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1 Introduction

Water is the primary life-giving resource and its availability is an essential component in socio-economic development and poverty reduction. The famous Tamil poet Thiruvalluvar explains about the importance of water as:

“No life on earth can exist without water,

And the ceaseless flow of that water cannot exist without rain.”

Availability of potable water in rural areas is strongly interlinked with rural development and growth and displays direct, positive results for human health and well being, especially for women and children. As the burden of obtaining drinking water is shouldered by young girls, easy availability results in better school attendance among girl children. Women tend to benefit from the reduced drudgery and improved quality of life. (Bapat, et al., 2007). The methods of delivering drinking water in rural India include dug wells, handpumps, and pipe water schemes such as single village schemes, multi village schemes sourced from ground water, surface water, near and far. The World Bank’s estimate of access to drinking water in 2002 is as given below:

Table 1-1: Access to Water services in 2002

Particulars	Population (In lakhs)	Percentage Share
Unserved Population (rural)	560	8
Hand Pump	3350	44.6
Open Dug wells	1290	17
Mini Water Schemes for group of households	470	6
Single Village schemes	1650	22
Multi village schemes	180	2.4
Total Rural Population	7500	100

Source: (Bapat, et al., 2007)

As per the Department of Drinking Water Supply (DDWS), the drinking water coverage in India is about 84.2 percent but only 12 % of the population has individual household tap connections. The overall situation of India is better in drinking water coverage when compared with the sanitation coverage. However, the quality of drinking water service

is poor and most users counted as having access to water receive poor quality water and only on an intermittent basis (Central Statistical Organisation, 2009).

As envisaged in the Eighth Five Year Plan (1992–97), that the government enumerated the following principles:

- (i) Water should be managed as a commodity.
- (ii) The provision of rural water supply and sanitation (RWSS) services should be based on expressed demand.
- (iii) Emphasis should be placed on decentralization, user participation and private sector involvement.
- (iv) Operation and maintenance should be managed at the local level with emphasis on financial sustainability.
- (v) Sanitation programmes should be integrated with those of water supply.

The role of water in development is recognized by including it in the Millennium Development Goals. The goal 7C of the Millennium Development Goals (MDGs) is to halve the proportion of the people without sustainable access to safe drinking water and basic sanitation by 2015. As per the report of Central statistical organization the MDG target by the year 2015 for goal 7C has been achieved by the year 2007-08 and it also claims the rural coverage improved from 61% in 1992-93 to 79.6% in 2007-08. (Central Statistical Organisation, 2009).

The effect of a safer drinking water intervention is not only to reduce the water borne diseases, but also to improve the access of drinking water in terms of time and energy utilised in collection and treatment. In many locations, people have to travel considerable distances to collect water for drinking and domestic water usage. Most interventions in rural areas could serve both purposes. Time released for other activities through time savings in terms of accessing and treating water has been found to be substantial (G. Hutton, 2006), (Z.S. Wang, 1989).

Provision of safer and more accessible water could also have an influence on school enrolment and attendance especially for young girls. It is widely believed that greater schooling of girl children leads to late marriage, greater birth spacing. The girls themselves and the next generation of children will have lower mortality and morbidity rates and hence savings in public sector provision of health care and welfare support (Thornton, 2003).

The WHO study showed that investments in sanitation in drinking water would bring returns up to 3-34 times the amount invested as economic benefits. These benefits are calculated by considering

- Health care savings by health agencies and individuals.
- Productive days gained per year and increased school attendance.
- Time savings resulting from better access to services.
- Value of deaths averted (WHO/UN Water, 2010).

Hence investing resources both financial and academic could have positive impacts on the society on multiple fronts and aid in overall development of the society.

1.1 Objectives

The objectives of this study are as follows:

- To provide an analysis of the causes of failures in access to drinking water in the Tankerfed¹ gram panchayats in Thane District, Maharashtra.
- To provide exact deliverables and objectives for TD 696 MTech Project stage II

1.2 Study Area

The study area taken for this work is Thane District in Maharashtra. The district is situated between 18°42' N and 20°20' N and 72°45' E and 73°48' E. The area of the district is about 9558 km². The district is bounded by Pune and Ahmadnagar on the east, Nashik on the east and northeast, Valsad District of Gujarat state and Union territory of Dadra and Nagar Haveli on the north. The Arabian Sea forms the western boundary, while it is bounded by Mumbai city district and Mumbai suburban district on the southwest and Raigad district on the south. The district is covered in between two westerly flowing river basins, Vaitarna and Ulhas.

The Thane district comprises of 15 Talukas, namely Thane, Kalyan, Murbad, Bhiwandi, Shahapur, Vasai, Ulhasnagar, Ambarnath, Dahanu, Palghar, Talasari, Jawhar, Mokhada, Wada and Vikramgad. It is the only district in India which has 7 municipal

¹ Tankerfed gram panchayat here refers to gram panchayats which consists at least one tankerfed habaitat.

corporations. There are also proposals at present to bifurcate the district due to increasing population size (Daily News and Analysis, 2011).

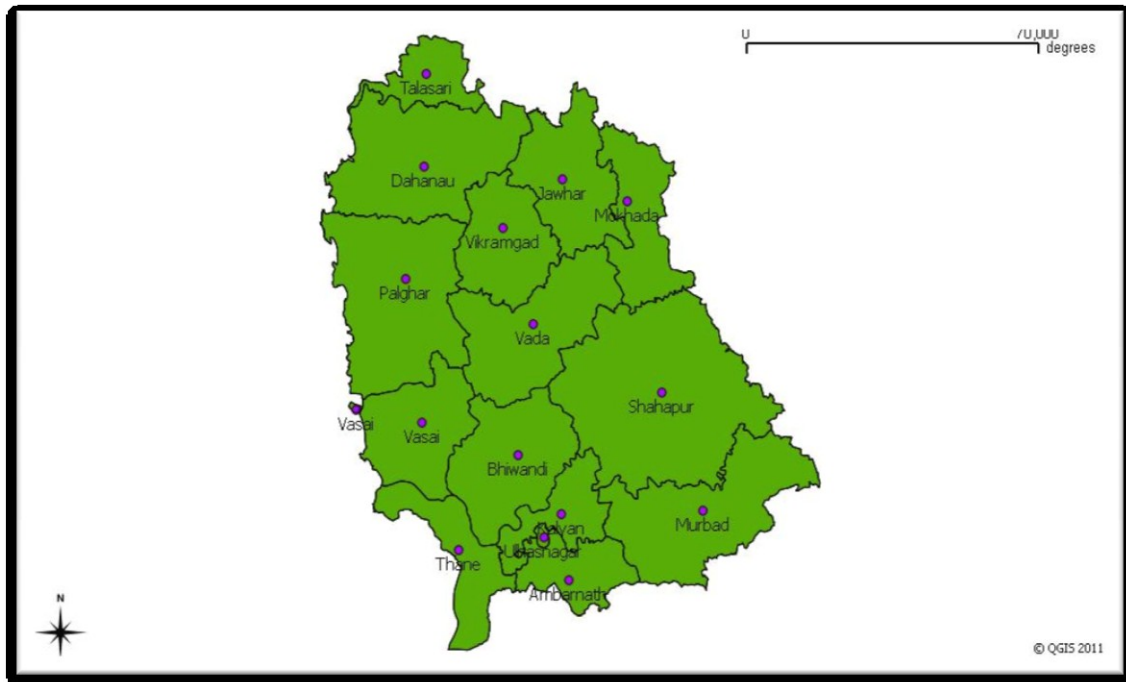


Figure 1:1: Thane Taluka Map
Source: Derived from GIS, MRSAC

As per GSDA, the district is classified based on morphology into three groups namely

- Hilly & Foot Hill region – Eastern Part
- Moderately dissected & sloping area – Central Part
- Coastal Area – Western part

1.3 Description of the Dataset

In this analysis, three main databases were used to analyse the problem of the tanker fed habitats. They are sourced from

- i. Government of Maharashtra,
- ii. Census 2001 and
- iii. Department of Drinking Water supply.

This section describes the information available in the different datasets. The figure 1: 2 gives an overview about the levels of information available within each data set.

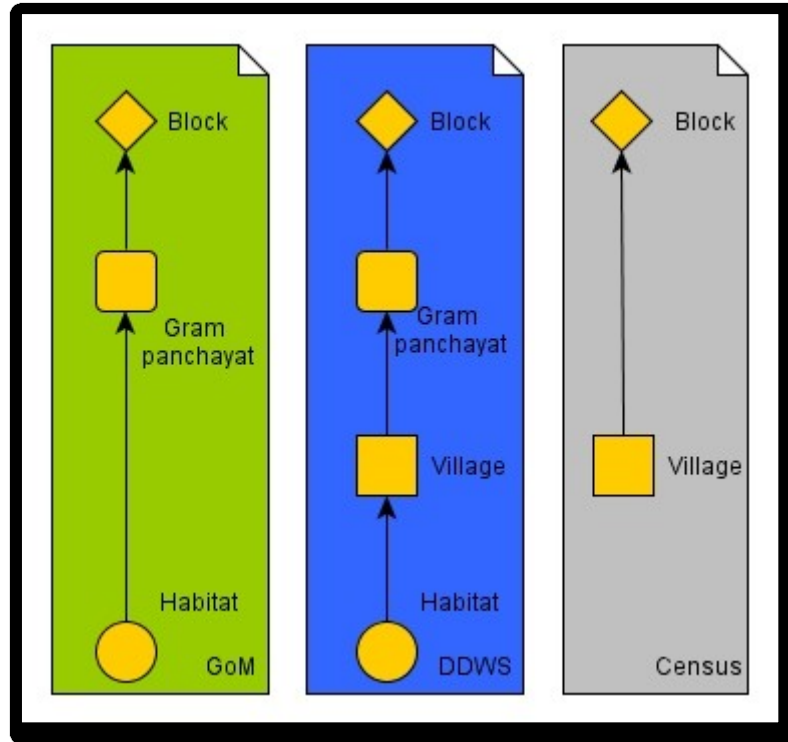


Figure 1:2: Description of datasets

As we know, the hierarchy of the habitations is given by the sequence: habitat–village-grampanchayat-block. However, most datasets do not follow the complete hierarchy.

1.3.1 Government of Maharashtra (GoM)

The Thane district administration handled us with two datasets: i) A hardcopy list which contains the name of 163 tankerfed habitats. ii) The GoM dataset for Thane district which consists of 96 datafields. Only 147 habitats from the list of 163 were found in the GoM dataset. It is the primary means to identify the tankerfed habitats in the district.

It contains the following data fields: name of the block, name of the gram panchayat, name of the habitat, total population, number of households, individual Public Water System (PWS), functional PWS, regional PWS, supply, annual expenditure on operation and maintenance of functional PWS, non functional PWS, energy arrear, habitat without PWS, number of hand pumps and wells, mini water supply/pump, tankerfed status, Nirmal gram status, and water quality test status etc. From this information, tankerfed status, number of hand pumps and wells were used in the final database.

For functional schemes, the following information was given: number of individual household connections, number of standposts, stages of pumping, number of days per month of water supply, pump discharge and energy consumption, operation and expenditure details.

For the non-functional schemes, the following information is given: Year since non-functional, reasons for non-functionality. This information for functional and non-functional are available at habitat and gram panchayat level.

This dataset did not have the name of the village for the habitat and only the name of the gram panchayat was provided. Hence the automatic pairing² with DDWS dataset was not successful using typical database processing. Since it does not contain the village name, the entries could not be paired with the census data. Therefore details about the number of hand pump, well and tankerfed status are taken into account for the final database.

The lack of village name and the presence of large number of 'no value data' entries prompted our habitat analysis to use the habitat name particulars from DDWS dataset. Another problem was that the name of the habitat did not match with the habitat name available in the DDWS dataset. For example, in the case of Vashala village it is written as Washala and Vashala at different datasets.

The revised guidelines from as of 2009, emphasises the need for using census names for the villages and GPS location measurement of water sources. It also allocates 100% funding for creation of GIS system for drinking water supply management. (Department of Drinking Water Supply, 2010)

1.3.2 Department of Drinking Water Supply

The dataset is obtained from the publicly accessible Management Information System³ (MIS) managed by the DDWS Ministry. It contains information about the administrative structure of the village, like name of the revenue village, gram panchayat, total population, ST population, SC population, number of cattle, number of households, Type of source-(groundwater, surface water) and information about the schemes in individual habitat. The information is available at habitat level and the population details are as of 01/04/09. Two variants of this dataset were obtained and one was used for automatic pairing and another dataset was created by requesting the data from the DDWS-MIS and manually compiling it. The manually compiled data set was used for the analysis of the habitats. There

² Automatic Pairing refers to combining the two datasets based on the common attributes like habitat name, gram panchayat name using the SQL programming language.

³ Management Information System can be accessed from http://indiawater.gov.in/imisweb/reports/searchprofile/rep_searchprofile.aspx?rep=Y

are few identical habitat names in the dataset, for example the entry “adivasipada” was found in different gram panchyats.

The name of the habitat did not match with that available in the GoM dataset, hence automatic pairing could not be done. The total population, ST population, SC population, Type of source, Number of cattle at habitat level from this dataset was used for the final analysis.

1.3.3 Census 2001

The census 2001 data was obtained from the Census Department. The census information is summarized in the given table (Census, 2001). It consists of information like total population, ST population, SC population, households, literates, illiterates, workers, non workers, main workers, marginal workers, cultivator, agricultural labourer, household industry worker and other workers. The information is available at the village level and also based on gender (male and female).

The census data which was used in our analysis is called as Part-I dataset which contains demographic information. There is also another dataset called Part-II, which is available and contains information about household assets, drinking water source and distance etc. Since the Part-II data is available only at block level, it was not used in the analysis.

The census dataset follows the hierarchy: village-block. Hence the analysis is done for the village level instead of the gram panchayat level. However these villages belong to tankerfed gram panchayats. This allows differentiating between the tankerfed villages and nontankerfed villages within tankerfed gram panchayats.

The name of the villages should be taken from census so that it is in standard format in every database. This helps in inter-operability, comparison and analysis by combining different database.

Table 1-2: Census Description

S.No	Name of the data field	Description
1	Household	A 'household' is usually a group of persons who normally live together and take their meals from a common kitchen unless the exigencies of work prevent any of them from doing so
2	Literates	A person aged 7 years and above who can both read and write with understanding in any language has been taken as literate.
3	Workers	Participation in any economically productive activity with or without compensation, wages. Includes effective supervision and direction of work. All persons engaged in 'work' as defined above are workers.
4	Reference Period	Reference period for determining a person as worker and non-worker is one year preceding the date of enumeration.
5.	Main workers	The workers who had worked for the major part ⁴ of the reference period are termed as Main Workers.
6	Marginal Workers	The workers who had not worked for the major part of the reference period are termed as Marginal Workers.
7	Cultivator	If the person is engaged in cultivation of land owned or held from Government or held from private persons or institutions for payment in money, kind or share. Cultivation includes effective supervision or direction in cultivation.

⁴ Major part of the reference period refers to 6 months of the year before enumeration.

8	Agricultural Labourer	A person who works on another person's land for wages in money or kind or share is regarded as an agricultural labourer. The person has no risk in the cultivation, but merely works on another person's land for wages.
9	House hold industry Workers	Industry conducted by one or more members of the household within the village and The industry is not run on the scale of a registered factory which would qualify or has to be registered under the Indian Factories Act. For example Foodstuffs & Beverage production, Tobacco products, Service and repair of transport equipment
10	Other Workers	All those workers other than cultivators or agricultural labourers or household industry workers are Other Workers. For Example government servants, teachers,
11	Non Workers	A person who did not at all work during the reference period was treated as non-worker. Students and persons performing household work or fetching water.
12	Urban Criteria	(a) All statutory places with a municipality, corporation, cantonment board or notified town area committee, etc. (b) A place satisfying the following three criteria simultaneously: i) A minimum population of 5,000; ii) Atleast 75 per cent of male working population engaged in non-agricultural pursuits; and iii) A density of population of at least 400 per sq. km. (1,000 per sq. mile).

1.4 Methodology

The study involves a review of literature, collection and analysis of secondary data, field visits. Literature review was done to understand the context of the problem and to help in understanding the concepts and norms associated with the secondary data. Secondary data collection involved obtaining the datasets mentioned in Chapter 1.3. Secondary Data Analysis is carried out using MS Excel, Postgress (SQL), and Quantum GIS.

1.4.1 Data Collection

Primary Data

The primary data for the study is collected through key informant interviews, and field observations.

Secondary Data

The secondary data for the study was demographic data of the study area. They are sourced from Government of Maharashtra, Census 2001 and Department of Drinking Water supply. The Geographic Information System's layers were obtained from Maharashtra Remote Sensing Application Centre (MRSAC).

1.4.2 Data Analysis

The datasets were subjected to elementary analysis for validation and identification of relevant data sets. After the analysis of the dataset of GoM, the list of relevant data fields necessary for further analysis was identified. The locations of these habitats were located with the help of Wikimapia and Google Earth. The co-ordinates and elevation details of the available habitats were updated in the database. Eventually this was not required as the MRSAC dataset had the location details of the villages present in Thane district. The automatic pairing was tried to combine the dataset of GoM with datasets of DDWS and Census to create multilevel database. But due to limitations which were explained in Chapter 1.3. the efforts were unsuccessful. Then the datasets were compiled manually and the attributes listed there were used to build the final database. After the analysis of secondary data, the selected gram panchayat was visited to verify the data and to find more relevant analysis for the problem. The gram panchayats were selected based on geospatial clusters of the village in block and it was made sure that the gram panchayat has variations in social demography.

For the final database, the entries were selected by the following process. Based on the tankerfed habitats, the corresponding gram panchayats were identified and the rest of the gram panchayats were termed as Non-tankerfed and left out of the analysis. From the Tankerfed grampanchayats the list of tankerfed villages and nontankerfed villages was identified. This list of villages was combined with the census data and used in village level analysis. From the Tankerfed gram panchayat's list the habitat wise list for individual villages (tankerfed and nontankerfed) was prepared. The habitat list was combined with the DDWS and GoM datasets and used for the habitat analysis. The village level list was combined with the Census data and village level database was prepared for the whole district as well as for the individual blocks.

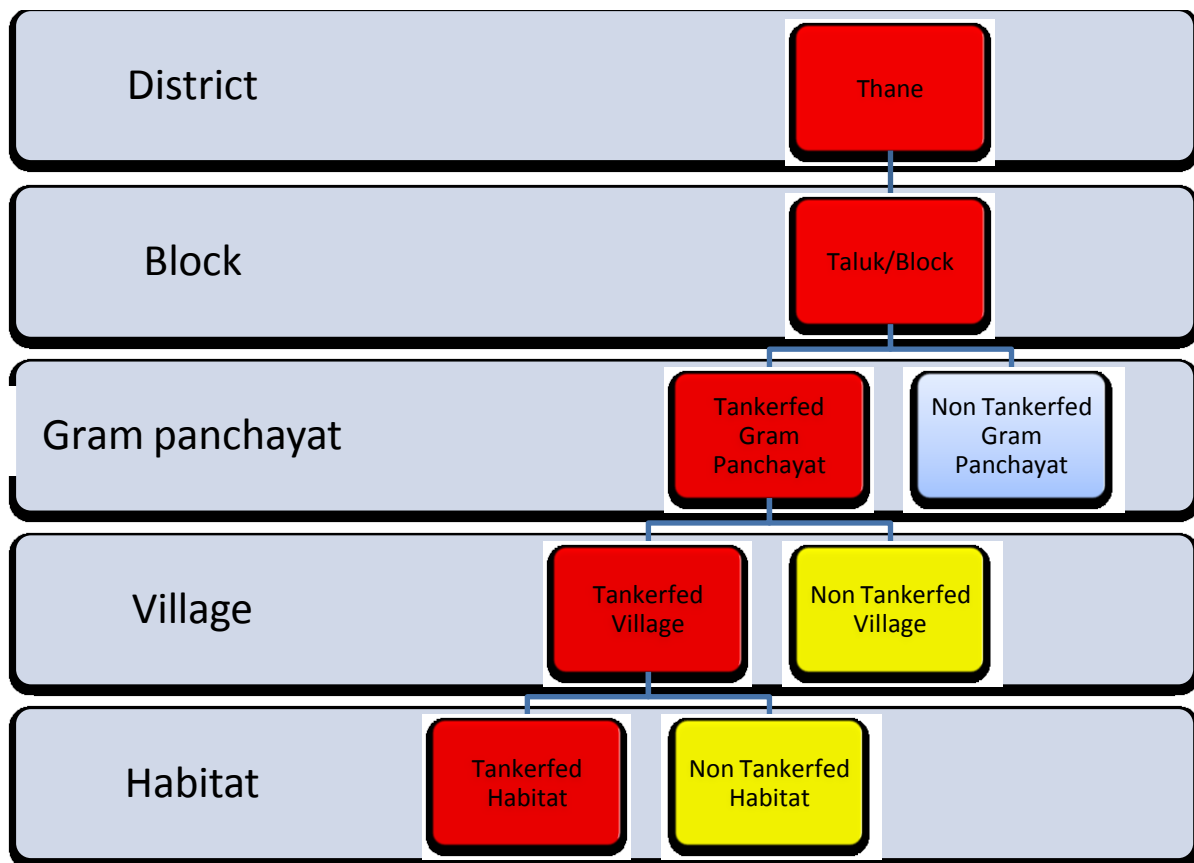


Figure 1:3: Data analysis levels

1.5 Structure of the report

Chapter 2 is literature review and deals with the review of existing drinking water schemes carried out by the state government and central government from the available literature. It also consists of information about the different types of schemes like single village and multi village scheme etc. Chapter 3 is data analysis and consists of information about the findings of the secondary data analysis. It consists of information about the factors which differentiate or link tankerfed and non tankerfed village/habitat. It consists of information about the elementary data analysis finding and also findings of village level and habitat level data analysis. It also describes the available GIS data and future data analysis. Chapter 4 is case studies and consists of compilation of field visit observations. It also describes the ground reality, gap between the available data and real time situations. Chapter 5 is conclusion and gives overview about the findings and provides deliverables for TD 696 MTP stage II. It also lays out the scope for the future work needs to be done for the solution of the tankerfed problem.

2 Literature Review

2.1 Access to Drinking Water and Norms

According to World Health Organisation's (WHO) guidelines of Right to Water, "Accessibility to water includes a continuous supply of a minimum amount of water which is sufficient for drinking, personal and domestic hygiene, for an affordable price, within a reasonable distance". According to WHO basic access can be defined as the availability of at least 20 litres of drinking water per person per day within a distance of not more than 1 km of the dwelling. (UN Water Taskforce, 2010)

Improved drinking water sources are defined as sources that are more likely to provide safe water than unimproved technologies. Improved water sources include household connections, public standpipes, boreholes, protected dug wells, protected springs, and rainwater collections. Unimproved water sources are unprotected wells, unprotected springs, vendor-provided water, bottled water and tanker truck-provided water. (WHO, 2010)

Sustainable access to water has two components

- a) Environmental sustainability
- b) Functional sustainability.

Environmental sustainability refers to environmental protection through limiting extraction of water to a capacity below what is actually available. Functional sustainability refers to programme sustainability in terms of supply and management. (WHO, 2010)

The Eighth Five Year Plan draws the norms and conditions as,

- 40 lpcd⁵ of safe drinking water within a walking distance of 1.6 kms or elevation difference of 100 metres in hilly areas.
- Above condition to be relaxed as per field conditions applicable to arid, semi-arid and hilly areas.
- At least one hand-pump/spot-source for every 250 persons to be provided.
- Additional 30 lpcd in Desert Development Programme(DDP) / Drought Prone Area Programme(DPAP) areas, for cattle to be provided. (Planning Commission, 2007)

⁵ lpcd refers to Litres per capita per Day, units to measure water supply.

2.2 National Rural Drinking Water Programme (NRDWP)

Rural drinking water supply is a State subject as per the Constitution of India. To accelerate the pace of coverage of problem villages with respect to provision of drinking water, the Government of India introduced the Accelerated Rural Water Supply Programme (ARWSP) in 1972–73, to aid financial and technical assistance to the state government in implementing drinking water supply schemes in such villages. The Rural Drinking Water Supply Guidelines have been revised in 2009 to address issues like sustainability and water quality in drinking water schemes. The revised program is known as National Rural Drinking Water Programme (NRDWP).

The state level allocation of funding for the NRDWP is as given as below:

Table 2-1: State Level Fund Allocation for NRDWP

Particulars	Allocation in Percentage
Operation and Maintenance	10
Sustainability	20
Coverage	45
Support Activities	5
Water quality	20

The salient feature of NRDWP is to ensure sustainability in drinking water schemes and preventing slip back. It also encourages developing multiple water sources instead of over dependence on single source. The programme supports conservation practices especially at village level. It emphasises the need for water budgeting and village water security plans. It argues for handing over the management of rural drinking water schemes to the panchayat and incentivises the States which follows this procedure. (Department of Drinking Water Supply, 2010)

The revised guidelines of 2009 revealed that the mere calculation of per capita availability of water might prevent some sections of the population in terms of access to water. It also emphasises, *“It is necessary to build a warehouse of information and knowledge at the State and district levels which can constantly contribute to bringing the “hardware” of technologies—conventional/ unconventional/ innovative systems of water supply and link the same to the “software” of skills, knowledge, and enthusiasm desire for ownership of the*

water supply projects by the communities and panchayati Raj Institutions themselves.”. This stresses the need of academic institutions and researchers to work towards in safeguarding water security in rural India and also creating sense of ownership for the sustained success of development initiatives.

The norms of revised guidelines also clearly indicate the role of government as a facilitator and its responsibility to bring NGO, civil society for capacity building of local panchayats. It outlines the role of state for bringing water to the village and responsibility of the Village Water and Sanitation Committee for local management of drinking water supply. It also encourages data inputs for ensuring the equitable investments to all habitations and sections of the society and priority should be given for habitations with no investments in the past. It gives due importance for women in water management and advises involvement of women association for community participation, (Department of Drinking Water Supply, 2009).

For building sustainability projects in drinking water supply, DDWS has issued a manual on ‘Mobilising Technology for Sustainability’. The funds to the states are allocated from the Central government with increased weightage (60%) for rural population. If this method of allocation is followed in state distribution to the districts and then districts like Thane which has higher urban population of 72% as per the Census 2001, might get lesser fund allocation. The twelfth finance commission has recommended grants to panchayats to meet the operation and maintenance for ensuring drinking water supply. In addition to these grants about 10% of the NRDWP fund allocated to the states should be used only for operation and maintenance of the schemes. The guidelines also stated that 25% of the NRDWP funds should be used for coverage in ST dominant habitations and 10% for SC habitations. This could also be increased if the state has higher proportion of SC/ST population.

The NRDWP also emphasized support activities for drinking water programme. It allocates funds for states to achieve the long term goal of the drinking water sector. The support activities cover information, education and communication, human resource development, water quality monitoring and surveillance, setting up water testing laboratories and involving state technical agency and national expert groups for preparation of projects, technical scrutiny and evaluation of rural water supply schemes. This can be taken up under the 5% support fund of NRDWP. It also supports satellite-data imagery; GIS mapping systems, use of GPS system for unique identification of habitations and water sources and

delivery points, support deploying the central online monitoring system. The states are required to set up a Water and Sanitation Support Organization (WSSO) to take up these support activities.

The programme gives highest priority to sustainability of drinking water sources and systems to prevent slippages. The sustainability measures include water conservation and rainwater harvesting lead to in-situ remediation of water quality. For this purpose 20% of the NRDWP allocation is made available to the states on a 100% grant-in-aid basis.

The NRDWP tries to achieve drinking water security at household level and shifting the paradigm of mere coverage of habitation. It is a clear shift from 'supply-driven' approach towards 'demand-managed' approach as it also has mechanisms and incentives for management at decentralised panchayat level.

2.3 Habitat

The rural habitation is often a unit of differentiation used to define a community based on caste and creed and also by members who share common language and cultural characteristics. Often, people from the socially backward classes living in a cluster were not able to access water from the common water supply schemes located in the main village. (Department of Drinking Water Supply, 2010). In the data analysis process habitat forms the smallest unit of analysis. Because before 1996 census village was the lowest unit but it was found out that the large numbers of satellite habitations were without adequate drinking water facilities although the main village was shown fully covered.

2.4 Bharat Nirman

Bharat Nirman is a programme launched by the Government of India in 2005. Its main purpose is to build rural infrastructure. It has two phases, Phase I is implemented from 2005-06 to 2008-09 while Phase II is being implemented from 2009-10 to 2011-12. There are six components under Bharat Nirman namely water supply, housing, telecommunications and information technology, roads, electrification, and irrigation. The water supply component is briefed as below:

The goal of Bharat Nirman water supply component is to provide safe source of drinking water to every habitation. It focuses on uncovered habitations, slipped back habitations due to source failure and/or water quality problem.

Responsible actors for meeting the goal are Ministry of Rural Development, Department of Drinking Water Supply, and State Governments. The programme is centrally sponsored scheme of Accelerated Rural Water Supply Programme. (Government of India, 2005) The norms for coverage in addition to usual 40 lpcd for human beings and 30 lpcd for cattles are as follows

- One hand pump or stand post for every 250 persons
- The water source should exist within 1.6 km in the plains and within 100 metres elevation in the hilly areas

The programme classifies the village for implementation into three categories as

1. Uncovered habitat,
2. Slipped- back habitat and
3. Habitat affected with a problem of water quality.

The factors responsible for slipped back were states as due to sources going dry or lowering of the ground water table and sources becoming quality affected.

2.5 Multi Village systems (MVS)

The need for Multi village distribution systems arises when local sources are scarce and not fit for drinking, hence the option available to bring water from an outside source. If this source is far away then the economy of scale indicates that more than one village be served by the system. In general MVS depend on surface water sources like rivers, reservoirs. This presents a unique challenge for these types of schemes as the sources are usually far away from the group of villages to be served .It also involves construction and operation of complex installations such as head works, pumping stations, water treatment plants, distribution network. A typical multi-village system is explained in the figure below.

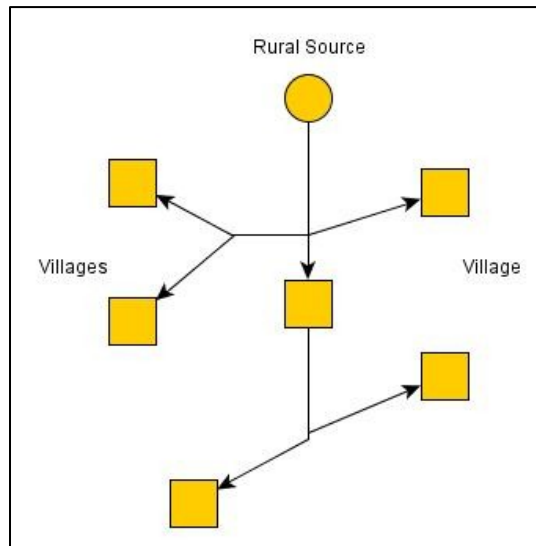


Figure 2:1: Multi Village System
Source: (World Bank, 2001)

As per the field report on South American countries prepared by the Water and Sanitation Programme, World Bank, following issues have been identified. (World Bank, 2001)

2.5.1 Social and Institutional issues

Legal status

There is a need for proper legal framework to ensure sustainability of water user associations.

Accountability to users

Effective communication and strong leadership are required in co-ordinating between villages that don't have existing social ties and separated between long distances. The employment of local staff is a way to improve the customer relations and accountability to users. Understanding the local context enables the utility to utilize flexible payment schemes that reduces disconnection and non payment of tariff.

Institutional models

For larger schemes a combination of national or regional agency for planning, construction and delivery of bulk supplies and village water user association for local distribution and day-to-day management. For smaller schemes, multi-village association is needed.

2.5.2 Infrastructure Issues

Technical Expertise

The high level of technical expertise required for planning and construction of larger multi-village systems may necessitate the involvement of state or regional authorities.

Water losses

Multi-village systems are relatively large and complex. Production is not often known and the risk of pipe breaks is high. Unaccounted for water⁶ may be due to illegal connections in places where the pipelines stretch between villages. It is also difficult to detect cause of problems in one part of the system which may lie away from the problem area.

2.5.3 Access to Water Services

In the systems covered in the field report, the tariff schedule is based on the family income. In the case studies presented in the field report, it was observed that the poor households could not afford connection fee and also the system did not provide any public standposts. To overcome this obstacle the connection fee could be reduced through the integration with the tariff schedule.

2.5.4 Financial Viability

Investment Financing

Financing for new infrastructure and rehabilitation due to large multi village systems present a major investment barrier which is difficult to cross for local communities without financial support. The investment cost per capita is higher than the single village schemes but the quality of service delivery is much better.

Financial Autonomy and ability to finance expanding coverage

Even if the revenues were able to cover the operation and maintenance costs, proper planning is needed for long term replacements or new investments to meet the growing demand. The initial connection fees played an important role in achieving financial viability in the cases observed by the field report of the World Bank.

Staff requirements per connection

⁶ Unaccounted for water refers to amount of water that has been produced and lost before it reaches the end user.

In case of multi village scheme the infrastructure serving many villages is usually limited to one source, one treatment plant. Hence staff requirements per connection are less when compared with a single village scheme.

Demand Management

In larger systems demand management could be achieved through metering and appropriate tariff design.

2.5.5 Environmental Issues

Allocation of Water Resources

There is a need to adapt command area approach to the allocation and optimized use of available water resources. State or regional agency is needed to identify the most suitable water resources for a given area.

Source Protection

A single source serving many communities requires greater protection of the water sources. Community management of sources and conservation measures could bring in better protective measures and also sense of ownership among the community.

2.5.6 Driving Factors for Community managed Multi-Village Project

Multi Village systems usually come about through joint community initiatives beginning with the search for a solution to the common problem of water scarcity. A multi village scheme might come due to following reasons (World Bank, 2001):

Coverage

In areas with few water sources, multi village systems provide a wider coverage to neighbouring villages.

Leadership

In order to initiate a water supply project, strong negotiating skills are required to open dialogue with support agencies and to mobilize financial resources and community participation. These leadership qualities are often lacking in small villages and it is better when it comes to group of villages.

Quality of service

The option of piped system is unlikely to be available to a small rural community but may be possible when villages join together. In addition to this, community need to make informed choices about the type of system and level of service that they will be able to maintain. Professional services may be contracted by the multi village system when required.

2.6 Community participation: Experience of Maharashtra

The case of Water and Sanitation project undertaken in Jalgaon and Dhule district throws light on how problems arise when roles assigned to intermediary agencies get increased or expended and the agencies were not in a position to accept new roles (Manikutty, 1998). In this case it was planned that officials of Zilla Parishads would carry Community participation work like formation water committees. The training to the officials was assigned to Tata Institute of Social Sciences (TISS). But the training process took much longer time to complete so it was decided that the TISS would do Community Participation activity in 10 % of the villages to be covered under the project. These model villages were made for learning experience of the officials. But this plan also did not work out as TISS team was handled the responsibility of doing the activity for all the villages. The TISS team was understaffed and it resulted in delays in formation of water committees and site selection. The outcome of the project was that water was not delivered to the village even five years after the implementation even though other aspects of the project were better when compared with the other water and sanitation projects analysed in the report.

2.7 Tankerfed problem in Ahmednagar: Case of Manhere watershed

The tankerfed problem is not confined to Thane district alone and it was found in other districts of Maharashtra too. This case study presents a similar situation and the measures taken for increasing access to drinking water.

A project on Integrated Watershed Development Project took place in Manhere area, Akole taluka of Ahmednagar district, Maharashtra. It was implemented during 1993 to 1999 in the villages Manhere, Ambevangan, Titvi and Kodani. The project was supported under Indo-German Watershed Development Programme (IGWDP), which emphasized mainly on soil conservation through mechanical and vegetative measures.

In all the main villages, community dug wells were the main supply source, which invariably dries up for 2- 3 months in summer. The habitats have been dependant on the spring water or the irrigation dug wells, which are located normally in the deep valleys. (H.Kulkarni,2000)

During summer the Zilla Parishad tankers used to supply water to main villages in a limited quantity. However the habitats had no option other than to collect the water by wandering during the nights which added to the drudgery of women and also losing the crucial wage earning days. The villagers had to walk for distance more than 5 to 10 kms to fetch drinking water in summer. Although the watershed project had no provision for drinking water supply the conservation measures helped augment the springs and dug wells, which particularly solved the problem of the habitats. The period of scarcity was reduced in the main villages. It was evident from that the tanker supply period being reduced from 2-3 months to 15-20 days in a year. The surface water storage structures such as check dams, roof water harvesting tanks and spring development from the non-project sources improved the access for the people. The habitats now have yearly water availability through the perennial springs. In the year 1999-2000 the piped water supply scheme has been provided by the Government in Manhere village and is under progress in Ambevangan and Titvi.

3 Data Analysis

3.1 Elementary Analysis

The outcome of the elementary analysis is to identify the relevant data fields from the GoM dataset and identify the reliable data fields. The number of habitat list given by the GSDA was 163 habitats. Out of these 163 habitats only 147 habitat names were found in the GoM dataset. From these 147 habitats, about 113 habitats were identified as tankerfed for about three years from 1.4.2007.

Table 3-1: Blockwise Tankerfed Habitat Distribution

Notified Block	Number of Tankerfed habitat
Jawhar	22
Vikramgad	6
Bhiwandi	3
Mokhada	20
Murbad	11
Shahapur	45
Palghar	3
Vasai	3
Total	113

The number of tankerfed habitats is found to be highest in the blocks - Jawhar, Mokhada, Shahapur, Murbad. From this analysis it was decided to focus on these blocks for the next level of analysis.

According to GoM dataset about 16 of the habitats have individual Public Water Systems (PWS) and only four were functional. These four habitats were located in Paye, Khodala, Kharekuran(2) gram panchayats of Bhiwandi, Mokhada, Palghar blocks respectively.

The lack of village name and the presence of large number of 'no value data' entries prompted our habitat analysis to use the habitat name particulars from DDWS dataset. The name of the habitat did not match up with the habitat name available in the DDWS dataset. For example the case of Vashala village is written as Washala and Vashala in different datasets. It was observed from the field visits that the number of source seems to have changed because of government schemes. So the number of sources was included in the final database but the analysis on the source as of now was not done.

The other data fields and description is already explained in the Section 1.3.1. From this information data fields like tankerfed status, number of hand pumps and wells were entered in the final database manually.

3.2 Textual Analysis

The main aim of this textual analysis is to check whether the main village is only covered by tankers and the other habitats are left out of the process. This analysis is done by checking whether the name of the habitat is same as village or gram panchayat. The habitats were given colour codes like red for tankerfed, yellow for non tankerfed and white for PWS. The colour codes were then given numbers like one for red, two for yellow, and three for PWS. The names of the habitats were corrected to match with the similar names of village/gram panchayat. For example habitat name Washala was changed to village and gram panchayat name Vashala. Then using the logical formulas like IF, AND, TRUE, FALSE the textual analysis was performed. The dataset used in the textual analysis is given in the appendix.

The 147 habitat list was expanded to gram panchayat level to include all the habitats of tankerfed gram panchayats. There are 200 habitats in this extended list and out of these 200 habitats, 82 habitats are tankerfed. This analysis covers four blocks namely Jawhar, Mokhada, Murbad, and Shahapur. Further textual analysis of the 200 habitat reveals following trends as shown in below table 3.2

Table 3-2: Textual analysis findings

Details	Total	Tankerfed
Total Habitat	200	82
Habitat name = Village name	59	26
Habitat name ≠ Village name	141	56
gram panchayat name = Village name	98	47
gram panchayat name ≠ Village name	102	35
gram panchayat Name=Habitat name= Village name	21	12

About 57% of the tankerfed village have same name as gram panchayat name, this implies that main villages of the gram panchayats were covered through the tankerfed scheme. Similar percentage of tankerfed coverage is seen for the habitat having same name as grampanchayat and village names. In the case of non-tankerfed habitats, about 72% of the total non-tankerfed habitats found to be sister habitats⁷. This reveals the pattern behind the non-tankerfed habitats.

So from these trends following situations are identified:

- The main villages of the gram panchayats were covered in the tankerfed schemes as it needs forwarding the applications through the gram panchayat.
- Similarly within the village, the main habitat is favored for the tankerfed scheme.

This analysis reveals that the main villages/habitats are covered by the tankerfed scheme and other habitats face a problem of exclusion. As in the case of Dhamni gram panchayat (see on page 48), the administrative structure has changed. The functioning of gram sabha and panchayat office shifted to new village. Hence there is a possibility of finding more cases like these in tankerfed gram panchayats.

⁷ Sister habitat refers to habitats other than the main habitat.

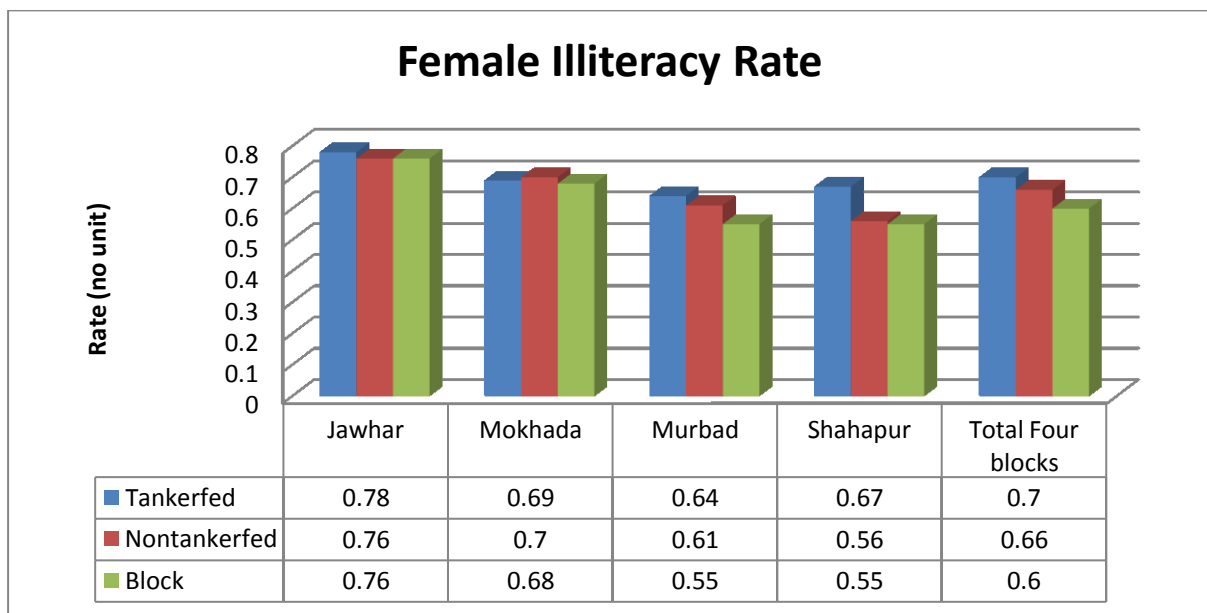
3.3 Census Analysis

In this analysis census 2001 dataset (see on page 7) is analysed and the variation between the tankerfed and nontankerfed village interms of social attributes is briefed in this section. In this, the parameters are also compared with the block level to get an idea about the normal situation prevailing in the block. All the parameters belong to rural category as defined in the census.

3.3.1 Social Factors

The social factors which were taken into consideration are female illiteracy rate, male illiteracy rate, ST population to total population ratio, SC population to total population ratio. The block ratio values are calculated from the block level census data 2001 available at block level.

Village female illiteracy rate

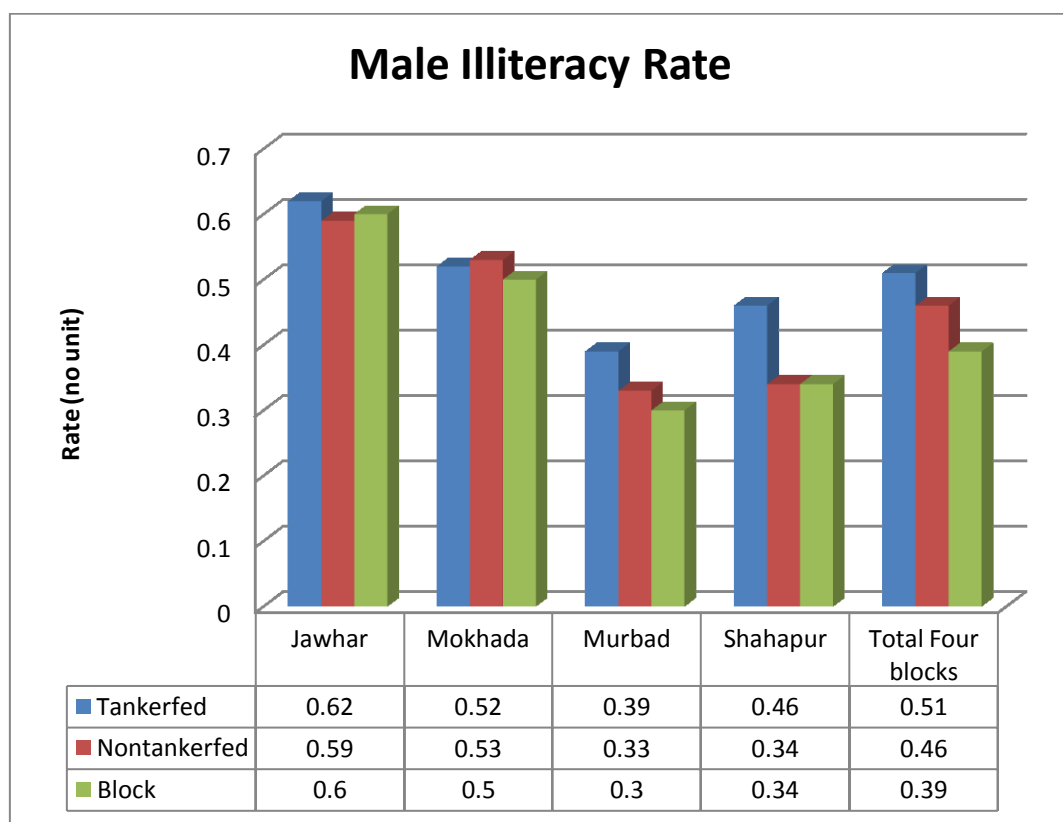


Graph 3-1: Female Illiteracy rate distribution

It is evident from the graph 3.1, that the female illiteracy rates for the tankerfed villages slightly higher than the non-tankerfed villages. The female illiteracy rate of both the tankerfed and non tankerfed villages is higher than the block average values. This is because only tankerfed gram panchayats were considered in this analysis, so the variation is smaller in difference. But the variation between the block values and tankerfed values show that there is a problem of illiteracy existing in these places. These values are higher than the state of Maharashtra (0.42) and Thane district (0.47) illiteracy rates.

This study conducted in Gujarat revealed the correlation between the water scarcity and higher literacy rates. Higher literacy levels and educational attainments improve the access of people to other social services (Rajiv.K.Gupta, 2003). This problem of illiteracy might be a cause or effect of lack of drinking water access in our study region. Lack of access to safe drinking water which results in time lost in collecting water, effects of head loading on women's and girl children's health and burden of household responsibilities have detrimental effect on their health, general family welfare and income earning capabilities.

Village male illiteracy rate

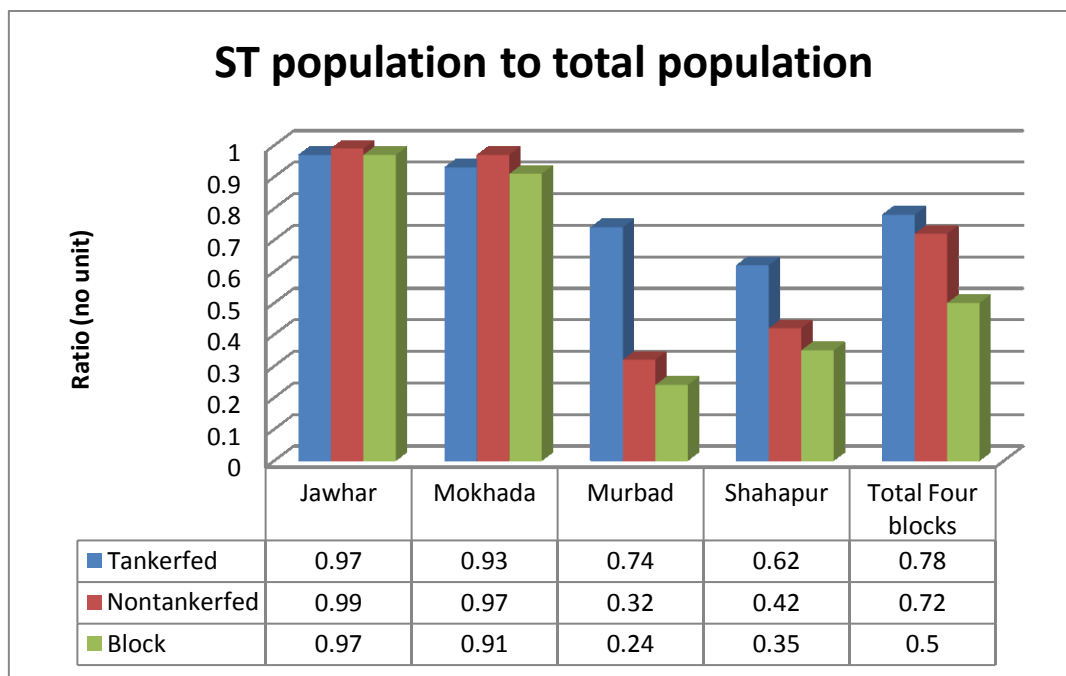


Graph 3-2: Male illiteracy rate distribution

The male illiteracy rate also shows similar variation as in the case of female illiteracy rate. The overall male illiteracy rate in the tankerfed villages is higher than that of non tankerfed villages and combined block values. It is also high when compared with state of Maharashtra (0.18) and Thane district (0.24) values.

ST population to total population ratio

The ST population to total population ratio is calculated to check whether there is social exclusion is happening in the tankerfed villages or non tankerfed villages from the administration.



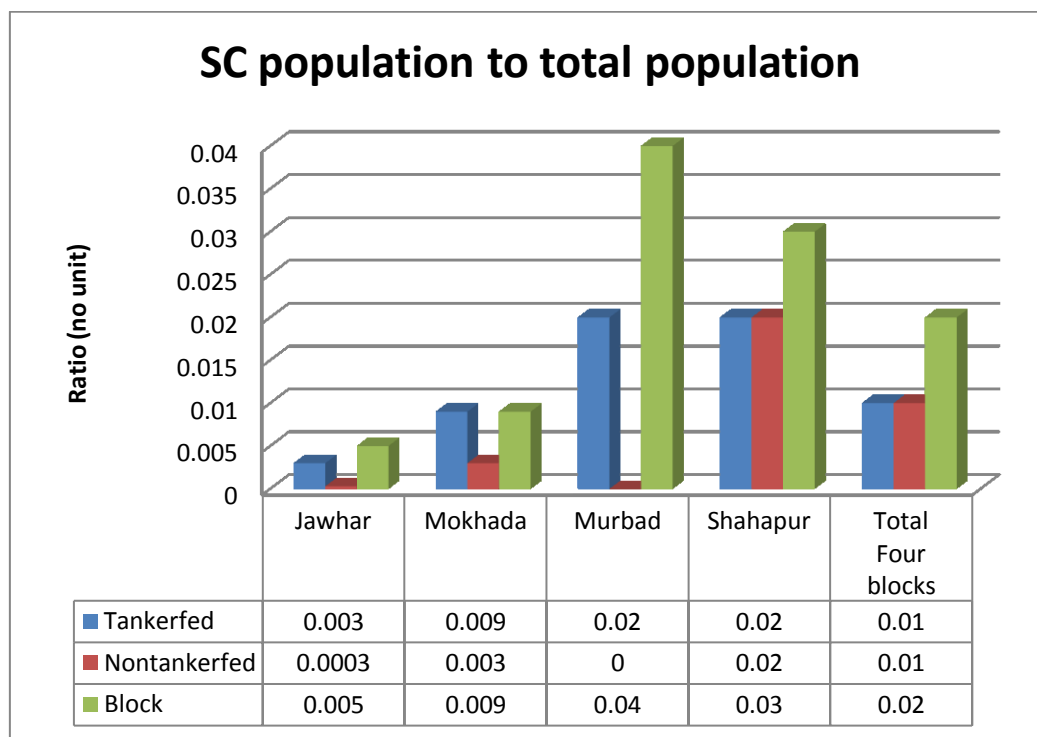
Graph 3-3: ST population to total population ratio

In case of blocks like Jawhar (0.97), Mokhada(0.91) which have high rural tribal population, the variation between tankerfed and non tankerfed villages is not showing much variation. But in the case of blocks Shahapur and Murbad the villages which have tribal population is covered by tankerfed schemes. The total rural ST population ratio at state level is 0.13 and district level is 0.47.

For better understanding we have to see the Jawhar and Mokhada blocks as separate as they are tribal blocks. In Jawhar and Mokhada the non tankerfed villages have higher ST population to the tankerfed villages and there is slight deviation from the average block values (0.97&0.91). But in the case of Murbad and Shahpur, both the tankerfed and non tankerfed values show higher than block average values. This shows that affected gram panchayats has higher ST population. The tankerfed villages show higher ST population when compared with the non tankerfed villages of the same block. This shows that mainly villages having higher ST population are left out of the drinking water schemes and made to depend on the tankers for drinking water requirement in summer months.

SC population to total population ratio

The percentage of ST population is very minimal in these four blocks. There is variation in SC population to total population ratio but it is very minimal.



Graph 3-4: SC population to total population ratio

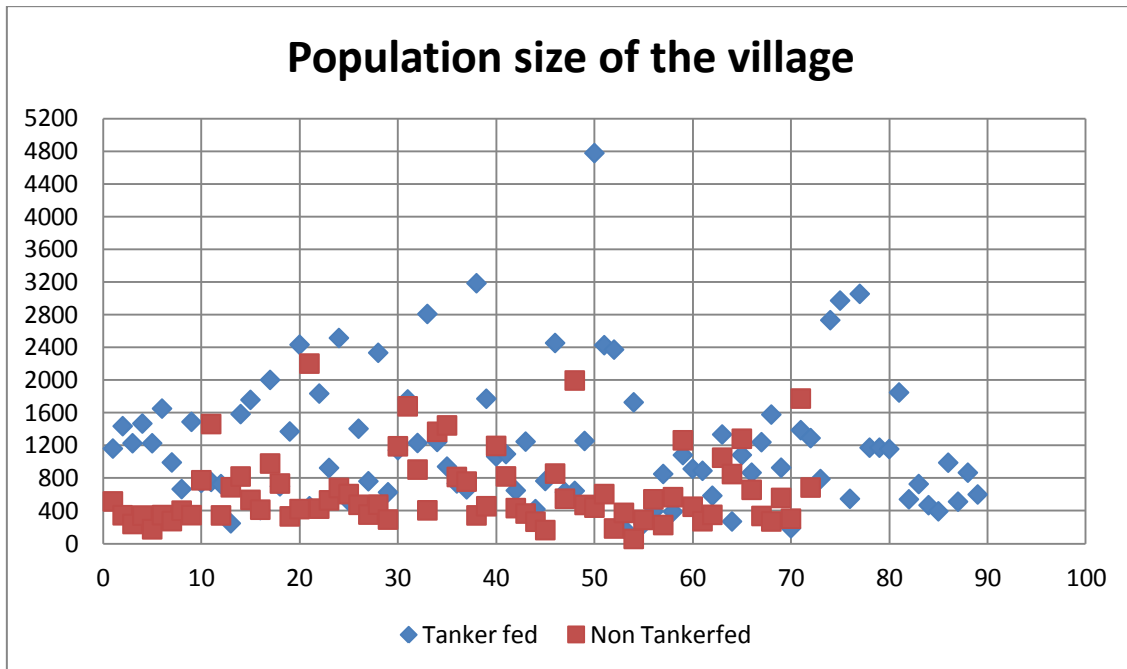
The total rural ST population ratio for the state of Maharashtra is 10.9 and Thane district 0.20. This shows that distribution of SC population in these blocks is less than state and district levels.

As per the analysis, one of the reasons for not detecting this social exclusion is mainly due to lack of analysis at different levels. Because in the case of ST population, even if the data values of two tribal blocks got mixed with the other blocks the end result seemed to show no big variation in the situation.

It is evident from this analysis showed that mainly tribal villages are left out of drinking water schemes and they depend upon tankers. This dependence on tankers in summers might reduce the motivation of the villagers to go for a full fledged drinking water schemes. Evidence from other countries showed that tankerfed schemes are highly inefficient in water allocation and results in welfare losses. (Veena Srinivasan, 2010)

3.3.2 Population size of the village

The total population size of the village also plays an important role in deciding the tankerfed nature of the village. This could be explained from the following graph. The larger tankerfed villages found out to be having higher population are Shirol(4776), Poshera(3183), Ajnup(2971), Aghai(2731).



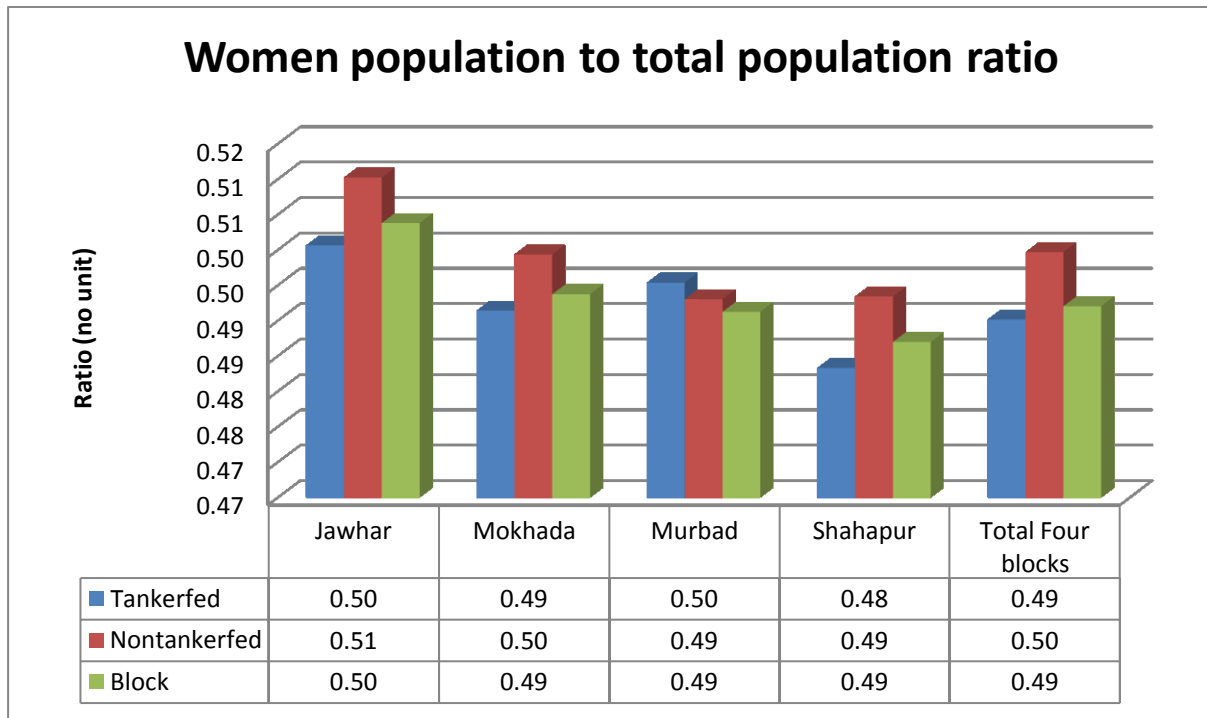
Graph 3-5: Total population variation between tankerfed and nontankerfed villages

It is understood that the villages having total population higher than the 400-500 have higher chances falling into the tankerfed category. This nature of tendency could be due to following reasons

- Higher population increases the demand during non-summer months which affects ground water levels due to high extraction. This creates source failure in the village prompting them to go for tankerfed bailout.
- Higher population might give these villages higher bargaining power in gram panchayats to get tankerfed schemes.
- Similarly smaller population results in reduced pressure on water resources and less bargaining power.
- The intent of the officials to take care of the larger village's drinking water problem as observed in the field visit.(see chapter 0)
- The larger population of village in gram panchayat might also decide the sarpanch of the gram panchayat being elected from same village. This decides the power structure in the village.

3.3.3 Impact of women population

The impact of women on water management and impact of water on women’s life is very crucial aspect while dealing with water problems of the society. Understanding this linkage could prove to be difference between the success and failure.



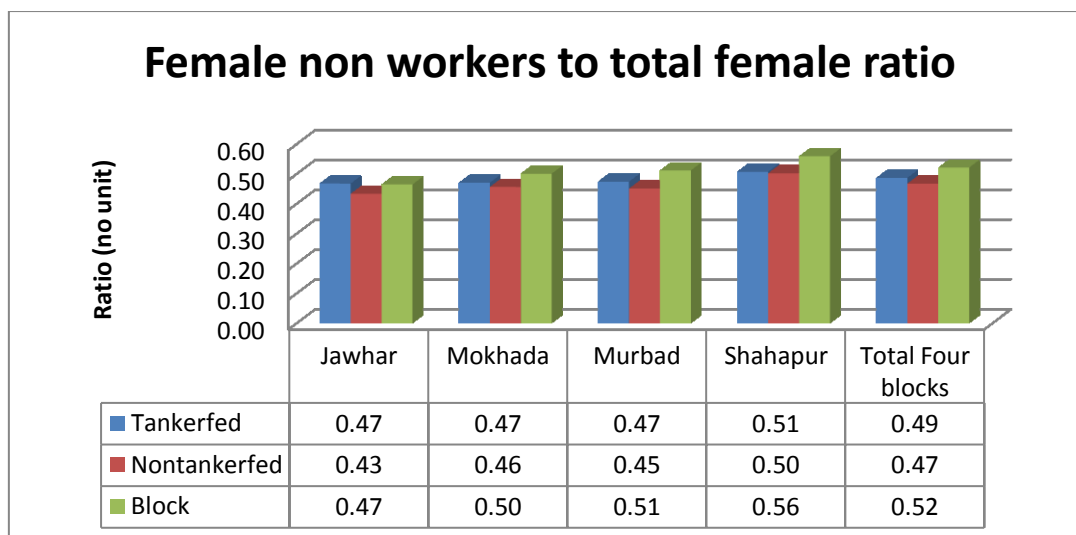
Graph 3-6: Women population to total population ratio

The graph 3-6 implies that the women population is higher in non tankerfed villages when compared with the tankerfed villages. This might be due to two scenarios:

- i. Higher women population leads to better water management resulting in non-tankerfed status.
- ii. Non-tankerfed status is result of less bargaining power due to higher women population.

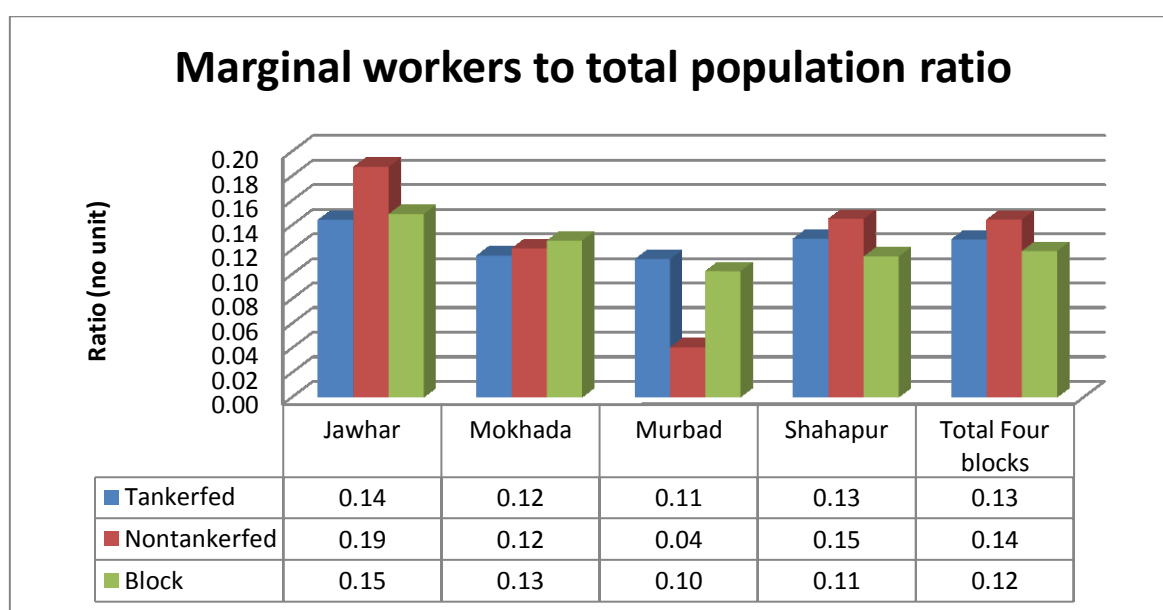
If the first scenario is present, then it is a good indicator and it will emphasise that women are good in water management. But one limitation is that the difference is very small between tankerfed and nontankerfed village.

From the Graph 3-7, it was found out that the non worker female population is slightly higher in tankerfed villages when compared with the non tankerfed villages. This implies that in tankerfed villages most of the women are involved in water fetching activities and they could not participate in economic activity due to water scarcity.



Graph 3-7: Non workers female to total female ratio

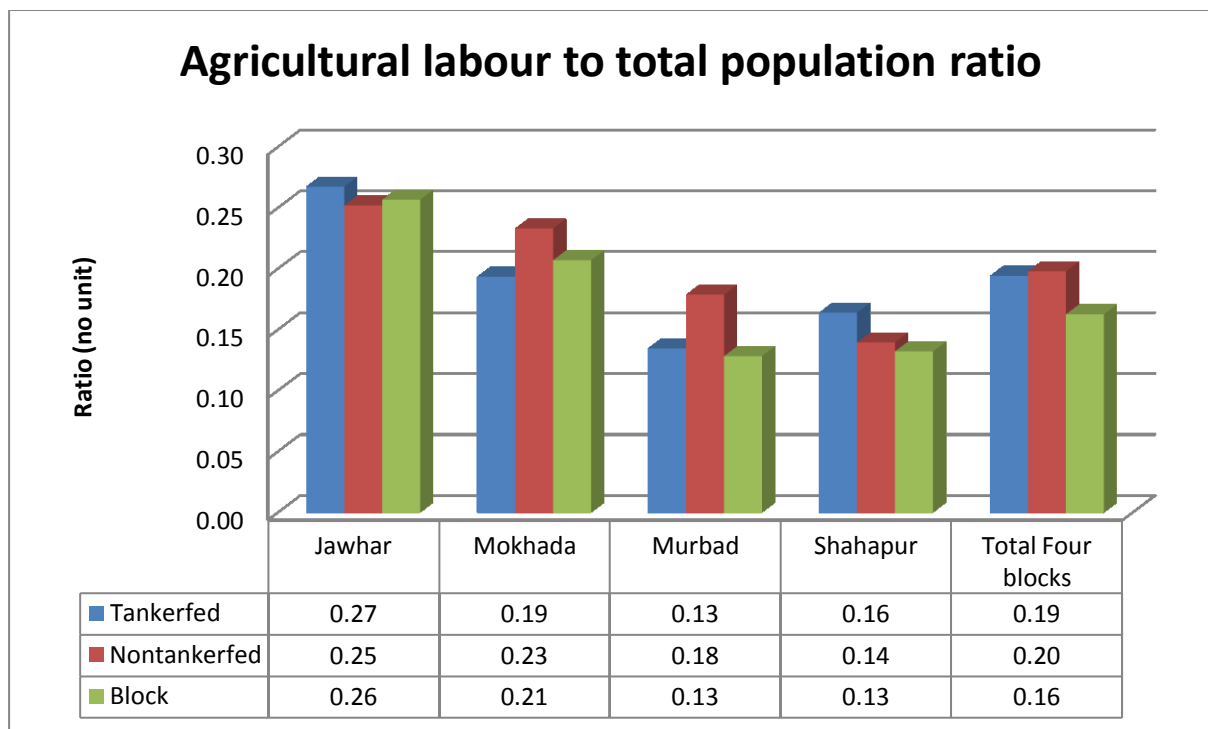
3.3.4 Impact of marginal workers



Graph 3-8: Marginal workers to total population ratio

It is evident from the Graph 3-8, that the marginal workers distribution is higher in non-tankerfed villages than tankerfed villages except in the case of Murbad block. It implies that tankerfed villages have high economical activity when compared with the non tankerfed villages. Higher economic activity increases the access to better social services (Rajiv.K.Gupta, 2003), so that tankerfed villages have better access to gaining the tankerfed services due to its better economic activity.

3.3.5 Impact of Agricultural labour



Graph 3-9: Agricultural to total population ratio

The impact of agricultural labour on the tankerfed status is less or negligible as there is very little variation between tankerfed and non tankerfed villages. This value of agricultural labour includes both the values of main labourers and marginal labourers.

4 Field Work

The field work part in this study is done to understand the problem more clearly and it helped to look the problem from different perspectives. The field work was done to collect primary data required for the study. The tools used for collecting the data were key informant interviews and field observation. The objective of the field visits is to validate the GoM dataset and facilitate the direction of data analysis. Adding to the data collection work, the habitats and its water sources were tagged by GPS during field work. Two field visits were arranged on 22.10.2011 and 19.11.2011. The first field visit covered two gram panchayats - Dhamni and Dhakne, covering seven habitats. The second field visit covered two gram panchayats -Vashala and Vihigaon. It was found out that the population details of habitat from GoM dataset was valid but the information about the water source changed. It might be due to recent efforts taken by the government.

4.1 Selection criteria

The gram panchayats for the field work was selected from the elementary analysis of the GoM dataset. The criteria for selecting the gram panchayat are that it should have the tankerfed, non tankerfed and PWS habitats and its habitats should have diversity in social demography. This was done so that the field work helps in better understanding the different habitats and to guide the analysis in figuring out what makes the tankerfed village distinct from other villages. The gram panchayats Dhamni and Dhakne were selected satisfied the criteria. The gram panchayats of Vihigaon and Vashala were visited on the request of engineers from ZP.

4.2 Findings and Observation

- In Dhamni gram panchayat the Golbhan habitat is the main village and acts as administrative centre for the gram panchayat.
- The road access to Dhamni and Musalepada habitat is in bad states which are tankerfed habitats while non tankerfed habitat Golbhan has better road access.
- The water supply through the tankers had little benefits as any of the habitats have no proper storage structure and tanker water is stored in the wells which are already failed during summer.

- The tankerfed status changes for each habitat every year depending on the application procedure. But the gram panchayat as a whole remains tankerfed because of these habitats.
- Urbanization is taking place along the National Highway and railway lines. The places near Khardi station and Kasara station is experiencing change in real estate scenario.
- In case of Musalepada, literacy rate is identified as an important factor in the village dynamics as the habitat has high illiteracy rates and it is tankerfed.
- Similarly from Golbhan, the road access and economic activity and literacy rate is identified as a important factor in the village dynamics.
- In the case of Dhakne gram panchayat, the habitat Chindyachiwadi has succeeded in implementing the Nal Yojana Scheme but the scheme failed in the habitat of Dhakne. The two habitats are on the two sides of the stream. The presence of Sarpanch of Dhakne gram panchayat in Chindyachiwadi habitat could be an influencing factor in success of the scheme.
- The habitat Chindyachiwadi and Dhakne gram panchayat also has women sarpanch. Hence the analysis takes into consideration the population of women, women literacy rate as an indirect indicator for the women participation and gender agency.
- Agricultural labour population to the total population ratio will be considered as indicator of urbanization. As per the census norms the villages having more than 75% of male working population involved in non agricultural activities is one of the criteria for urban area.
- The marginal agricultural population, non workers to the total population ratio and the non-agricultural population as the indicator for economic activity.
- These Indicators will be compared with villages where the schemes are functional and tankerfed habitats.
- The conservation measures such as source protection for existing water sources could be carried out in the villages. Source protection measures includes construction of side walls for well, platform for well and protection from cattle usage.
- The new schemes are implemented without yield tests which might result in source failure due to over exploitation. This was observed in the case of Chindyachiwadi located in Dhakne gram panchayat.

5 Conclusion

5.1 Conclusion

The variation between tankerfed village and non tankerfed village is very less but some factors like population size of the village, ST population, illiteracy rate, non worker population have significant impact on this issue. Since the tankerfed villages and non tankerfed villages were compared without considering status of neighbouring village status the variation is less. That is, a tankerfed village and non-tankerfed village which are very nearby might share very close society structure. It is found out that the villages having higher population and share of ST population are mostly tankerfed. The high illiteracy rate found in tankerfed village might be a cause or effect of the tankerfed problem. The higher non worker female population in Jawhar and Murbad indicates that more women population is engaged with the water fetching activity. The tankerfed scheme distributes the water to village in summer months by discharging into the wells. This practice is not a viable option as there is no proper storage or distribution infrastructure in the villages.

5.2 Future work

For the future work following options might be considered

- Designing GIS based information system for the ZP for management drinking water schemes to help in monitoring and forecasting the problems.
- Designing drinking water scheme for any one of the gram panchayats- Dhakne, Vihigaon, Vashala.

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7 Appendix

Appendix I: Demographic Parameters (2001) for State Maharashtra and Thane

Indicators	Maharashtra	Thane	Shahapur
Total population	96,878,627	8,131,849	273,304
Male	50,400,596	4,377,747	140,547
Female	46,478,031	3,754,102	132,757
Rural population	55,777,647	2,229,376	231,741
Male	28,458,677	1,148,123	118,879
Female	27,318,970	1,081,253	112,862
Female population as percentage of total population(%)	47.98	46.17	48.57
Rural Female population as percentage of total rural population	48.98	48.50	48.70
Sex Ratio	922	858	945
Sex Ratio-Rural	960	942	949
Population Density(sq.km)	103.3	850	-
No of Literates	63,965,943	5,635,799	-
Male	37,184,963	3,295,251	-
Female	26,780,980	2,340,548	-
No of Literates-Rural	33,313,270	1,197,007	-
Male	19,711,796	724,560	-
Female	13,601,474	472,447	-
Literacy Rate	76.9	80.7	69.3
Male	86	87	81
Female	67	73	57
Literacy Rate-Rural	70.4	64.4	66.9
Male	82	76	79
Female	58	53	54
Gender gap in literacy rate	19	14	1.4
Gender gap in literacy rate-Rural	24	23	1.5
Total Workers	41,173,351	3,179,981	128,704
Male	28,852,095	2,443,327	76,918
Female	14,321,256	736,654	51,786
Total Workers- Rural	27,261,431	1,070,883	116,194
Male	15,348,636	639,172	66,483
Female	11,912,795	431,711	49,711
Percentage total workers	42.5	39.1	47.1
Male	53.3	55.8	54.7
Female	30.8	19.6	39

Percentage total workers-Rural	48.9	48.0	50.1
Male	53.9	55.7	55.9
Female	43.6	39.9	44.0
Percentage of Agricultural labourers-Rural	37.8	27.2	26.4
Male	30.4	21.3	21.7
Female	47.4	36.0	32.7
Percentage of Cultivators-Rural	42.4	34.9	47.4
Male	42.4	29.4	39.9
Female	42.5	43.0	57.4
Percentage of Main workers-Rural	39.2	35.7	38.7
Male	47.5	46.2	48.5
Female	30.5	24.5	28.4
Percentage of marginal workers-Rural	13.1	15.4	15.7
Male	6.4	9.5	7.5
Female	13.1	15.4	15.7
Percentage of workers in agrisector-Rural	80.3	62.1	73.8
Male	72.8	50.7	61.5
Female	90.0	79.0	90.1
Percentage of workers in non agri sector-Rural	19.7	37.9	26.2
Male	27.2	49.3	38.5
Female	10.0	21.0	9.9
Percentage of SC Populaton	10.2	4.2	4.1
Percentage of SC Populaton-Rural	10.9	2.0	3.1
Percentage of ST population	8.9	14.7	32.9
Percentage of ST population-Rural	13.4	47.0	35.3

Appendix II: Village Level Findings

Block Name	Derived parameters	Tankerfed Village	Nontankerfed Village	Block
Jawhar	Female illiteracy	0.78	0.76	0.76
	Male illiteracy	0.62	0.59	0.60
	ST population to total population	0.97	0.99	0.97
	SC population to total population	0.003	0.0003	0.005
Mokhada	Female illiteracy	0.69	0.70	0.68
	Male illiteracy	0.52	0.53	0.50
	ST population to total population	0.93	0.97	0.91
	SC population to total population	0.009	0.003	0.009
Murbad	Female illiteracy	0.64	0.61	0.55
	Male illiteracy	0.39	0.33	0.30
	ST population to total population	0.74	0.32	0.24
	SC population to total population	0.02	0	0.04
Shahapur	Female illiteracy	0.67	0.56	0.55
	Male illiteracy	0.46	0.34	0.34
	ST population to total population	0.62	0.42	0.35
	SC population to total population	0.02	0.02	0.03
Total Four blocks	Female illiteracy	0.70	0.66	0.60
	Male illiteracy	0.51	0.46	0.39
	ST population to total population	0.78	0.72	0.50
	SC population to total population	0.01	0.01	0.02

Appendix III: Textual Analysis

Red = Tankerfed; Yellow = Non Tankerfed; White = Non Tankerfed and PWS present;

S.No	Grampanchy at	Village	Habitat	color (red=1; yellow	Hab=vill	Tankerfed	GP=Hab	Tankerfed	GP=Vill	Tankerfed	
1	Shirol	Shirol	Ambyachapada	1	0	0	0	0	0	1	1
2	Shirol	Shirol	Bhagatpada	1	0	0	0	0	0	1	1
3	Shirol	Shirol	Chafepada	1	0	0	0	0	0	1	1
4	Shirol	Shirol	Gopalpada	3	0	0	0	0	0	1	0
5	Shirol	Shirol	Fanaspada	1	0	0	0	0	0	1	1
6	Shirol	Shirol	Kalchirapada	3	0	0	0	0	0	1	0
7	Shirol	Shirol	Kundanpada	2	0	0	0	0	0	1	0
8	Shirol	Shirol	Pethyachapada	1	0	0	0	0	0	1	1
9	Shirol	Shirol	Shirol	3	1	0	1	0	0	1	0
10	Shirol	Shirol	Karanipada	3	0	0	0	0	0	1	0
11	Shirol	Shirol	Vihirichipada	1	0	0	0	0	0	1	1
12	Shirol	Shirol	Warlipada	3	0	0	0	0	0	1	0
13	Shirol	Shirol	Umbermali	1	0	0	0	0	0	1	1
14	Dhakne	Dhakne	Dhakne	1	1	1	1	1	1	1	1
15	Dhakne	Dhakne	Chindhyachiwadi	2	0	0	0	0	0	1	0
16	Dhakne	Dhakne	Dhupurwadi	1	0	0	0	0	0	1	1
17	Dhakne	Dhakne	Gavenwadi	2	0	0	0	0	0	1	0
18	Dhakne	Dhakne	Wagwadi	1	0	0	0	0	0	1	1
19	VEHLOLI (BK)	LINGAYATE	LINGAYATGAON	3	0	0	0	0	0	0	0
20	VEHLOLI (BK)	VEHLOLI (BK)	AMBYACHIWADI	1	0	0	0	0	0	1	1
21	VEHLOLI (BK)	VEHLOLI (BK)	BHAVARTHEPADA	2	0	0	0	0	0	1	0
22	VEHLOLI (BK)	VEHLOLI (BK)	CHINCHWADI	1	0	0	0	0	0	1	1
23	VEHLOLI (BK)	VEHLOLI (BK)	GHARTAN	1	0	0	0	0	0	1	1
24	VEHLOLI (BK)	VEHLOLI (BK)	KATICHIWADI	1	0	0	0	0	0	1	1
25	VEHLOLI (BK)	VEHLOLI (BK)	KHANDUCHIWADI	1	0	0	0	0	0	1	1
26	VEHLOLI (BK)	VEHLOLI (BK)	KRUSHNACHIWADI	1	0	0	0	0	0	1	1
27	VEHLOLI (BK)	VEHLOLI (BK)	VEHLOLI (BK)	3	1	0	1	0	0	1	0
28	KASARA (KH)	DAND	DAND	1	1	1	0	0	0	0	0
29	KASARA (KH)	KASARA (KH)	BIBALWADI	1	0	0	0	0	0	0	0
30	KASARA (KH)	KASARA (KH)	CHINTAMANWADI	1	0	0	0	0	0	0	0
31	KASARA (KH)	KASARA (KH)	LATHIFWADI	1	0	0	0	0	0	0	0
32	KASARA (KH)	KASARA (KH)	NARALWADI	1	0	0	0	0	0	0	0
33	KASARA (KH)	KASARA (KH)	OHOLWADI	1	0	0	0	0	0	0	0
34	KASARA (KH)	KASARA (KH)	PARADHAWADI	1	0	0	0	0	0	0	0
35	KASARA (KH)	KASARA (KH)	PAYERWADI	1	0	0	0	0	0	0	0
36	KASARA (KH)	KASARA (KH)	SAVERWADI	2	0	0	0	0	0	0	0
37	KASARA (KH)	KASARA (KH)	THOKARWADI	1	0	0	0	0	0	0	0
38	KASARA (KH)	KASARA (KH)	GANGANWADI	1	0	0	0	0	0	0	0
39	KASARA (KH)	UMBRAWANE	UMBRAWANE	2	1	0	0	0	0	0	0
40	KASARA (KH)	KASARA (KH)	NAVINWADI	1	0	0	0	0	0	1	1
41	DHAMNI	DHAMNI	DHAMNI	1	1	1	1	1	1	1	1
42	DHAMNI	DHAMNI	MUSALEPADA	1	0	0	0	0	0	0	0
43	DHAMNI	DHAMNI	TALEKHAND	1	0	0	0	0	0	0	0
44	DHAMNI	GOLBHAN	GOLBHAN	2	1	0	0	0	0	0	0
45	DHAMNI	GOLBHAN	HARYACHAPADA	2	0	0	0	0	0	0	0
46	DHAMNI	JARNADI	JARNADI	1	1	1	0	0	0	0	0
47	VIHIGAON	VIHIGAON	BAUDHWADI	2	0	0	0	0	0	1	0
48	VIHIGAON	VIHIGAON	BHENDICHIWADI	2	0	0	0	0	0	1	0
49	VIHIGAON	VIHIGAON	CHINCHWADI	2	0	0	0	0	0	1	0
50	VIHIGAON	VIHIGAON	DARYACHEWADI	2	0	0	0	0	0	1	0
51	VIHIGAON	VIHIGAON	DHUBHACHIWADI	2	0	0	0	0	0	1	0
52	VIHIGAON	VIHIGAON	HIWALWADI	1	0	0	0	0	0	1	1
53	VIHIGAON	VIHIGAON	KATHODWADA	2	0	0	0	0	0	1	0
54	VIHIGAON	VIHIGAON	KATKARIWADI	2	0	0	0	0	0	1	0
55	VIHIGAON	VIHIGAON	KAVTHYACHIWADI	1	0	0	0	0	0	1	1
56	VIHIGAON	VIHIGAON	NIRGOODWADI	1	0	0	0	0	0	1	1
57	VIHIGAON	VIHIGAON	PANAVTHAWADI	2	0	0	0	0	0	1	0
58	VIHIGAON	VIHIGAON	TELAMPADA	1	0	0	0	0	0	1	1
59	VIHIGAON	VIHIGAON	VIHIGAON	1	1	1	1	1	1	1	1
60	VIHIGAON	VIHIGAON	SHIDWADI	1	0	0	0	0	0	1	1

61	AWALE	AWALE	AMBEPADA	2	0	0	0	0	1	0
62	AWALE	AWALE	AWALE	2	1	0	1	0	1	0
63	AWALE	AWALE	BORICHAPADA	1	0	0	0	0	1	1
64	AWALE	AWALE	JAMBHALIPADA	2	0	0	0	0	1	0
65	AWALE	AWALE	PATILPADA	2	0	0	0	0	1	0
66	AWALE	AWALE	PATRAYACHAPADA	1	0	0	0	0	1	1
67	AWALE	AWALE	WEDUCHAPADA	2	0	0	0	0	1	0
68	AWALE	CHANDROTI	CHANDROTI	2	1	0	0	0	0	0
69	AWALE	CHANDROTI	KATEKUIPADA	2	0	0	0	0	0	0
70	AWALE	CHANDROTI	KATKARIPADA (THA	2	0	0	0	0	0	0
71	AWALE	CHANDROTI	SHEKTYACHAPADA	2	0	0	0	0	0	0
72	AWALE	KARADE	KARADE	2	1	0	0	0	0	0
73	AWALE	MAHULI	KHARMEPADA	2	0	0	0	0	0	0
74	AWALE	MAHULI	MAHULI	1	1	1	0	0	0	0
75	AWALE	MAHULI	SUTARPADA	2	0	0	0	0	0	0
76	AWALE	MAMNOLI	DHAKANEPADA	2	0	0	0	0	0	0
77	AWALE	MAMNOLI	MAMNOLI	2	1	0	0	0	0	0
78	AWALE	MAMNOLI	PACHOLKARPADA	2	0	0	0	0	0	0
79	TALWADE	CHONDE KH)	CHONDE KH)	2	1	0	0	0	0	0
80	TALWADE	GANDHULWA	GANDHULWAD	1	1	1	0	0	0	0
81	TALWADE	HINGLUD	HINGLUD	1	1	1	0	0	0	0
82	TALWADE	ROADVAHAL	ROADVAHAL	1	1	1	0	0	0	0
83	TALWADE	TALWADE	TALWADE	1	1	1	1	1	1	1
84	DHASAI	DHASAI	DHASAI	2	1	0	1	0	1	0
85	DHASAI	DHASAI	KATKARIWADI	2	0	0	0	0	1	0
86	DHASAI	DHASAI	SAKHARWADI	2	0	0	0	0	1	0
87	DHASAI	MANGAON (M	MANGAON (THALK'	2	0	0	0	0	0	0
88	DHASAI	SHIVANERI	FARDEPADA	2	0	0	0	0	0	0
89	DHASAI	SHIVANERI	SHIVANERI	1	1	1	0	0	0	0
90	MANEKHIND	ADIVALI	ADIVALI	2	1	0	0	0	0	0
91	MANEKHIND	ADIVALI	ADIWALIPADA	2	0	0	0	0	0	0
92	MANEKHIND	ADIVALI	PAYERWADI	2	0	0	0	0	0	0
93	MANEKHIND	AMBEKHOR	AMBEKHOR	1	1	1	0	0	0	0
94	MANEKHIND	AMBEKHOR	BHAILYACHIWADI	2	0	0	0	0	0	0
95	MANEKHIND	AMBEKHOR	KAVTEWADI	2	0	0	0	0	0	0
96	MANEKHIND	AMBEKHOR	KUBHAICHIWADI	2	0	0	0	0	0	0
97	MANEKHIND	AMBEKHOR	SAKHARWADI	2	0	0	0	0	0	0
98	MANEKHIND	ASHTE	ASHTE	2	1	0	0	0	0	0
99	MANEKHIND	MANEKHIND	MANEKHIND	2	1	0	1	0	1	0
100	MANJARE	BHINAR	BHINAR	2	1	0	0	0	0	0
101	MANJARE	MALAD	MALAD	2	1	0	0	0	0	0
102	MANJARE	MANGAON (M	MANGAON (N.V.)	2	1	0	0	0	0	0
103	MANJARE	MANJARE	MANJARE	1	1	1	1	1	1	1
104	MANJARE	MANJARE	NIBHALPADA	1	0	0	0	0	1	1
105	MANJARE	MANJARE	PANDHARICHAPAD	1	0	0	0	0	1	1
106	MANJARE	TEMBHURLI	CHANDRICHAPADA	2	0	0	0	0	0	0
107	MANJARE	TEMBHURLI	KATKARIWADI	2	0	0	0	0	0	0
108	MANJARE	TEMBHURLI	TEMBHURLI	1	1	1	0	0	0	0
109	MANJARE	TEMBHURLI	TORANPADA	2	0	0	0	0	0	0
110	VASHALA (BK	VASHALA BK	CHARANWADI	1	0	0	0	0	0	0
111	VASHALA (BK	VASHALA BK	KOLIPADA	2	0	0	0	0	0	0
112	VASHALA (BK	VASHALA BK	RAICHEWADI	1	0	0	0	0	0	0
113	VASHALA (BK	VASHALA BK	TOKARKHAND	2	0	0	0	0	0	0
114	VASHALA (BK	VASHALA BK	UMBERWADI	2	0	0	0	0	0	0
115	VASHALA (BK	VASHALA (BK	VASHALA (BK)	1	1	1	1	1	1	1
116	VASHALA (BK	VASHALA (BK	VASHALA (BK)	1	1	1	1	1	1	1
117	WARSKOL	BENDEKON	AMBADAPADA	2	0	0	0	0	0	0
118	WARSKOL	BENDEKON	BENDEKON	2	1	0	0	0	0	0
119	WARSKOL	DUDHAR	DUDHAR	2	1	0	0	0	0	0
120	WARSKOL	GHANEPADA	GHANEPADA	1	1	1	0	0	0	0

121	WARSKOL	GHANEPADA	INDHANPADA	1	0	0	0	0	0	0
122	WARSKOL	PIMPALPADA	DONGARIPADA	1	0	0	0	0	0	0
123	WARSKOL	PIMPALPADA	PIMPALPADA	2	1	0	0	0	0	0
124	WARSKOL	PIMPALPADA	SUGAON	2	0	0	0	0	0	0
125	WARSKOL	WARSKOL	KUBHAICHAPADA	2	0	0	0	0	1	0
126	WARSKOL	WARSKOL	WARSKOL	2	1	0	1	0	1	0
127	TEMBHA	AMBIVALI TAF	AMBIVALI TARF DA	3	1	0	0	0	0	0
128	TEMBHA	AMBIVALI TAF	BHOSPADA	1	0	0	0	0	0	0
129	TEMBHA	AMBIVALI TAF	JAMBHULPADA	1	0	0	0	0	0	0
130	TEMBHA	AMBIVALI TAF	MORANEPADA	2	0	0	0	0	0	0
131	TEMBHA	AMBIVALI TAF	UMBERACHAPADA	2	0	0	0	0	0	0
132	TEMBHA	BALWANDI	BALWANDI	1	1	1	0	0	0	0
133	TEMBHA	BELWAD	BELWAD	2	1	0	0	0	0	0
134	TEMBHA	BELWAD	BHALLYACHA PADA	2	0	0	0	0	0	0
135	TEMBHA	BELWAD	GANGADPADA	2	0	0	0	0	0	0
136	TEMBHA	BELWAD	KHARPADEPADA	2	0	0	0	0	0	0
137	TEMBHA	BELWAD	ROJPADA	2	0	0	0	0	0	0
138	TEMBHA	TEMBHE	KHAIRPADA	2	0	0	0	0	0	0
139	TEMBHA	TEMBHA	MADHVIPADA	1	0	0	0	0	1	1
140	TEMBHA	TEMBHA	MEGALPADA	3	0	0	0	0	1	0
141	TEMBHA	TEMBHA	TEMBHA	3	1	0	1	0	1	0
142	TEMBHA	TEMBHA	VAITERNA	3	0	0	0	0	1	0
143	TEMBHA	TEMBHA	WARCHA-TEMBHA	3	0	0	0	0	1	0
144	VELUK	PATOL	PATOL	1	1	1	0	0	0	0
145	VELUK	PATOL	PATOLPADA	1	0	0	0	0	0	0
146	VELUK	PATOL	TELAMPADA	1	0	0	0	0	0	0
147	VELUK	PINGALWADI	PINGALWADI	2	1	0	0	0	0	0
148	VELUK	SUSARWADI	KHARMYACHAPAD/	2	0	0	0	0	0	0
149	VELUK	SUSARWADI	SUSARWADI	1	1	1	0	0	0	0
150	VELUK	VELUK	DHENGANMAL	1	0	0	0	0	1	1
151	VELUK	VELUK	KATKARIWADI	2	0	0	0	0	1	0
152	VELUK	VELUK	PATKICHAPADA	2	0	0	0	0	1	0
153	VELUK	VELUK	VELUK	1	1	1	1	1	1	1
154	DHADRE	BELWALI TARI	BELWALI TARF JAD/	3	1	0	0	0	0	0
155	DHADRE	BELWALI TARI	BHINGURLIPADA	2	0	0	0	0	0	0
156	DHADRE	BELWALI TARI	HUMBYACHAPADA	2	0	0	0	0	0	0
157	DHADRE	DHADRE	DHADRE	1	1	1	1	1	1	1
158	DHADRE	DHADRE	FANASWADI	1	0	0	0	0	1	1
159	DHADRE	DHADRE	KERPETWADI	1	0	0	0	0	1	1
160	DHADRE	DHADRE	RIKAMWADI	1	0	0	0	0	1	1
161	DHADRE	DHADRE	UMBERWADI	1	0	0	0	0	1	1
162	VANDRE	KHOR	KHOR	1	1	1	0	0	0	0
163	VANDRE	VANDRE	ALANPADA	2	0	0	0	0	1	0
164	VANDRE	VANDRE	BAYAJIPADA	2	0	0	0	0	1	0
165	VANDRE	VANDRE	DODKEPADA	2	0	0	0	0	1	0
166	VANDRE	VANDRE	GHATALPADA	2	0	0	0	0	1	0
167	VANDRE	VANDRE	KAKADPADA	2	0	0	0	0	1	0
168	VANDRE	VANDRE	MEGHLEPADA	2	0	0	0	0	1	0
169	VANDRE	VANDRE	RAMJIPADA	2	0	0	0	0	1	0
170	VANDRE	VANDRE	SATHEPADA	2	0	0	0	0	1	0
171	VANDRE	VANDRE	THAKURPADA	2	0	0	0	0	1	0
172	VANDRE	VANDRE	VANDRE	1	1	1	1	1	1	1
173	MAL	MAL	AMBYACHAPADA	2	0	0	0	0	1	0
174	MAL	MAL	KAVTHYACHIWADI	2	0	0	0	0	1	0
175	MAL	MAL	MAL	2	1	0	1	0	1	0
176	MAL	MAL	PATILPADA	2	0	0	0	0	1	0
177	MAL	MAL	SHIDWADI	2	0	0	0	0	1	0
178	MAL	MAL	WARGHADWADI	2	0	0	0	0	1	0
179	SAKADBAV	BABREWADI	BABREWADI	3	1	0	0	0	0	0
180	SAKADBAV	DEVGAON (N.	DEVGAON (N.V.)	2	1	0	0	0	0	0
181	SAKADBAV	JULAWANI	JULAWANI	2	1	0	0	0	0	0
182	SAKADBAV	JULAWANI	KHARALI	2	0	0	0	0	0	0

183	SAKADBAV	JULAWANI	POKLYACHIWADI	1	0	0	0	0	0	0
184	SAKADBAV	JULAWANI	RUMALPADA	2	0	0	0	0	0	0
185	SAKADBAV	JULAWANI	SHIDPADA	2	0	0	0	0	0	0
186	SAKADBAV	SAKADBAV	GERHYCHIWADI	1	0	0	0	0	1	1
187	SAKADBAV	SAKADBAV	JIVYACHIWADI	1	0	0	0	0	1	1
188	SAKADBAV	SAKADBAV	PARADHAWADI	1	0	0	0	0	1	1
189	SAKADBAV	SAKADBAV	PAYERWADI	1	0	0	0	0	1	1
190	SAKADBAV	SAKADBAV	SAKADBAV	1	1	1	1	1	1	1
191	MADH	HAL	HAL	2	1	0	0	0	0	0
192	MADH	HAL	ISAMEPADA	1	0	0	0	0	0	0
193	MADH	HAL	KASHIWALEPADA	2	0	0	0	0	0	0
194	MADH	MADH	MADH	1	1	1	1	1	1	1
195	TAHARPUR	DIMBHE	DIMBHE	2	1	0	0	0	0	0
196	TAHARPUR	DIMBHE	GAVITPADA	2	0	0	0	0	0	0
197	TAHARPUR	DIMBHE	MORASPADA	2	0	0	0	0	0	0
198	TAHARPUR	TAHARPUR	TAHARPUR	2	1	0	1	0	1	0
199	TAHARPUR	VEDVAHAL	PALICHAPADA	2	0	0	0	0	0	0
200	TAHARPUR	VEDVAHAL	VEDVAHAL	2	1	0	0	0	0	0

Appendix IV: Contact Details

S. No	Name	Particulars	Contact No
1	Mr. Eknath Shankar Bharat	Golbhan Maji-sarpanch	92701357611
2	Mr. Vishnu Jannu Paradhi	Dhamni- Grampanchayat sarpanch (Musalepada)	9270141288
3	Mr. Eknath Ramachandra Manje	Resident - Jarandi	9273368278
4	Mr. Bhagwan Sankar Boire	Resident- Talekhind	9271969741
5	Ms. Radha Bhai Eknath Kadkai	Dhakne- Grampanchayat sarpanch (Chindhyachihabitat)	9545345513
6	Mr. Tukaram Wagh	Vihigaon Grampanchayat - sarpanch	9158870314
7	Mr. Phatak	Deputy Engineer- ZP	9763709139
8	Mr. Vikas Jadav	Assistant Engineer- ZP	9870232351

Field Visit Report I

The objective of the field visit is to validate the GoM data and understanding the ground reality. The field visits are carried out to find the relevant factors in differentiating between tankerfed and non tankerfed villages. It gave direction to our data analysis and helped in deciding the future course of actions. The field visit was arranged on October 22, 2011. About 7 habitats from two gram panchayats of Dhamni and Dhakne were visited. The gram panchayats was selected on the basis of elementary analysis. It is selected as it satisfied the criteria that it should consists of tankerfed, nontankerfed and PWS habitats in it. The field visit team consists of Mr. Nachiket Sakhadeo and myself. The plan is to visit all the habitats in the two gram panchayats and information related to drinking water is collected. The GoM is validated through these visits and it was found out the population details is valid but the number of source seems to be vary.

Dhamni gram panchayat

The Dhamni grampanchyat consists of six habitats and five habitats were covered during the field visit. The total population of Dhamni grampanchyat is 1700 as per Census 2001. The detailed description of the habitats is given below.

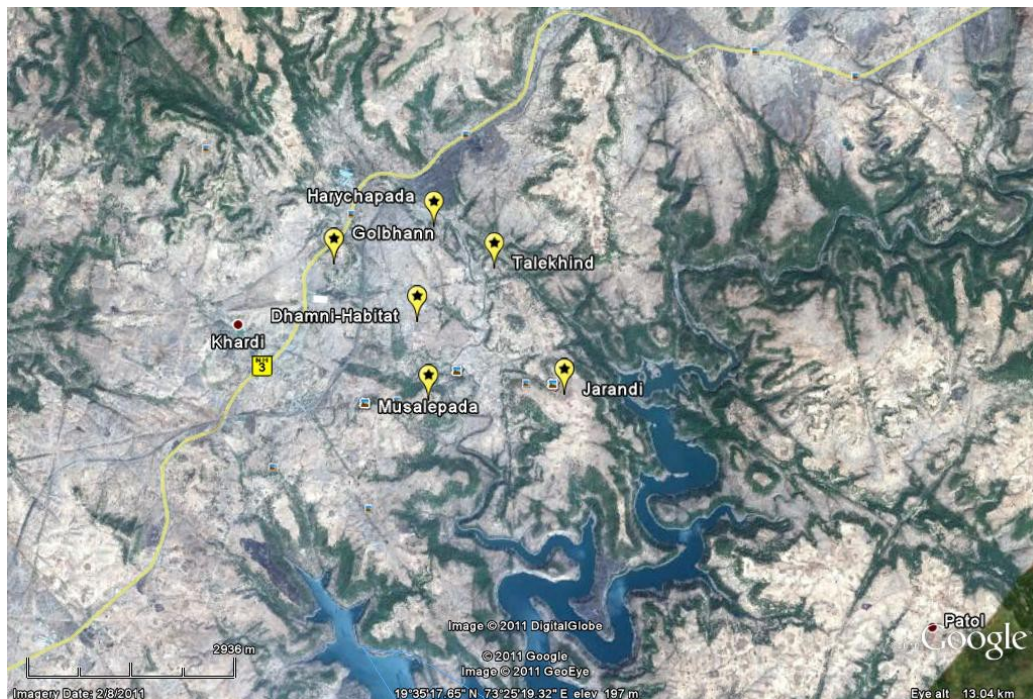


Figure 7.1:Dhamni grampanchyat

Table 7-1: Dhamni grampanchayat Habitat Details

Name of the habitat	Individual PWS	Regional PWS	No of Handpump	No of functional handpump	No of public well	No of functional public well	Tanker fed	Population	Elevation (m)
Dhamni	No	No	3	3	1	1	Yes	317	203
Musalepada	No	No	1	1	1	1	Yes	150	239
Talekhind	No	No	2	2	2	2	Yes	175	207
Golbhan	No	No	0	0	1	1	No	367	242
Haryachapada	No	No	0	0	1	1	No	64	197
Jarandi	No	No	2	2	1	1	Yes	627	246
Source: GOM									

Dhamni

The main occupation of Dhamni habitat is Agriculture and about significant share of the population is employed in private sector. The road access to dhamni is poor and has a narrow and Katcha road. The main samaj present were Kunbhi, Katkari, Warali. There is no NREGA work is undertaken currently in this habitat and the last NREGA work was carried out in 2009. Even though the name of the grampanchayat was Dhamni, the Panchayat office is located in Golbhan and the gram sabha were held in Golbhan due to better road access. The village has four wells and Nal Yojana scheme is not implemented. The Jalswarajya scheme is currently under construction and it started from 2009. The persons interviewed were: farmer, teacher and women. The streams located close to the habitat is seasonal and dries up in summer. The tanker frequency is once in a day. The reason for scarcity as told by the villagers was in scarce conditions people from nearby villages/habitats access water from here.

Location & Elevation: N 19° 35.505", E 73° 24.433" and 203 m

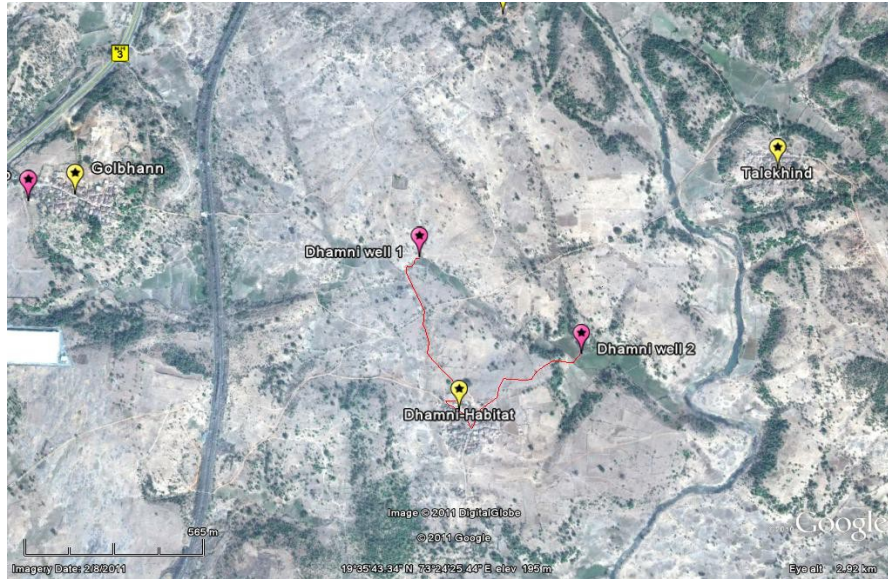


Figure 7-2: Dhamni habitat and its wells

Table 7-2: Dhamni habitat- Well details

Particulars	Coordinates		Elevation (m)	Elevation Difference (m)	Distance from Village(km)	Depth (ft)	Status
Well 1	N 19' 35.785	E 73' 34.358	185	18	0.74	15	Empty in summer
Well 2	N 19' 35.609	E 73' 24.655	179	24	0.50	30	Not Empty in summer
Well 3	Not visited					30	Empty in summer
Well 4	Accessed by Katkari people; Far away from village						

Table 7-3: Dhamni Secondary Data

Dhamni Census Details		
Total Population	317	DDWS
ST Population	38	DDWS
SC Population	0	DDWS
No of Households	73	DDWS
No of Cattles	240	DDWS
Public well	1	GOM
Handpump	3	GOM
Tankerfed	Yes	GOM
PWS	No	GOM

The GOM data showed details about only one public well but there are actually four public wells in use at present.

Golbhan

Golbhan is the main habitat of Dhamni gram panchayat. The gram panchayat office is located in Golbhan. The habitat has a very good road access and it lies very close to the NH 3 than the other habitats. The habitat has about 4 shops and good number of two wheelers which we can assume it as a sign of economic growth of residents. The main samaj present in the habitat were Kunbhi, Katkari and Warali. According to Maji Sarpanch the literacy is at very good level in this habitat. The NREGEA scheme is carried out in this habitat to do road related works. The frequency of tanker is one tanker per day. About half of the population in the habitat is employed in the private sector and a good number of people work in government sector. There are about three reservoirs namely Bhatsa, Vaitarna, Tansa located within 16 km radius from the habitat.

The Nal yojana scheme was implemented in the village and It is part of the Khardi regional water supply scheme. The water tax is about 150 Rs per household per year. The main income for the gram panchayat is by land tax and the gram Panchyat works on funds received as Grants from ZP.

Table 7-4: Golbhan Secondary Data

Golbhan Census Details		
Total Population	367	DDWS
ST Population	30	DDWS
SC Population	0	DDWS
No of Households	87	DDWS
No of Cattles	135	DDWS
Public well	1	GOM
Handpump	0	GOM
Tankerfed	No	GOM
PWS	No	GOM

People depend on Nal yojana and Handpump for drinking purposes. There is one handpump in the village and it is maintained by the grampanchayat. The functional handpump and PWS is not mentioned in GOM data set.

Location of Golbhan : N 19°35'53.51" , E 73°23'44.53" and Elevation : 242 m

Table 7-5: Golbhan : Handpump details

Particulars	Coordinates		Elevation (m)	Elevation Difference (m)	Distance from Village(km)	Depth (ft)	Status
Handpump	N19° 35.850	E 73° 23.656	239	3	0.20	-	Year around supply



Figure 7:3: Golbhan Habitat

Musalepada

The musalepada habitat is located very close to the privately owned township and the samaj is Warali Samaj. The sarpanch of the village Mr. Vishnu Jannu Paradhi was interviewed during the fieldwork. The Maharashtra Rojgar Yojana was implemented in the village. The main occupation is agriculture and there are no people employed in government jobs from this village. There are no shops in the village and it has a school till 4th standard. There is a problem of literacy rate in this village according to local people. The people depend on well, bawdi and handpump for their water requirements. They have heard about Pan adwa- Pani Jirwa. The well is located about 1.5km from the habitat and its about 35 feet deep extended from 20 ft due to Nal Yojana scheme.

The Nal yojana scheme was implemented but not completed because the funds were stopped. As a part of the scheme overhead tanks and plastic syntax tanks were built near the school. The scheme is non functional as the grants were stopped in middle of the scheme implementation.

Table 7-6: Musalepada Secondary Data

Musalepada Census Details		
Total Population	150	DDWS
ST Population	150	DDWS
SC Population	0	DDWS
No of Households	39	DDWS
No of Cattles	135	DDWS
Public well	1	GOM
Handpump	1	GOM
Tankerfed	Yes	GOM
PWS	No	GOM

The overhead tank as part of the Nal yojana scheme was constructed but it was incomplete. Its present status can be seen in the. The coordinates of overhead tank is N 19° 34.984' E 73° 24.539' and elevation 239m



Figure 7:4: Musalepada Habitat and Overhead Tank



Figure 7:5: Overhead Tank in Musalepada

Jarandi

The habitat Jarandi is the most populated habitat in the Dhamni grampanchyat. There are watershed activities carried out in these habitat mainly through Shramdan(Voluntary labour). The samaj in this habitat is mainly Adivasi, Thakar, Kunbi, Katkari and Koli. There are there shops in the habitat and anganhabitat is present in the village. There is also a school upto 4 th grade. There are 2 graduates in the village. I felt the gender participation was better in Jarandi village as the women were more interested in answering the questions about the

water problem. Both the men and women were involved in fetching water as men are responsible for bringing water for cattles using bullock carts. The road access is not as bad as in the case of dhamni. There are two wells and two handpumps in the habitat and only one is functional at present. This habitat faces the severe water scarcity problem in summer according to the nearby villages. There are about 4 check dams in the habitat. The water is available till March in the checkdams. There is presence of NGO but the details about the NGO were unknown to the local people.

The Nal yojana scheme was carried out in the habitat with the budget of about Rs 22 Lakhs . But the scheme was not completed. Only the wells were deepened using the funds and it helped in making the seasonal wells into perennial in few cases. The Pani committee was allotted 13 lakhs to repair the wells which were not utilized as told by local people. The people are unaware about the Jal Swarajya scheme. They were made to think that it is normal to left out of the schemes because their habitat is remote and small in proportion.

Table 7-7: Jarandi Secondary Data

Jarandi Census Details		
Total Population	627	DDWS
ST Population	324	DDWS
SC Population	0	DDWS
No of Households	64	DDWS
No of Cattles	425	DDWS
Public well	1	GOM
Handpump	2	GOM
Tankerfed	Yes	GOM
PWS	No	GOM

Table 7-8: Jarandi Well Details

Particulars	Coordinates		Elevation (m)	Elevation difference (m)	Distance (km)	Depth (ft)	Status
Well 1	N 19° 35.112''	E 73° 25.476''	223	22	0.35	15	
Well 2						30	
Well 3	N 19° 35.131''	E 73° 25.392''	216	29	0.56	30	Drinking water



Figure 7:6: Jarandi Habitat – Wells

Talekhind

The Talekhind habitat consists of samaj categories namely Warali, Khadkhari, Kunbi. The habitat has poor road access and it has no direct road access due to lack of bridge. The habitat depends upon the streams, wells and hand pumps for water requirement. According to the local men water availability better than Golbhan habitat. The local people work mainly in private industries and few works in railways. There are 4 wells and 2 hand pumps in the village of which only one hand pump is operational. There are additional two public wells than mentioned in GOM data set. There was no tanker water supply for last two years but mentioned in GOM dataset as tanker fed in last 3 years.

Table 7-9: Talekhind secondary data

Talekhind Census Details		
Total Population	175	DDWS
ST Population	36	DDWS
SC Population	0	DDWS
No of Households	45	DDWS
No of Cattles	225	DDWS
Public well	2	GOM
Handpump	2	GOM
Tankerfed	Yes	GOM
PWS	No	GOM

Table 7-10: Talekhind Well details

Particulars	Coordinates		Elevation (m)	Elevation Difference (m)	Distance (km)	Depth	Status
Well 1	N 19' 36.045''	E 73' 25.019''	196	12	0.19	15 ft	Drinking & used in summer
Well 2	N 19' 35.942''	E 73' 24.876''	179	29	0.47	10ft	
Well 3	N 19' 35.919''	E 73' 24.840''	179	29	0.72	30ft	Nal Yojana source
Well 4	N 19' 35.851''	E 73' 24.867''	179	29	0.64	12ft	



Figure 7:7: Talekhind habitat

Dhakne Gram Panchayat

The Dhakne Gram Panchayat is located in Shahapur Block of Thane District. The Dhakne Gram panchayat has five habitats. We visited Dhakne and Chindyachiwadi habitat as part of the field visit. The details of the habitats is briefed below. We visited Ms. Radha Bhai Eknath Kadkai, sarpanch of Dhakne gram panchayat in chindyachiwadi and we met the residents of Dhakne habitat.

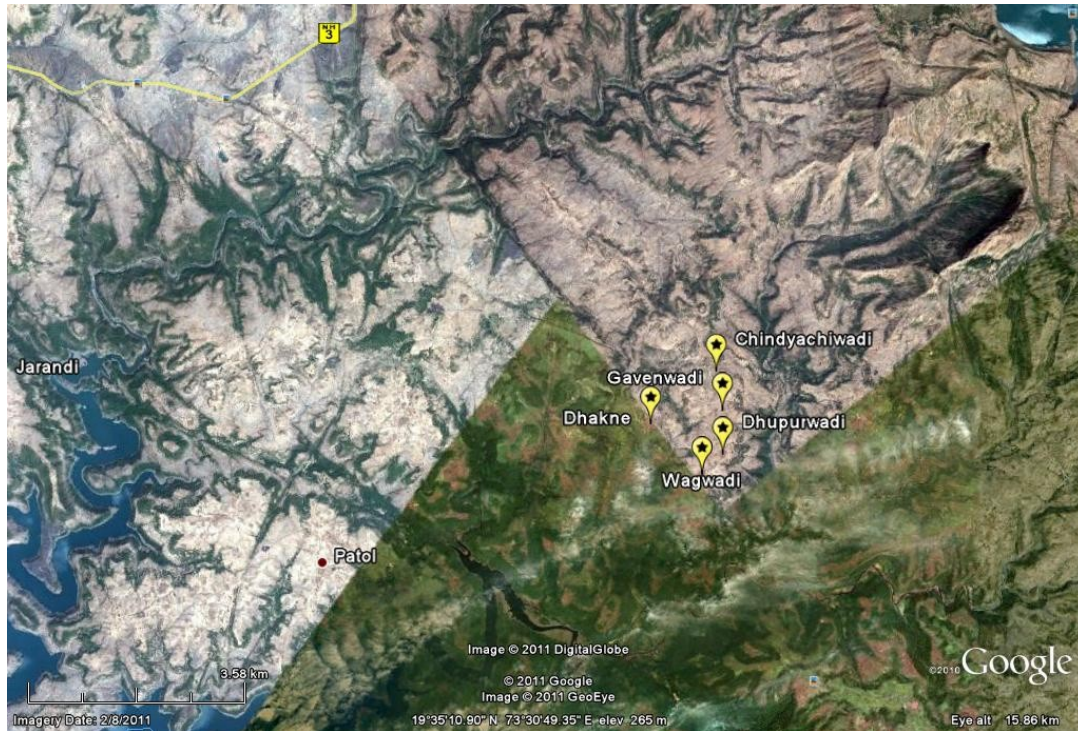


Figure 7:8: Dhakne gram panchayat

Dhakne

The main occupation of the Dhakne habitat is agriculture. The samaj of Dhakne habitat consists of Katkari, kunbi, Thakur, Warali. The NREGA works have been carried out in the habitat and check dams were constructed as part of the scheme. The habitat has better road access. There are about five shops in the village and hospital is present near the habitat. There are about 10-13 graduates in the habitat. There are five wells in the habitat about which 2 were used for drinking and 3 were used for domestic uses. The handpump is present in the habitat but it is not functional even after the efforts of local Gram Panchayat. The water availability in the habitat is till April end. There are no buffalos in the habitat as it is a symbol of sufficient water availability. The watershed works was not carried out in this village. The Nal yojana scheme was implemented but failed and become non functional. According to the local people of Dhakne, Chindyachiwadi and Gavenwadi have functional Nal yojana schemes. The reason for the failure of the scheme is due to contractor's fault as per the local people. The people in the habitat do not prefer to go for outside work as this is a mountainous terrain.

Table 7-11: Dhakne habitat well details

Particulars	Coordinates		Elevation (m)	Elevation Difference (m)	Distance (km)	Depth (ft)	Status
Well 1	N 19' 34.604''	E 73' 31.626''	272	20	0.32	25	Drinking & used till April end.
Well 2	N 19' 34.824''	E 73' 31.859''	282	10	0.33	30	Drinking

Table 7-12: Dhakne gram panchayat details

Name of the habitat	Individual PWS	Regional PWS	No of Handpump	No of functional handpump	No of public well	No of functional public well	Tankerfed
Dhakne	No	No	0	0	1	1	Yes
Chindyachiwadi	No	No	0	0	1	1	No
Gavenwadi	No	No	0	0	1	1	No
Wagwadi	No	No	1	1	1	1	Yes
Dhupurwadi	No	No	1	1	1	1	Yes

The functional well used for drinking water is 2 but the GSDA dataset is showing only one functional well.



Figure 7:9: Dhakne habitat wells

Chindyachiwadi

The Chindyachiwadi samaj consists of Koli and Thakur. There are about 2 shops in the habitat. The sarpanch of the Dhakne Gram Panchayat resides in Chindyachiwadi. There is a secondary school near the habitat. The interviewed person was Sarpanch of GramPanchayat. The NREGA activities were Road work. The main occupation in the habitat is agriculture. The watershed development works were carried out in the habitat. The BAIF NGO has constructed check dams for water supply to cattles. There are no buffalos in the habitat as it is a symbol of sufficient water availability. Nal yojana scheme was implemented in the village and it is functional. There is a issue of water conflict between the two habitats Dhakne and Chindyachiwadi. Last year the habitat is tankerfed eventhough the habitat is mentioned as not tankerfed. The habitat also has a water supply scheme

Table : Chindyachiwadi – Secondary Data

Chindyachiwadi Census Details		
Total Population	157	DDWS
ST Population	157	DDWS
SC Population	0	DDWS
No of Households	71	DDWS
No of Cattles	71	DDWS
Public well	1	GoM
Handpump	0	GoM
Tankerfed	No	GoM
PWS	No	GoM

The Chindyachiwadi habitat is reported as non-tankerfed, but the tankers came during last year. The Nal Yojana and the scheme details were missing GoM dataset.

Field Visit Report II

Shahpur taluka is one of the larger talukas in Thane district which faces severe drinking water stress in summer and pre-summer months and has a large number of tanker fed habitats. A field trip was planned on Saturday, 19th November 2011 to visit this taluka along with some engineers from the water supply department. The team for the field work consists of Prof. Milind Sohoni (CTARA), Ms. Pooja Prasad and myself. The engineers from ZP joined with us from Kharadi and accompanied with us during the field visit.

Our initial plan was to visit the Dhamni gram panchayat (GP) in Shahpur district, visited during first field visit on October 22, 2011. Our objective for the field visit was to have some questions answered and explore some possible solutions for this area. However, the engineers had a different plan. They wanted us to visit Vihigaon GP and Vashala GP as they thought that those were the GPs which had the most severe problem. The gram panchayats of Kasara, Vashala and Dhakne, all within Shahpur taluka, have been tanker fed for 40 years. The water department had been unable to find a solution based on their current practices and requested CTARA to explore drinking water solutions for these areas.

Vihigaon gram panchayat

The Vihigaon gram panchayat consists of fifteen habitats and two habitats were covered during the field visit. The total population of Vihigaon grampanchayat is 1726 as per Census 2001. The detailed description of the habitats is given below.

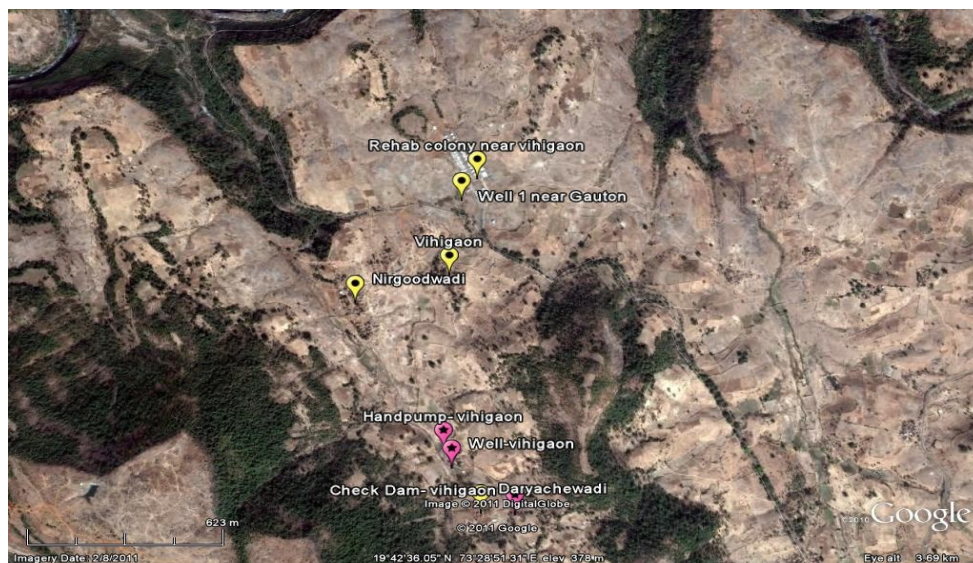


Figure 7:10: Vihigaon Grampanchayat

There is a well in Vihigaon gavthan (main Vihigaon) which also serves Kathodhabitat and Katkarihabitat (~200 homes based on the people there). This well dries up by Jan/Feb. There is a village water committee which applies for tankers. There is a single water committee for all padas. The river Vaitarna is two km away from this location and it is perennial. A piped scheme has not been feasible as the cost per capita not fitting into norms.

There is an ongoing rehabilitation project right next to this well to relocate a habitat. The construction of Vaitarna dam will submerge the existing location of that habitat. It is expected that people from that habitat would move into this rehabilitation housing within two months on condition that water must be made available to them. The BMC has promised that it will provide a scheme to bring water to the rehabilitation colony in 2-3 years. But until then a temporary plan needs to be in place to cover the rehab colony as well as Vihigaon.

We went to the sarpanch Shri Tukaram Lakshman Wagh's house. Other villagers too joined in for a discussion. Some points from our discussion

- The Vihigaon GP covers 1722 people and 375 homes
- Rs 47 lakhs have been granted to the GP for a temporary scheme. The tentative plan for the scheme is to pump water from the Vaitarna river and dump the water in the well. Prof. Sohoni suggested that a good portion of the water will percolate if water was dumped into the well and hence a storage tank should be used instead.
- The tanker water is also dumped in this well during summer months.
- There is a second well uphill from Vihigaon main village, closer to two tribal habitats – Nirgoonwadi and Dharyachiwadi. This well which we visited has water all 12 months but is in a poor condition.
- A borewell was dug close to this well, which struck water but went bad. A second borewell with a handpump was made next to it. The handpump is operational.



- The well was in a state of disrepair. There was a small spring flowing next to the well. The well has water all round the year but currently cattle use this water and so the water is not sufficient for the people and women have to go all the way to the river for fetching water.

- We walked upstream from the well towards a check dam that was built close to the village school. The checkdam present in the village has foundation problem and the baseflow exists along the checkdam but there is no water storage.



- NREGA work is done in the village but they seem to work on other activities – perhaps fixing the check dam could be done through NREGA labour.
- The sarpanch said that the uphill well water is only sufficient for the two uphill habitats and not for the other habitats. Prof. Sohoni suggested that people should be asked to stop taking their cattle to this well and perhaps then there would be sufficient water available. But the sarpanch thought that the people would not follow this instruction.
- Prof. Sohoni suggested that the uphill well seemed to be very delicately placed and it would not be advisable to deepen it or do any blasting there. He, however, suggested that that access to the well should be improved and that it could be broadened. He did not recommend using this well as a source for a single village drinking water scheme.
- The sarpanch of the village is quite aware of the Ralegaon Siddhi village and its developmental activities.
- The ZP rationale for capital cost allocation were Rs.2300 per capita for tribal population and Rs.1800 for Non-Tribal population.

Table 7-13: Vihigaon secondary data

Name of the habitat	Individual PWS	Regional PWS	No of Hand pump	No of functional hand pump	No of public well	No of functional public well	Tanker fed	Population	Elevation (m)
Baudhhabitat	No	No	0	0	0	0	No	134	
Bhendichi habitat	No	No	0	0	0	0	No	90	
Chinchhabitat	No	No	0	0	0	0	No	95	
Daryache habitat	No	No	1	1	1	1	No	180	376
Dhubhachi habitat	No	No	0	0	0	0	No	97	
Hiwal habitat	No	No	0	0	0	0	Yes	110	
Kathodwada	No	No	0	0	1	1	No	90	
Katkar habitat	No	No	0	0	1	1	No	78	
Kavthyach habitat	No	No	0	0	1	1	Yes	110	
Nirgood habitat	No	No	0	0	0	0	Yes	98	352
Panavth habitat	No	No	0	0	0	0	No	110	
Rajwada	No	No	0	0	0	0	No	114	
Telampada	No	No	0	0	2	2	Yes	364	
Vihigaon	No	No	0	0	1	1	Yes	221	369
Shid habitat	No	No	1	1	0	0	Yes	92	
Source: GOM									

Table 7-14: Vihigaon population data

Name of the habitat	Total Population	ST population	SC Population	No of Households	No of Cattles
Baudhhabitat	134	44	90	23	24
Bhendichihabitat					
Chinchhabitat	95	0	95	53	250
Daryachehabitat	180	0	180	28	100
Dhubhachihabitat					
Hiwalhabitat	110	0	110	81	190
Kathodwada	90	0	90	23	50
Katkarihabitat	78	0	78	20	30
Kavthyachihabitat					
Nirgoodhabitat	98	0	98	95	285
Panavthahabitat					
Rajwada	114	50	0	null	null
Telampada	364	0	340	110	100
Vihigaon	221	221	0	221	67
Shidhabitat					
Source: DDWS					

Vashala grampanchayat

The Vashala gram panchayat has 7 habitats and it is located in Shahapur block. It is very close to the Dhakne gram panchayat which was visited in the first field visit.



Figure 7:11: Vashala Grampanchayat

Vashala (bk) has about 150 homes. There is a river ½ km away where women go to wash clothes. This river is expected to dry in a month (by Dec/Jan) after which they will have to go ~3km away to Bhatsa river. The drinking water source of the village is well and people use the river, nallah for washing. In this village a spring is present and each household is given number. This number is used to determine the queue to access water from the spring.

Tokarkhand is a non tankerfed habitation. It has a check dam that was built 10 years ago which has been successful. There are two checkdams near Tokarkhand, the one constructed by the gram panchyat appears to be in good condition and water is available.



- There is water in this reservoir all 12 months however this water is not fit for drinking because it is made dirty by improper use (clothes washing etc).
- There is a well downstream from this check dam which has water till about May-Jun.
- A second check dam was built downstream from this well, but it turned out to be a failure. We could spot cracks in the wall of the check dam and it is possible that it was not deep enough. The one constructed by the ZP is poorly constructed and has no water in it and also it is in the downstream of gram panchayat check dam.



Table 7-15: *Vashala secondary data*

Name of the habitat	Individual PWS	Regional PWS	No of Hand pump	No of functional hand pump	No of public well	No of functional public well	Tanker fed	Population	Elevation (m)
Charanwadi	No	No	0	0	1	1	Yes	55	
Kolipada	No	No	0	0	1	1	No	150	
Raichewadi	No	No	0	0	1	1	Yes	75	280
Tokarkhand	No	No	2	2	2	2	No	620	294
Umerwadi	No	No	0	0	1	1	No	50	
Vashala (Bk)	No	No	0	0	4	4	Yes	382	303
Vashala (Kh)	No	No	0	0	1	1	Yes	275	
Source: GOM									

Table 7-16: *Vasala population data*

Name of the habitat	Total Population	ST population	SC Population	No of Households	No of Cattles
Charanwadi					
Kolipada	150	0	0	39	0
Raichewadi	75	0	0	19	0
Tokarkhand	260	0	503	195	100
Umerwadi	50	0	0	13	200
Vashala (Bk)	382	71	157	99	215
Vashala (Kh)	275	23	221	33	0
Source: DDWS					

Appendix VII: Semi structured questionnaire

- Name of Habitat:
- Name of Gram Panchayat:
- Location: (Coordinates):
- Name of Sarpanch:
- Name of Gram Sevak:
- Number of households:
- Number and types of communities:
- Number of shops in the wadi:
- Presence of school: Yes/No
- Type of school:
- Literacy rate:
- Activity pertaining to NREGA:
- Main Occupation :
- List of water sources:
- Coordinates of drinking water sources:
- Seasonality of drinking water sources:
- Number of private borings or handpumps:
- Average amount of water per person:
- Activities of water shed development:
- Functionality of the hand pumps:
- Tankerfed status:
- When the tanker did last come to the habitat?
- Where is the tanker water stored and how it was distributed?
- Number of people working for private companies (labourers):
- Number of people with government jobs:
- Awareness about jalswarajya and other related projects:
- Contacts in the wadi