठी मोठे पंप लावून होणारा पाण्याचा उपसा थांबविला तर भूगर्भातील पाण्याचा साठा बराच काळ टिकेल. प्रमाणाबाहेर केलेल्या उपशामुळे काही भागात क्षारयुक्त, क्लोराईडयुक्त पाणी मिळत आहे. मोठ्या शहरातील १५ टक्के, तर इतर भागातील ५० टक्के पाणी पिण्यायोग्य नसते, असे नुकत्याच केलेल्या एका पाहणीत आढळून आले. रायगडसारख्या जिल्ह्यातील सर्व नद्या रासायनिक उद्योगांमुळे दूषित झाल्या आहेत. मुंबईचा पाणीपुरवठा १३० किलोमीटरवरून होतो, तर इतर शहरांतही ६०-७० किलोमीटरवरून पाणी आणले जाते. याचा खर्च कोणी उचलायचा, हा मोठा प्रश्न आहे. म्हणून केंद्र सरकारने लोकवर्गणीची अट घातली. पाणीपुरवठा योजनेचा १० टक्के खर्च लाभार्थींनी उचलावा, अशी सरकारची अपेक्षा आहे. त्याचबरोबर योजनेच्या देखभालीचा खर्चही लाभार्थींनी उचलला पाहिजे, अशी अट आहे.

१५ वर्षांपूर्वीच्या अनेक योजनांची स्थिती आज दयनीय झाली आहे. या योजनांची देखभाल करण्याऐवजी नव्या योजनांची मागणी केली जाते. राजकीय दबावापोटी त्या मंजूरही होतात आणि सरकारवर ताण पडतो, हे लक्षात घेऊन जनतेकडून आर्थिक सहभाग आल्याशिवाय कोणत्याही योजना हाती घेऊ नयेत, असे केंद्र सरकारचे मत आहे. असा सहभाग असेल तरच जनतेला योजनेची खरी किंमत कळते आणि पाण्याचा अपव्ययही टळतो, असा अनुभव आहे. आता न्यायालयानेही त्याला मान्यता दिली आहे. चांगले रस्ते व पूल बांधण्यासाठी पथकर घेण्यात काहीही गैर नाही, असा निवाडा मुंबई उच्च न्यायालयाने दिला. शुद्ध पाणी हवे असेल तर पैसे दिले पाहिजेत, स्वस्त पाणी मिळणे यापुढे शक्य नाही, हे वास्तव नागरिकांच्या गळी उतरविण्याचे कठीण काम या सरकारला करावे लागणार आहे. शुद्ध पाण्याचा पुरवठा करण्याचा व्यापार यशस्वीपणे चालविण्यासाठी जगात बहुराष्ट्रीय कंपन्यांमध्ये चढाओढ सुरू आहे. एनॅनसारख्या कंपनीने लंडनच्या उपनगरांना महागड्या दराने पाणीपुरवठा करण्याचे कंत्राट मिळविले आहे, अशा परिस्थितीत राज्य सरकारने काही निर्णय तातडीने घेतले पाहिजेत, असे या क्षेत्रातील तज्ज्ञांना वाटते. पुढील काही वर्षांत पाण्याची समस्या जटिल होत जाणार असल्यामुळे पाण्याच्या अर्थशास्त्राकडे सरकारला लक्ष द्यावे लागेल आणि जनतेची नाराजीही स्वीकारावी लागेल. पाणी खात्याचे मंत्री आर.आर. पाटील आणि सचिव व्ही. पी. राजा या दिशेने प्रयत्न करीत आहेत. इंडियन वॉटर वर्क्स असोसिएशनतर्फे मुंबईत झालेल्या आंतरराष्ट्रीय परिसंवादात श्री. राजा यांनी कडक शब्दांत पाण्याबाबतच्या सरकारच्या कचखाऊ धोरणाचे वाभाडे काढले. राजा प्रश्नाच्या मुळापर्यंत जातात आणि सर्वसामान्यांना फायदा कसा होईल, याचा मूलभूत विचार करतात. 'बौद्धिक घेणारा सचिव' म्हणून त्यांची ख्याती आहे. परंतु सरकारला राजकारणाला प्राधान्य द्यावे लागते, व्ही. पी. राजांकडील वस्तुनिष्ठ माहिती आणि सरकारचे राजकारण यांचा मेळ घालण्याची कठीण कामगिरी आर.आर. पाटील यांना करायची आहे.

पालिका सभागृहाचे स्थलांतर

मुंबईत या आठवड्यात एक लहानशी पण ऐतिहासिक घटना घडली. १०६ वर्षांच्या पालिकेच्या इतिहासात प्रथम महापालिकेची सभा पालिका सभागृहात न होता नायर रुग्णालयाच्या सभागृहात भरविण्यात आली. पालिका सभागृहाला आग लागल्यामुळे हा निर्णय घेण्यात आला. मुंबई महापालिकेबद्दल अभिमान बाळगणाऱ्यांना या घटनेचे अप्रूप वाटेल. मुंबई महापालिका हा देशाचा अभिमानाचा विषय आहे. देशातील इतर स्थानिक स्वराज्य संस्थांच्या तुलनेत मुंबईची महापालिका अतिशय व्यावसायिक पद्धतीने चालविली जात असे. अलीकडे मात्र महापालिकेची कार्यक्षमता घटली आहे. देशातील या श्रीमंत महापालिकेला हजार कोटी रुपयांची तूट सहन करावी लागत आहे. ही घसरण गेल्या काही वर्षांत वेगाने घडली.

(P.T.O. for English version)

SEVERE WATER PROBLEM

Roads, water and electricity are the need of people. In coming days, people in Maharashtra should be mentally prepared to pay for these needs. There is nothing wrong in it. We have a habit of using these amenities at very low cost hence a hike in these amenities may create imbalance among people. There is one group which always demands for a subsidy in bills. The numbers of such persons is increasing very fast leading to a large sum of unpaid dues. The local leaders also want exemption from water dues as a result of which the economic status of the state is weakening fast. It will not be possible any longer for the state to provide free electricity and water to people. We shall have to pay for these amenities in future.

This issue has been placed before the people due to severe problems in Maharashtra Jeevan Pradhikaran (MJP). They are facing enormous problems of finance and administration. Through MJP, Government had announced several water supply schemes costing 1.5 million crores of rupees. There was no proper planning and thought while announcing such schemes. Due to lack of proper allocation of money and poor administration, most of the schemes collapsed. Subsequently, Government tried to raise money through different schemes but failed. In many areas, instead of people, contractors benefitted more.

The Government gave a lot of publicity among villagers about the water supply schemes. People therefore had lot of expectations from these schemes but no thing fructified. Local leaders made only popular announcements in their constituencies ignoring the economic fact of schemes. As a result, the psychology of people towards water supply has changed drastically.

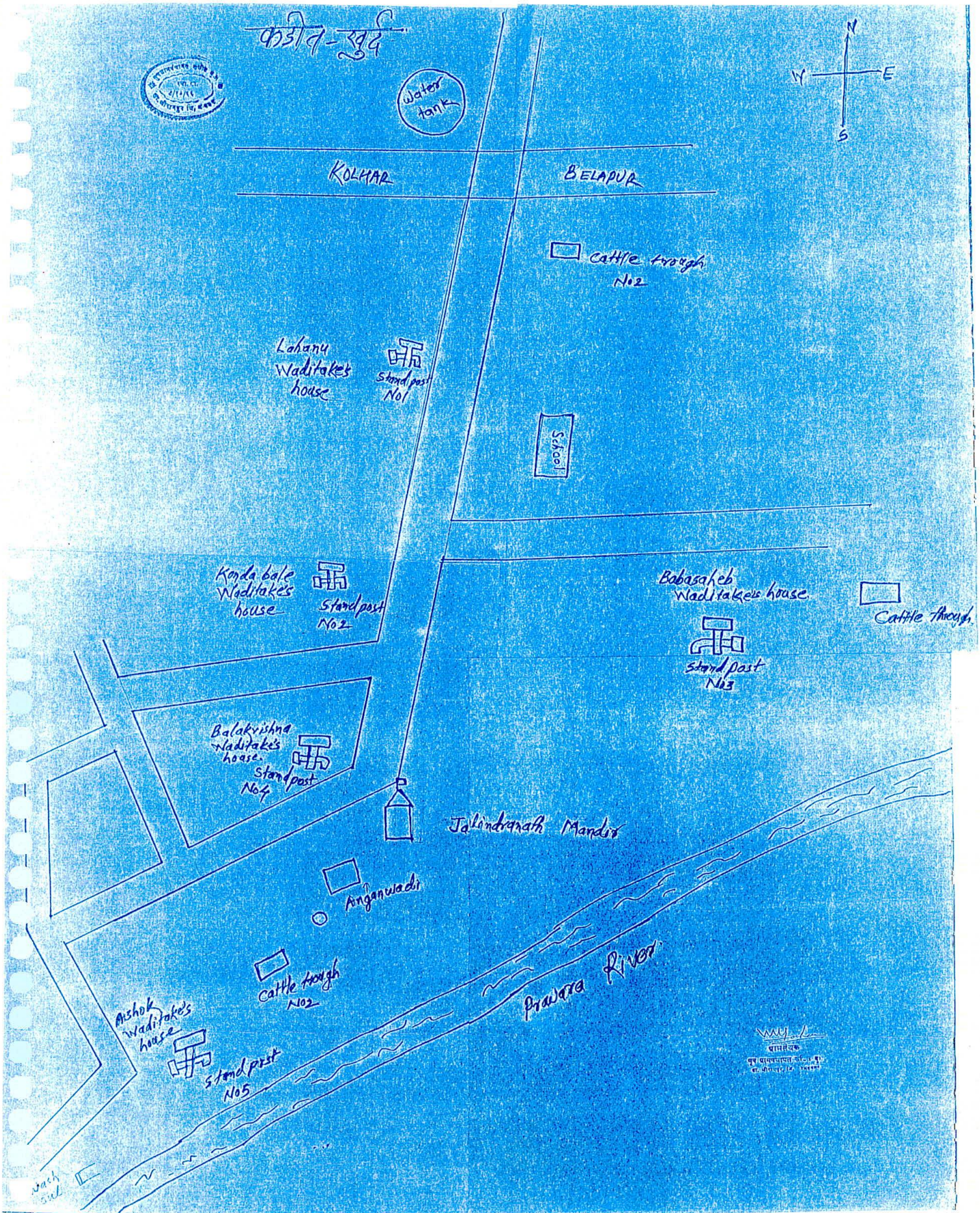
According to the World Bank water is a saleable product. Every citizen has a right to get water but they should understand that operation and maintenance of schemes also require money. It should be a citizen's contribution. The Central Government accepted such terms and conditions which were however refused by the Sena-BJP Government. They removed the clause of public contribution and announced free water to all people. However this has not turned out to be a reality.

In many cases, leaders clubbed different schemes within a radius of 10 km and made a budget of more than rupees one million. Thus the sanctioning power was vested at Mantralaya in Mumbai. Some schemes were prepared with the help of outdated toposheets drawn up in British times. After sanctioning of the scheme, the first installment was immediately given to contractor.

According to experts, small scale water shed programmes at the village level would be useful for our nation. These projects will help to swell ground water content which in turn will be useful for irrigation also. The unnecessary usage of water for cash crops is harmful to the soil as well as to the quality of ground water. Good management of ground water supplies is the need of the next century.

Annexure 17-A (Map of Tarapur, Dist. Thane)

Annexure 17-B (Village Map of Kadit Khurd, Dist. Ahmednagar)



Annexure 18
Format for Water Sampling

WATER SAMPLING DETAILS

CODE NO. : _____ DATE OF COLLECTION : _____

TIME OF COLLECTION : _____

LOCATION (VILLAGE ADDRESS) :

WATER SOURCE : WELL /STREAM / RIVER / LAKE / TANK / TAP / HOUSEHOLD OTHERS (Specify)

APPEARANCE OF THE SAMPLE : MUDDY / TURBID / CLEAR / OTHERS (Specify)

PRIOR TREATMENT IF GIVEN : CHLORINATED / OTHER TREATMENT (Specify) / NO TREATMENT

PRESENCE OF DRAIN PIPES / POLLUTANTS (Specify) / EPIDEMICS (Specify) / ANY OTHER FACTOR (Specify) NEAR THE WATER SOURCE

pH : _____ TEMPERATURE : _____

NAME OF THE PERSON COLLECTING THE SAMPLE : _____

Annexure 19

Format of Household Questionnaire

IMPACT ASSESSMENT OF MRWSSP& MRWESP

HOUSEHOLD SCHEDULES

1. Identification Particulars

1.1 Village: ☐☐

1.2 C.D. Block / Tehsil : ☐☐

1.3 District : ☐

1.4 Household Head : Shri./Smt. ---------- ☐☐☐☐

1.5 Household Location / Adress :

1.6 Respondent : Head (self)-1 Spouse - 2 Son - 3 Daughter -4 ☐
Father - 5 Mother - 6 Brother - 7 Sister - 8
0ther- 9

2. Household Heads

2.1 Age (in complete years) : ☐☐

2.2 Sex : Male - 1 Female - 2 ☐

2.3 Education : Literate - 1 Upto Higher Secondary - 4 ☐
Can read and write - 2 Graduate - 5
Primary school - 3

3. Household Particulars

3.1 Type of Family : Joint - 1 Nuclear - 2 Extended - 3 ☐

3.2 Religion : Hindu - 1 Buddha - 2 Muslim - 3 Christian - 4 ☐
Sikh - 5 Jain - 6 Others - 7

3.3 Tribe / Caste : S.T. - 1 S.C. - 2 OBC - 3 ☐
General - 4 Other than above - 5

3.4 Family Size : Adult Males No. - ☐☐
Adult Females No. - ☐☐
Children 6 to 17 years - ☐☐
Children below 6 years - ☐☐
Total Number ☐☐

3..5 Main Occupation : ☐

Crop cultivation - 1 Darying - 2 Other livestock - 3
Agri. wage earner - 4 Non agri. wage - 5 Trade / Business - 6
Self Emploed - 7 (Art / Craft) Sevice - 8 Other - 9

3.6 Socio - Economic Status : Poor - 1 ☐
Middle income group - 2
Better off (Upper middle) - 3
Affluent (Rich) - 4

3.7 Type of House : All pucca - 1 ☐
Roof and wall pacca & floor kutcha - 2
Roof Pucca but walls, floor kutcha - 3
Thatched roof , walls/ floor kutcha - 4
Thatched Hut - 5
Other - 6

3.8 House electrified : Yes - 1 No - 2 ☐

3.9 Has any family member suffered from water related health problems, in last 6 months ? ☐

Yes - 1 No - 2

3.10 If yes, please provide following details.

Patients	Patient No.	Disease code	Treatment				Dist. from home
			Allop.	Ayur.	Homeo	Home remedy	
1. Adult males 2. Adult females 3. Children 4. Old people							

* Diarrhoea -1, Dysentry - 2, Jaundice - 3, Skin disease - 4,
Malaria - 5, Other (specify) - 6

3.11 Please tell us about your latest (last) visit to the Health worker ? ☐

Visit to fortnight - 1 A month ago - 2 6 months ago - 3
Last year - 4 Not visited - 5

3.12 Since Grampanchayat / Village Water Committee began and suppling drinking water, in your opinion has the frequency of suffering from water related infections, [ ]

Has went down - 1	Increased - 2	Not changed - 3

If decreased, how much % - If incrased , how much % -

4. Access and Usage of Water

4.1 Do you get adequate quantiuty of water to meet all your requirements ? [ ]
Yes - 1 No - 2

4.2 Water Utilization Pattern (Please provide details)

Purpose used for	Water Sources (Please write codes)				
	Main	Next major supplimentary source			
1. Drinking					
2. Cooking					
3. Bathing					
4. Washing hands					
5. Washing cloths					
6. Washing utensils					
7. Cattle Drinking					
8. Courtyard Sprinkle					
9. Other household uses					

Water sources codes : Piped / Tap - 1, Hand pump - 2, Tube / Bore well - 3, River / Canal - 4, Stream - 5, Tank / Lake - 6, Pond - 7, Dug/ Open well - 8, Tanker / other - 9

4.3 Please tick (✓) ownership status of two major water sources used by you.

Self owened -A	Private owened by other - B	Public - C

4.4 Distance of the two major water sources from your house : [ ] [ ]

Less than 50 mts - 1 251 to 500 mts - 4
51 to 100 mts - 2 501 to 1000 mts - 5
101 to 250 mts - 3 More than 1kms - 6

4.5 Quality of the water of two major sources :

Source : 1	**Source : 2**
Good quality : 1	Good quality : 1
O.K. (acceptable) : 2	O.K. (acceptable) : 2
Poor : 3	Poor : 3
Very poor (Not acceptable) : 4	Very poor (Not acceptable) : 4

4.6 Do you pay tarrif (bill) for taking water from main / supplimentary sources ?

Main source : Yes - 1 No - 2
Next major source: Yes - 1 No - 2
Third major source : Yes - 1 No - 2
If yes, Rs. _____ per bucket / per day / per month.

4.7 Do you face problems regarding availability of water during,

Mansoon : Yes - 1 No - 2
Floods : Yes - 1 No - 2
Drought : Yes - 1 No - 2

4.8 If yes, if you collect drinking water from other sources please specify the source and its distance from home.

Source _____ Distance _____ mts

5. Water Collection Practices

5.1 Type of vessel used for drinking water collection

a) Shape of water : Cylendrical - 1 Rectangular - 2 Bucket -3
Round with narrow mouth (Ghagar) - 4 Handa - 5
Math - 6 Other - 7

b) Make of vessel :

Copper - 1 Brass - 2 Stainless - 3 Plastic - 4
Earthen - 5 Any other (specify) - 6 (Specify two very often used vessels)

5.2 Type of vessel used for storing drinking water

a) Shape of water : Cylendrical - 1 Rectangular - 2 Bucket -3
Round with narrow mouth (Ghagar) - 4 Handa - 5 Math - 6
Other - 7

b) Make of vessel :
Copper - 1 Brass - 2 Stainless - 3 Plastic - 4 Earthen - 5

5.3 Quantity of water in liters per trip : _____lit. / trip. ☐☐

5.4 Number of trips per day : ☐☐

5.5 Left over drinking water water per day : _____ lit. / day. ☐☐

5.6 Left over water usage (lit. / day)

1. Used for feeding animals ☐
2. Used for other non drinking purposes ☐
3. Irrigation of kitchen garden ☐
4. Thrown out ☐

5.7 Who collects drinking water ? ☐

Adult females - 1 Young Girls - 2 Young Boys - 3 Men - 4
Female servant - 5 Male servant - 6 Other (specify) - 7

5.8 How do feel water in the vessel ? ☐

Direct from Tap - 1 Through attached pipe in house itself - 2
Covered Carried from courtyard - 3 Without covering carried from courtyard - 4
Brought from far away, covered - 5 Brought from far away, uncovered - 6

5.9 How often water collecting / carrying vessels are cleaned ? ☐

Every time - 1 Once a day - 2 Alternate days - 3
Once a week - 4 Less frequently - 5

5.10 Method of cleaning water carrying vessels : ☐

Only rinsing - 1
Scrubing with detergent / soap powder - 2
Scrubing with ash - 3
Scrubing with mud or brick - 4
Other - 5

6. Water Storage Practices

6.1 Do you store drinking and cooking water seperately ? ☐

Store only drinking water - 1 Store drinking and cooking water together - 2
Store drinking and cooking water seperately - 3
Water not stored exclusively for either - 4

6.2 How is the drinking water stored ? ☐

In covered vessel - 1 In covered vessel with long handled dispenser - 2

In open vessel - 3 In built cement tank - 4 Synthetic water tank - 5
Others (specify) - 6

6.3 For what other purposes the water is stored ? ☐
Washing cloths - 1 Washing utensils - 2 Washing hands and feet - 3
Bathing - 4 Others - 5

6.4 Where is the water stored for drinking kept ? (Observation) ☐
In the kitchen - 1 Livingroom - 2 Open varandah - 3
Near the sink - 4 Near the drain - 5 Neat the toilet - 6 Any other - 7

7. Drinking Water Purification Practices

7.1 Before storing drinking water , if any purification methods are adopted by your household please provide details.Please tick (✓) mark in appropriate box.

Frequency of purification	Water Purification Methods				
	Filtering Straning	Boiling	Treat with external agent	Other Specify	Tap (Potable) water
1) Every time water is stored / collected					
2) Daily once					
3) Only when dirty water is collected					
4) Occasionly					
5) Regularly during mansoon					
6) Never					

* External agents like Alum, Lime, Chlorination, Pottassiam Permangnet, local herbs (specify name)

7.2 If water is strained, please code the strainer used : ☐
Cloth strainer - 1 Metal strainer - 2 Others - 3

7.3 Frequency of cleaning strainer : ☐
At every straining - 1 Daily once - 2 At alternate days - 3
Weekly once - 4 Only when become dirty - 5

For Field Workers

8. Observations (During visit to Household)

8.1 Vessel storing drinking water kept on
Pedstal - 1
On elevated platform - 2
On floor but away from drain / washbasin - 3
Away from cooking place - 4
Others (Specify) - 5

8.2 Vessel storing drinking water
Covered but with tap for draining water - 1
Without tap but always properly covered - 2
Occassionally not covered - 3
Not covered at all - 4
Other (Specify) - 5

8.3 Drinking water drawn from storage water
By dipping any available pot / thumbler - 1
By long handled specially kept pot / thumbler - 2
By specially kept handleless pot / thumbler - 3
By tilting the storage vessel itself - 4
Hand or fingures dipped with pot in water - 5
Others (specify) - 6

8.4 Whether finger nails regularly clipped by household members ?
If yes,
Specially by women - 1 By men - 2 By children - 3
All household members - 4 None - 5

9. Cleanliness or Sanitation practices

9.1 Liquid waste or effluents disposal from household

a) From kitchen : Closeby - 1 In to street - 2
Flows into kitchen garden or soakage pit - 3
Into village drain - 4 Other (specify) - 5

b) Forth bathing place : Closeby - 1 Into street opposite house - 2
Flows into kitchen garden or soakage pits - 3
Into village drain - 4 Other (specify) -5

c) Utensils / cloths washing: Closeby - 1 Into street opposite house - 2
Flows into kitchen garden or soakage pits - 3
Into village drain - 4 Other (specify) -5

d) Cattleshed :
Closeby - 1 On street or open space - 2 To manure pit - 3
to village drain - 4 Other (specify) - 5

9.2 Semi-solid or Solid waste disposal from household :
Dumped in front or back of home - 1
To own compost pit - 2
Dumped in common or public compost pit - 3
Not to any specific spot - 4
Other (Specify) - 5

9.3 Disposal of dung and effluents from cattleshed :
Daily in manure - 1 Taken to farm - 2
Heeped in shed / courtyard - 3 Dumped at common village spot - 4
Others (Specify) - 5 Non cattle household / not applicable - 6

9.4 Whether household members use latrine for defaecation ?
Yes - 1 No - 2

9.5 If yes, What type of latrine ?
Own sanitory - 1 Dry service - 2 Any other common - 3
Community latrine - 4 Other (Specify) - 5

9.6 Household members using latrine :
All - 1 6yrs + males - 2 6yrs + females - 3
< 6 children - 4 Old / disabled personns - 5 None - 6

9.7 If No, to Ques. 9.4, where do they go for defaecation ?
Own farm - 1 Close to village - 2
Common village land away from basti - 3 Others - 4

For Men : Code as above

For Women : Code as above

For children : Code as above

For old or disabled person : Code as above

9.8 If answer is No for Ques. 9.4, please state reasons.

_____

_____

9.9 Who cleans own latrine ? ☐

Young / Adult female - 1 Young /Adult males - 2 Hired sweepers - 3
Community sweepers - 4 Others (specify) - 5 None (no cleaning) - 6

9.10 Would the household like to own a sanitary latrine ? ☐

Yes - 1 Need to know more about it - 2
Depends upon cost - 3 Feard saffocation in closed latrine - 4
Do not need (require) - 5

Interviewer to Explain before asking Question 9.10

In sanitary latrines, excreta is flushed down underground with water (or to septic tank) it doesnot leave foul smell, no flies / insects etc. It can be build close to house in small or low cost.

9.11 Question for those giving 1 to 4 response to ques.9.10,
The cost of such a unit will be between 3 to 4 thousand rupees.
Would you like to own one such unit ? ☐
Yes - 1 No - 2
If No, how much cost you like to pay ? Rs. _____.

10. General Sanitation Practices

10.1 State of drains in your house

Covered drain - 1 Open drain - 2
Cleaned every day - 3 Cleaned twice / thrice a week - 4
Weekly cleaned - 5 Cleaning done only when waste water overflows - 6
Never cleaned - 7

10.2 How do the members of the household routinely adopt the following practices ?

	Practices	Men	Women	Children & Older people
1	Wash hands before eating			
2	Wash tumblers before drinking water			
3	Wash hands before cooking food			
4	Wash vessels before serving food in it			

5	Wash hands and feet with soap after toilet (defaecation)			
6	Wash hands and feet with soap\ ash after cleaning infants bottoms			
7	Sweep the place of dining place before serving food			

Frequency codes : Always - 1, Mostly but not always - 2, Sometimes - 3, Never - 4 .

11. Water Committee Awareness

11.1 Are you aware of the existance of the Water Committee in your village, if so when was it formed ? ☐

Yes, I am aware - 1 Formed recently (less than month) - 2

Exists since 1 to 3 months - 3 Exists since 4 to 6 months - 4

Exists since 6 months to 1 yr. - 5 Exists since more than one year - 6

No, I am not aware of its existance - 7

11.2 Do you know how the Water committee was formed ? ☐

Elected by villagers - 1 Unanimously nominated by villagers - 2

Nominated by Sarpancha - 3 Nominated / selected by State Govt. - 4

Others (Specify) - 5

11.3 What is the size and composition of the Water Committee in your village ?

a) Total number of members : ☐☐

b) Women members : ☐

c) SC/ ST members : ☐

d) Ethinic (Geographical) representations ☐