TOWARDS WATER FOR ALL HOMES:

INEQUALITIES IN ACCESS TO DRINKING WATER AT MUTHALAMADA PANCHAYAT PALAKKAD (DT.)

Research Project Report
(Final)

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Shilaja
Sujith

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List of voluntary organisations associated with the survey

Haritha Development Association.

Darshana Kala samithi.

Maithri.

Gandhi Uvajana Sankadana.

Galaxy Uvajana Sankadana.

Kerala Sasthra Sahithya Parishath, Kuttipadam unit.

Parakkulambu Arts Club.

Chapter 1
Introduction

Water is an eternal need of all living beings. But potable water is a scarce resource on earth and is not easily available everywhere. It has to be harvested, stored and carried. The state-of-the art of water harvesting has evolved to such an extent that safe water can be brought to any desired site from distant sources. Inspite of these technological achievements, only few million people on earth are fortunate to have safe water supply at their home. In Kerala, only 10% of the households have piped domestic water supply (1). Thus most of the people suffer daily agonies of fetching water from distant places.

Non availability of sufficient safe water at the household level has several implications on the health and well being. Firstly it affects the health and hygiene of all members of the family or community. In rural areas it affects livestock improvement and homestead farming. Traditionally women being the collectors of drinking water they are under physical stress by these daily collection of water from distant places and are squeezed by their time for caring their children and older members of the family. Needless to say, availability of safe and sufficient drinking water at household level is an essential condition for improving the quality of life.

Globally, massive efforts have been initiated to improve the accessibility and availability of drinking water. Various national governments and international agencies are deeply involved in this mission. The international water and sanitation decade (1971-1980) by United Nations was the most recent transnational effort in this direction. Conditions in the North have improved a lot from what Edwin Chadwick wrote in 1842, " In Paris and other towns where the middle classes have not the advantage of supplies of water brought into the houses, the general habits of household and personal cleanliness are inferior to those inhabitants of towns who do enjoy the advantage" (2). But in the countries of the South the scenario is bleak. Various economic and socio-cultural factors have contributed to it. The present study was undertaken within this general context. The study focuses up on the problems related to availability of drinking water at household level in Muthalamada panchayat of Palakkad district.

The project was sanctioned under the Kerala Research Programme on Local Level Development (KRPLLD) (Project No.56/97) of Centre for Development Studies, Trivandrum.

Conceptual frame work

Water is one of the most important requirements for life. However more than 99% of earth's water is not readily available for human use because it is saline (sea water) or frozen (ice caps and glaciers). Thus all life, except marine life, depends on the remaining 1% . Only a fraction is present at any one time in rivers and in lakes. Thus a regular daily supply of drinking water presupposes water harvesting, purification, storage and transportation. This needs appropriate deployment of resources like work, money and knowledge - all brought together through collective human action. The deprivation or inappropriate deployment of these resources constitute the basic drinking water problem in any area.

Empirically, it may be seen that accessibility to safe drinking water is determined by factors like a) geographical peculiarities of the area like rainfall, topography. landuse etc, (b) political commitment of national government, (c) cultural factors that activate or dissipate the institutional arrangements for drinking water supply, (d) the water related practices that conserve the sustainability of available fresh water sources, and e) socio economic conditions of the households in the area.

Thus for the present study drinking water problems are formulated on assumptions of inequality in access to drinking water by households arising from (1) the location of households in water scarce areas (2) economic deprivation of households which incapacitate them to invest in water harvesting devices (3) contamination or pollution of available water sources either by geographical factors or landuse pattern (4) lack or inefficiency of public water supply schemes and (5) social inequalities and cultural inadequacies in collective action.

Analysis of data were directed towards identifying the forms of inequality in access to drinking water existing in the area by identifying the most severely affected area (ward) and the number of households traveling more than 50 m daily

for collection of water in each area, those affected by drying up of wells and those with financially incapable of creating their own drinking water facilities. An assessment of existing natural sources, private and public water facilities, institutional arrangements existing for drinking water supply and willingness of people to participate in neighbourhood based water co-operatives for preparing peoples plan, were also made to evolve recommendations to solve the problem.

Objectives

Objectives of the study were

1) To identify the drinking water problems in Muthalamada panchayat in terms of people affected by water scarcity, geographic obstacles, socio economic factors, water quality problems and nature of institutional inefficiencies.

2. To review the status of public water supply schemes or assets distributed or created by Central, State or Local Governments and their role in improving the drinking water situation of the area.

3. To identify the potential sources of water for preparing an alternative water supply scheme for the area.

4. To discuss issues like appropriate cost effective technologies, equity considerations and organisational set up for sustainable operation and maintenance of public water supply schemes in the problem areas.

5. To prepare a people's plan for domestic water supply schemes in the most affected areas.

Method of study

The study was commenced in Nov.1998. Public contacts were established in the early weeks of November by meeting Panchayat board members, Panchayat officials, voluntary organisations and social workers.

Secondary information on ward-wise population, and details about the existing public water facilities and other sources of water were collected from the panchayat office, Kerala Water Authority, census reports etc. Sites and survey numbers of natural ponds in the area were collected from previous studies conducted in the area. List of ponds with more than 1500 m^3 capacity were collected from CWRDM studies (1989).

Local enquiries revealed the nature of problems related to drinking water in the area and later helped to prepare a questionnaire for survey of drinking water problems. Informations about the drinking water projects which are under construction and those proposed for the future by the water authority and in people's planning projects were also collected.

In December 1998, Maithri was appointed as the implementing agency for the resource mapping of the panchayat, a project sanctioned in the second year of people's planning. Four members of the research team of the present study were fully involved in the resource mapping project. After a two day training on resources mapping for 70 volunteers, the field work started on 27th December. An average of 6 volunteers worked for 10 days in each ward. Using a cadastral map of the area they collected information on landforms, land use, water sources, depth and water levels of open wells. Information collected by field workers are marked into another copy of cadastral map on alternate days at a single point. Digitalisation of the final master map and analysis by GIS package was also executed by a member of the present research team (Muralikrishna). Information on landforms of the area collected from the toposheets was also used for analysis and preparation of a land form map of the area. The involvement of the members of the present study team in the resource mapping process gave them an opportunity for direct observation of the geography and the degree of land degradation affecting the water sources and for collection of well data for preparing depth to water table map of the area.

Primary data on modes of drinking water sources, drying up of wells in summer, difficulties in access to well water, gender difference in collection of drinking water etc were collected in two steps through questionnaire. The first step was accomplished with the help of science club of Govt.High school, and second with the help of volountary organi- sations at Muthalamada. Being the only high

school in the area it has an average attendance of 100 students from each ward except for ward 13. Class teachers distributed the questionnaire to each student in their class with sufficient instructions and collected them back. The survey started on 5th February and was completed on 24th February 1999. Responses from 765 households were obtained. Average response from a ward was 60. This survey was intended to collect some preliminary informations on inequalities of drinking water availability in the area. The survey also helped to sensitise the households on drinking water issues in the area.

Based on the preliminary analysis of data collected by high school students, another questionnaire was prepared to collect similar information from each household in the area on a survey number basis. It was hoped that these survey number based data can be analysed by GIS package as the cadastral map of the area was already been digitalised for resource mapping and utilised for identifying drinking water problems at the household level in each survey number. The volunteers identified during the resource mapping were invited for this and discussions conducted for preparing a registry of households with drinking water problems in the area. Two volunteers from each ward were identified to conduct the survey using a questionnaire for each households in their respective wards. Volunteers were specially instructed to make special efforts to record the survey number of households correctly. Survey was conducted from 21 to 27 May 1999. Data from 4882 households were obtained. A preliminary analysis of these data showed that survey numbers could be obtained only for one third of the households. So only a wardlevel analysis was tried. Highest number of responses were from ward 10 (569) and the least from ward 11 (236). The enumerator from ward 11 explained that he excluded two colonies in the area - Ambedkar colony with 300 families and Meenkara colony with 30 families - as these households have no variation of water sources and he could not get enough time to cover those areas.

Immediately after the survey a seminar on water utilisation problems in the area was conducted. Experts like Anand, RVG Menon, Terry Machado, Suja and the panchayat president and convenor of people's committee etc, participated in the seminar which was conducted on 28-5-99. All the volunteers who conducted the survey and local people actively participated in the discussions on the drinking water problems and the proposed solutions.

Later in the evening, focus group discussions were conducted in which some propositions and suggestions were evolved. These are included in the recommendations of this report.

A sample survey was conducted on the condition of tube wells in ward 1 and 2 but reliable data were not obtained.

Group discussions were also conducted on the salinity of wells in some areas of ward 1 and drinking water problems of Ambedkar colony in ward 11 where the problem of drinking water is reported to be most severe. Series of talks were conducted with Satishchandran and Santhi (INTACH, Thiruvananthapuram) on the ecological problems of the water resources and about the conservation of water bodies in the area during their visits. A number of discussions were conducted with panchayat officials and users to familiarise them with the problems of maintenance of public water facilities in the area.

Though significant number of households reported pollution of wells existing in their vicinity, water quality analysis of those wells could not be conducted because of financial and time constraints.

The data collected were compiled on ward basis and analysed for identifying the most severely affected areas, households affected by the drying up of wells in summer, number of households with members who have to travel more than 50 m daily for water, the social sections who are affected most, gender bias in the collection of water and the willingness for participation in water co-operatives in future.

Institutional problems relating to drinking water were obtained mainly through participatory approach which were triangulated with information from other sources and is included in the report.

Chapter 2
Findings of the Study

Description of the Study Area

The Geographical location and land form characteristics of Muthalamada give it great advantage with plenty of rainfall and natural water resources like streams, river , ponds etc. having great potential for water harvesting.

Located at $10^{0}33^{1}$ - $10^{0}36^{1}$ N, $76^{0}44^{1}$ - $76^{0}50^{1}$E, Muthalamada is one of the largest panchayaths in Kerala. Administratively it belongs to Kollengode block of Palakkad Dt. and covers a total area of 375 Sq km. Of this 301 Sq km is forest area and 75 Sq km revenue land. There are 13 wards in the panchayath. The 13th ward includes the forest area and ward numbers 1-12 cover the revenue land. 95% of people live in 1-12 wards. For practical reasons this study cover only the ward numbers 1-12.

Situated in the upland regions of westernghat, physiographically Muthalamada panchayath has a varied topography. The southern portion of the panchayath has the maximum elevation (>1100m) and is sloping towards the north. The escarpment in the southern part faces towards north has a dip of 600m within 1 km width. These are less inhabited forest area. Towards north from Chappakkad - Chammanampathy area the terrain in gently undulating without much gradient. The spot height of the hillranges in the area measures upto 300 m The average elevation of the panchyath is approximately 140 m above MSL which is more or less an extension of the palakkad gap region.

A landform map of the area and a table of landforms of wards 1-12 (Table 1) prepared by resource mapping team are given below. The landforms are classified here as plains, ridge area, side slope gentle <10 gradient, side slope moderate 10-250 gradient, and side slope high >250 gradient . This shows that in almost all wards there are potential sites suited to tanks based water supply system by gravitational method which can be adopted for decentralised drinking water projects.

Table 2.1

Landform of Muthalamada (1 to 12 wards) - ward-wise

Ward No.	Ridge crest	Slope (low)	Slope (moderate)	Slope (high)	Plains	valley	Total
1	0.00	302.94	0.00	0.00	789.98	0.00	1092.92
2	34.10	864.11	0.00	0.00	222.88	0.00	1121.09
3	0.00	0.00	0.00	0.00	387.70	0.00	387.70
4	25.70	316.04	0.00	0.00	250.07	0.00	591.80
5	315.79	719.31	0.00	0.00	241.42	0.00	1276.52
6	0.91	666.43	0.94	0.00	236.47	0.94	905.70
7	161.60	705.96	365.46	187.30	0.00	1086.75	2507.08
8	54.86	144.80	801.10	34.35	54.36	0.00	1089.46
9	174.95	1486.06	704.73	0.00	0.00	0.00	2365.74
10	339.02	0.00	1338.54	5.63	0.00	99.83	1783.02
11	256.34	234.99	704.41	98.07	0.00	0.00	1293.82
12	334.08	0.00	3106.05	581.43	0.00	0.00	4021.55
Total	**1697.35**	**5440.65**	**7021.22**	**906.78**	**2182.88**	**1187.51**	**18436.40**

Percentage	**9.21**	**29.51**	**38.08**	**4.92**	**11.84**	**6.44**	**100.00**

(Source : Panchayat Resource Map Report 1999)

Climate and Drainage

The study area has a humid dry climate and experiences two monsoons like all other parts of Kerala state. South west monsoon is active during June to August and North - East monsoon during October and November. Average annual rainfall is 1900 mm. The period, December to May is more or less dry. Gayathripuzha, a tributary of Bharathapuzha formed by Chulliar and Meenkara streams drains the area. Gayathripuzha, Meenkara, Chulliar and several unnamed streams arising from the slopes of Nelliyampathy hills in the south - western boundaries of ward 5,7 and 12 give rise to a dendrite and subparallel type of drainage covering almost all the 12 wards.

Surface water sources in the Area

The above mentioned rivers and streams are surface water sources in the area. There are 202 natural ponds which can be considered the natural water reservoirs in the area. A ward wise distribution of these ponds and area of each (in acres) are given in the annexure. Most of them are under private ownership and are used for washing and bathing. CWRDM study (1979) shows that 82 of them are perennial with a capacity of more than $1500m^3$. There are three perennial springs, two in the ward 7 and one in ward 10 from which 10-15 families draw water for drinking.

Meenkara reservoir with a capacity $11.3m^3$ (constructed in 1964) and Chulliar reservoir with a capacity $13.7m^3$ (constructed in 1970) of the State irrigation department are situated in ward 11 and 7 respectively. Irrigation canal networks from these reservoirs extend to almost all wards except ward 12 and may have influence on the subsurface water levels in the area.

Open dug wells and tube wells are the subsurface water resources in the area. Resource mapping reported 891 dug wells and 43 tube wells in the area. 282 wells (31%)are reported to be drying up during summer. The survey conducted as part of the present study shows that there is severe underreporting of dug wells in the resource map report.

Table 2.2
Water Sources in Muthalamada 1-12 wards

Type of Water Source	***Wards Numbers***												***Total***
	1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***	***12***	
Surface Water Sources													
1.River Streams	Drains through almost all wards												
2. Spring							2			1			3
3. Ponds	33	21	7	19	33	22	16	9	17	14	8	3	202
4. Reservoirs							1				1		2
Sub Surface Water Sources													
1. Open Dug Wells	145	125	49	77	41	130	35	63	50	117	21	38	891
2. Tube Wells	0	2	1	0	0	2	13	4	1	12	2	6	43

Source : compiled from Resource Map Report 1999

Depth to water table map

During the preparation of panchayat resource map depth of water level from ground were measured for about 600 open wells in the month of Jan. 1999. An isoline map of the panchayat (1 to 12 wards) area is prepared using these well observations - depth to water table is plotted in map and isoline were drawn keeping terrain units as base reference. The depth to water table map shows that the terrain morphology has a determining effect over the ground water availability of the region. In general the eastern part of the panchayat has a low water availability compared to the western part though both the Meenkara and Chulliyar reservoirs are towards the eastern part. The reason for low potentiality is that the land area between Chulliyar and Meenkara reservoir - the Attayampathi, Govindapuram and Chammanampathy area - the terrain is sloping towards the reservoir orginating from the Nelliyampathy ridge crest which is in the southern part of the panchayat.

A map showing areas with depth to water table classified as less than 3m, 3 to 5 metre, 5 to 7 metre and more than 7 m is given. This will be helpful to decide strategies to be adopted for preparing a decentralised drinking water project in the area. The ward wise area of different depth zones is given in the table which provides a clear picture of the water potential in the region. This in combination with water resource distribution map showing the wells, ponds and water bodies will help in the preparation of necessary management strategies for drinking water demand in the area. A preliminary attempt in this direction done as part of the this study is included in chapter three of this report.

Table 2.3
Depth to water table in Muthalamada 1-12 wards-ward-wise

Ward No	*Depth to water table*				*Well density*
	< 3m	*3-5m*	*5-7 m*	*>7m*	*Wells / Sq km*
1	4.07	0.35	0	0	34
2	3.13	1.14	0	0	32
3	1.48	0.09	0	0	42
4	2.19	0.2	0	0	33
5	1.74	3.42	0	0	10
6	3.08	0	0	0	51

7	5.04	5.2	0.1	0	6
8	1.94	1.31	0.96	0.06	22
9	1.84	5.46	0.22	0	10
10	1.8	5.92	0.73	0	24
11	1.64	4.05	0.07	0.07	5
12	2.63	9.9	2.21	0.85	3
Total	**30.58**	**37.31**	**5.19**	**0.98**	**16**

Source : Prepared from resource map survey 1999

The well distribution data shows that the perennial wells are more clustered in western part of the panchayat where land form is plain and is the extension of the Palakkad gap region. The perennial wells are clustered in the Kuttipadam, Pallam, Kambrathuchalla, Nandakizhaya, Parayampallam and Pothampadam areas of the panchayat. Well density data in table 2.3 though an under estimate shows the trend in each ward.

Land degradation in the area :

Direct observation of land degradation in the area was made possible during resource mapping activities. Appearance of rocky patches not marked in cadastral map of 1935 and ravine formations in slope regions are extensive in ward 5,7,10,11 and 12. In ward 3,5 and 6 where irrigation canals dry up in summer were seen to be used as dumping sites for household wastes. Water logged areas were found in ward 1. Satishchandran who had conducted ecological studies in the area notes that 30 or more streams now flowing seasonally from Nelliyampathy hills to this area were marked perennial in the maps prepared during British periods. In the revenue area also many of the perennial streams plotted in cadestral map of 1935 were found dried up or disappeared during the resource map preparation. In the late seventies there were two episodes of massive landslides in the hill slopes of ward 7. Nearly 30 tribal people died in the event.

People and settlements in the study area:

From the 1991 census report it can be estimated that the population of the present 1-12 wards in the area is 31863. [(SC population 5491 (17.23%) and ST 1478 (4.63%)] From the information on the number of households reported in peoples planning development report (1997) (P.64) and resource map report (1999) (P. 27) number of households for 1-12 wards are found to be 6450. Ward

wise distribution of households is not available. Talks with panchayat officials reveal that lowest number of household is in ward 4 (474) and highest in ward 11 (850) with a total of 8000 households in the panchayat. Hence the average number of households is 605 per ward(1). IRDP survey (1992) shows that 55% of the households are below the poverty line. According to the information collected from Anganwadi workers (1999) there are 1133 SC households and 564 ST households in wards 1-12 area. Though density of population in the area is lower than the coastal regions of Kerala, most of the settlements are clustered except in the case of tribals. If the estimation by Hirshleifer etal (1970)(2) that the typical population for public water system are 330 to 500 people per mile of the distribution main (Santhakumar 1998) is accepted, the clustered settlements of the area are suited to water supply through decentralised or centralised pipe line. It can be cost effective and can cover most of the population in the area. Most of the tribal settlements are scattered and a few which are in colonies are situated in ward numbers 5,7,12 where revenue lands are continuos with the forest land. Most of the SC households are settled in 51 colonies and are more concentrated in wards 1,2,3 and 11. Largest SC settlement is in ward 11 - Ambedkar colony - with 300 households in 15 acres of land. People's planning report acknowledge this colony as the most severely affected area in the panchayat with regard to drinking water.

Water utilisation practices in the study area :

Local enquries revealed that in earlier periods water for drinking was drawn directly from the flowing river. In summer when streams dry up small pits were dug in the streambeds to collect water. Agriculture was mainly food crops - paddy, groundnut, green gram, bengal gram, maize, ragi and vegetables which were rainfed. Recent three to four decades have given rise to massive change in landuse and the resultant water utilisation practices. Rise in human settlements gave rise to intensive digging of wells. Construction of Chulliar and Meenkara reservoirs opened up a network of irrigation canals. Agriculture became more irrigation based and were shifted to cash crops like coconut, banana, mango etc. More motor pumps were installed and large quantity of both surface and ground water were pumped for cultivation. A rough estimate shows that for irrigation there may be one 10 HP motor for every 100 acres of land in the area. The extensive earth works for the dams and canals and the changing agricultural practices should have affected the naturally evolved water conservation systems of the area. The

emerging form of land utilisation of the area does not seem to be sustainable for water conservation.

Invasion of public sources of water for private use is not rare. One such instance witnessed during the study was at Rangapuram Colony in ward 7 which is close to boarders of ward 12. There are 10-15 ST households settled there as a colony who are resettlers after a land slide in the area in the late seventies. One tube well which was constructed near the colony 4 years ago, is not used by the people as the water obtained is muddy. All the colony people now depend on a spring 200 meters away which they call 'Nagaroot' and is attributed some divinity. Recently a well of more than 10 meter diameter was constructed by a private owner just 5 meters away from the spring and water is pumped to a coconut farm used for toddy tapping. The colony people feel that after hours of pumping the discharge from the spring seems low and fear that by the coming summer the spring may dry up.

As most households are drawing water from wells, springs or public taps which are carried home, the amount of water used is limited and conservation practices are good. But in Pothampadam area there is a public well constructed many years ago and a public tap which was recently installed. Most people prefer to collect water from the public tap as the physical stress of drawing water can be avoided. As there is no drainage, water overflows over footpath of the road making it dirty. The scene is highlighted here in order to note that many of the existing water conservation practices may disappear once the mode of water supply is changed to piped water. It is important that the sense of conservation be retained. The sense of water conservation achieved does not seem to be attained in household hygienic practices. High prevalence of water - borne diseases reported in many parts of the panchayath may be due to unhygenic practices rather than water scarcity as such.

Findings of the survey by Science Club,
Muthalamada Govt. high school (MGHSS survey 1999)

This survey which was conducted in Feb 1999 among High school students of Muthalamada aimed at identifying the sources of drinking water, peak period of

drying up of wells in summer, gender differences in collection of water and factors responsible for lack of water sources at household level. Responses from 765 households were received. A ward wise distribution of high school students enrolled and those participated in the survey are given below (Table 2.4).

Table 2.4
Percentage of participation of high school students
MGHSS survey 1999 - ward-wise

Ward no	Total No of students in H.S Classes	No students participated	% of participation
1	114	74	64.91
2	123	76	61.78
3	120	82	68.33
4	132	102	77.27
5	88	65	73.86
6	194	127	65.46
7	79	37	46.83
8	101	67	66.33
9	85	45	52.95
10	90	44	48.88
11	69	37	53.62
12	37	14	37.80
Total	**1232**	**765**	**62.09**

62.09% students participated in the survey. Maximum participation (77.27%) was from ward 4- and minimum from ward 12 (37.83 %).

Drinking water sources at household level

Open wells-one's own or neighbour's - are the main source of drinking water in the area. A ward wise distribution of different sources of drinking water is given below (Table 2.5).

Table 2.5
Sources of drinking water by households MGHSS survey 1999 - ward-wise

ward Nos	own Well	own Pipe	Own Pond	neigh's well	panch well	panch tube Well	public Tap	neigh pond	other sources	not responded	Total
1	21	0	0	38	13	1	7	0	2	0	74
2	24	2	0	32	9	1	6	0	2	0	76
3	15	1	0	36	21	0	5	0	4	0	82
4	22	1	0	36	21	0	5	0	4	0	82
5	18	0	0	20	18	4	3	2	0	0	65
6	30	15	1	46	4	12	17	0	0	2	127
7	17	0	0	16	5	0	4	0	1	0	37
8	26	1	0	34	5	0	1	0	0	0	67
9	20	0	0	22	1	0	0	0	01	0	45
10	13	2	1	17	10	0	1	0	0	0	44
11	4	0	0	22	3	2	0	0	1	0	32
12	4	0	0	3	5	0	0	1	0	0	140
Total	**207**	**23**	**2**	**344**	**103**	**23**	**45**	**4**	**10**	**4**	**765**

27.05 % households have own well 44.96 % use neighbour's well. 13.46 % depend on public wells. Total users of public facilities (Public well, tube well and public taps together) constitute 35.42 %

Drying up of wells in summer

44.18% of the well using households have experience of drying up of wells during summer.

Table 2.6
Households experiencing drying up of wells in summer
MGHSS survey 1999 - ward-wise

ward number	no of HH using well	no H H Experiencing drying	% of H H Experiencing drying
1	65	30	40.54
2	74	35	46.05
3	77	43	52.44
4	102	52	50.98
6	60	32	49.23
7	106	39	36.79
8	65	13	35.14
9	41	24	53.23
10	42	16	38.09
11	30	20	62.50
12	12	5	33.71
Total	**703**	**308**	**44.18**

A ward wise distribution of these households is given below (Table 2.6). In wards 3,4,9 & 11 more than 50% of well using households experience drying up.

Drying up of wells - The peak season

Drying up of wells usually extends from Jan to May each year. Information on peak season of drying and the extent of households affected by this will be useful for timing the remedial actions. The MGHSS survey shows (Table 2.7) that 78.04% of the wells dry up April - May. Only 4% of wells dry up in Jan and 2.7% in February. 15% of wells start drying up in March. In ward 4 a significant number of wells seems to dry up during March - May period

Table 2.7
Seasons of experience of drying up of wells MGHSS survey 1999 - ward-wise

Seasons of drying	Ward Numbers												Total and % of H H
	1	2	3	4	5	6	7	8	9	10	11	12	
Jan - May	1	0	2	2	0	1	0	2	0	0	0	0	8 2.7%
Feb - May	0	1	1	1	2	3	0	1	0	0	3	0	12 4.05%
Mar - May	4	6	4	10	2	1	1	6	7	2	2	0	45 (15.2%)
April-May	22	23	31	31	21	22	12	20	14	13	11	5	231 78.04%
Total	**27**	**30**	**38**	**50**	**25**	**27**	**13**	**29**	**21**	**15**	**16**	**5**	**296**

Number of wells drying up in summer

Of the 203 households reported as having own wells, 73 (35.09%) are reported drying. A ward wise distribution of drying wells is as follows (Table 2.8). In wards 7, 9 and 11 more than 50% of wells are seasonal.

Table 2.8
Wells drying up in summer MGHSS survey 1999 - ward-wise

Number of house holds	*Ward Numbers*												*total wells*
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
With own wells	21	24	15	22	18	30	11	26	20	13	4	4	203
Wells reported drying	9	8	6	5	4	5	7	10	10	6	2	1	73

% of drying wells	42.9	33.3	40	22.7	22.2	16.7	63.7	38.5	50	46.2	50	25	35.09

Period of construction of wells

For an enquiry into the year of construction of wells, 187 responses were received. 17 Wells were constructed before 1959, 39 wells between 1960 and 79, and 131 wells between 1980-99.

A ward wise distribution of period of construction of wells is given below (Table 2.9)

Table 2.9
Period of construction of wells MGHSS survey 1999 - ward-wise

Ward No.	before 1959	between 60 - 79	between 80 - 99	Total
1	0	5	9	14
2	2	4	18	24
3	2	6	7	15
4	0	4	13	17
5	2	1	14	17
6	4	3	23	30
7	0	0	9	9
8	3	6	14	23
9	2	2	15	19
10	2	3	6	11
11	0	3	1	4
12	0	2	2	4
Total	**17**	**39**	**131**	**187**
%	**9.09**	**20.85**	**70.05**	**100**

Distance travelled for collecting drinking water

12.31% of households with no own water source travel more than 200m to collect drinking water either daily or during summer. A wardwise distribution is given below (Table 2.10). In wards 7, 9, and 12 more than 20% of households are travelling more than 200m a day.

Table 2.10
Households travelling more than 200 m MGHSS Survey 1999 - ward-wise

House Holds	Ward Numbers												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Total No. of house hold responded	47	51	65	77	46	90	23	40	24	28	28	9	528
No. of House holds travelling more than 200 M	6	4	5	14	4	6	7	6	5	1	5	2	65
% of House holds travelling more than 200 M	12.7	7.8	7.7	18.2	8.7	0.2	30.4	15	20.8	3.6	17.9	22.2	12.31

Gender differences in collection of drinking water

To know the gender differences, information on member of house hold in relation to the student going for collection of water was sought. Ward - wise results are given in Table 2.11.

In 30.81% of household mother is going for the collection of water. In 21.77% sisters are responsible for it, thus showing the universal phenomenon of women as collectors of drinking water for household in Muthalamada also.

Table 2.11
House hold members going for collection of water
MGHSS survey 1999 - Ward- wise

Member of HH	Ward Numbers												Total & % total
	1	2	3	4	5	6	7	8	9	10	11	12	
Mother	18	17	21	27	17	17	9	14	10	7	9	1	167 (30.81%)
Father	0	0	0	0	0	0	0	0	0	0	0	0	0 0
Brothers	0	0	1	0	0	21	2	0	1	0	1	0	26 (4.79%)
Sisters	14	10	23	18	18	0	2	9	4	9	9	2	118 (21.77%)
Other Members	0	1	0	0	0	0	0	0	0	0	1	0	2 (.36%)
All Members together	19	23	22	33	12	54	12	18	10	12	8	6	229 (42.25 %)
Helpers	0	0	0	0	0	0	0	0	0	0	0	0	0 0
Total	**51**	**51**	**67**	**78**	**47**	**92**	**25**	**41**	**25**	**28**	**28**	**9**	**542 (100 %)**

Factors for not having own well/water sources

Four factors were considered for not having own water source at the household viz . Non availability of land, water scarcity in the area if the household owns land, financial incapacity, and the availability of water nearby. 60.9% of 509 households which responded to this question during the survey with no own water source are financially incapable, 19.64% of the households do not own land to dig a well and 11.39% of the households have land but in a water scarce area. Ward-wise details are given in Table 2.12.

Table 2.12
Reasons for not having own water source MGHSS survey 1999 - ward-wise

Reasons for no own source	Ward numbers												Total and % of total
	1	2	3	4	5	6	7	8	9	10	11	12	
No land	4	11	11	20	8	20	4	4	5	7	5	1	100 19.64%
Water scarce area	5	4	11	6	9	7	4	2	1	5	1	1	58 11.39%
Financial incapacity	33	32	34	36	26	54	12	30	18	13	17	3	310 60.9%
Water available nearby	6	4	6	5	1	6	5	1	0	2	2	3	41 8.05%
Total	**48**	**51**	**62**	**67**	**44**	**87**	**25**	**37**	**24**	**27**	**25**	**8**	**509**

In ward 4 and 6, non availability of land seem to be the significant factor.

Findings of Muthalamada drinking water survey 1999 (M D W survey 1999)

4842 households responded to this survey which intended to prepare a registry of households with drinking water problems. Of the households which responded 767 (15.84%) belonged to scheduled caste and 342 (7.06%) to scheduled tribe.

A ward wise and social category wise distribution of such households are as follows (Table 2.13)

Table 2.13
Distribution of responded households
M D W survey 1999- ward-wise and social section-wise

Social category of households	Ward Numbers												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
SC Respondents	171	93	82	48	91	73	23	65	43	61	3	14	767
ST Respontants	1	0	0	0	23	4	125	35	10	64	17	63	342
Total respondents	**540**	**406**	**320**	**425**	**329**	**524**	**379**	**483**	**259**	**569**	**236**	**383**	**4882**

Highest number of households is from ward 10 (569) and least from ward 11 (236). Though ward 11 has the highest number of households in the panchayat the field investigator from this ward excluded two colonies from the survey - Ambedkar colony with 300 households and Meenkara colony with 30 households - for lack of time and as there is no variation from house to house with regard to their water source.

Sources of Drinking water

Traditional open wells are the single main source of drinking water in the area. 29.45% of house holds have own wells and 37.8 % depends on neighbour's wells. Public water facilities are used by 27.02% of households (Public well 11.19% + tube well 8.61 % + public tap 7.22%). 92 households (%) have sources other than this, not mentioned clearly, (may be from streams / springs near by). Though 40 households staying in govt. quarters or rented houses participated in the survey, they did not mention the source.

A ward-wise details of sources of water are given in table 2.14

Though open wells are again the single major source in all wards the total number of households with own wells show high locational variation. Ward 10 has the maximum number of own wells - 194 and ward 7 - the minimum 44. But ward 4 with less number of households have the number of highest of wells. Number of households depending on neighbour's well is maximum in ward 1 (278) and least in ward 12 (7)

Table 2.14
Sources of drinking water at house hold level MDW - Survey 1999 - ward- wise
WATER SOURCES

Ward Nos	Own well	Own pipe	Own pond	Neigh well	Panch well	Panch T.well	Public Tap	Nigh pond	Other sources	Not resp	total
	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*	*k*
1	173	1	0	278	62	16	4	1	0	4	**540**
2	132	0	0	174	33	2	1	64	0	0	**406**
3	69	0	0	77	113	9	49	49	1	1	**320**
4	172	3	2	135	26	0	71	12	0	4	**425**
5	85	1	0	139	49	26	27	0	0	0	**329**
6	158	1	0	146	11	12	162	22	0	2	**524**
7	44	12	0	160	63	37	9	0	37	17	**379**
8	192	0	0	202	54	23	0	0	12	0	**483**
9	85	1	1	125	29	5	2	4	3	4	**259**
10	194	1	3	174	65	91	0	1	24	6	**569**
11	45	0	3	166	14	8	0	0	0	0	**236**
12	77	7	0	57	13	186	25	1	15	2	**383**
Total	**1426**	**27**	**9**	**1833**	**542**	**417**	**360**	**106**	**92**	**40**	**4882**
%	**29.45**	**0.56**	**0.18**	**37.86**	**11.19**	**8.61**	**7.22**	**2.18**	**1.44**	**0.9**	

Experience of drying up of wells.

952 households (25.04%) out of 3801 well users experience drying up of their wells during summer. A ward-wise details of households reported drying of wells is given in Table 2.15.

Table 2.15
Households (Well users) experiencing drying up of wells
MDW survey 1999- ward-wise

	Ward Numbers												
	1	2	3	4	5	6	7	8	9	10	11	12	Total
No of. H H reporting Drying up of wells	62	84	74	92	40	126	238	39	39	14	127	17	952
Total No of users of wells (own, public or neigh's wells)	513	339	259	333	273	325	267	384	239	333	225	147	3801
% of house holds experiencing drying up of wells	12.08	24.78	28.57	27.63	14.65	38.76	89.13	11.20	16.32	4.20	56.44	11.56	25.04

Highest percentage of drying up of wells was reported in ward 11 (55.55%). In wards 5,6 and 7 nearly 40% of the wells are drying. Area with lowest number of wells drying up is in ward 10. Percentage of households experiencing drying of wells is high in ward 7 (89.13%) and ward 11 (56.44%), and least in ward 10 (4.2 %)

Number of wells drying up in summer

Of the 1426 households with own wells, 351 households (24.61%) reported drying of their wells in summer. A wad-wise details of distribution of drying wells is given in Table 2.16. Ward 11 shows highest % of drying up of wells (55.55). Ward 10 shows lowest % (4.12)

Table 2.16
Households (Well Owners) having own wells who reported drying up of wells M D W survey 1999 - ward-wise

	Ward Numbers												
	1	2	3	4	5	6	7	8	9	10	11	12	Total
Total HH with own wells	173	132	69	172	85	158	44	192	85	194	45	77	1426
Total wells drying	33	31	23	51	38	63	20	32	27	8	25	14	351
% of wells	19.07	23.48	33.33	29.65	44.7	39.88	45.45	16.66	31.76	4.12	55.55	18.18	24.61

drying

Sources of drinking water during summer

Around 25% of open well users experience drying up of their wells during summer. Sources of their drinking water during this period is as follows (Table 2.17)

Table 2.17
Sources of drinking water during summer seasons
MDW Survey 1999 -ward-wise details

Source	Ward Numbers												Total
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	
Neighbour's Well	82	215	41	66	18	42	222	33	13	5	133	21	**891**
Panchayat Well	19	29	37	14	4	6	16	4	7	1	0	0	**137**
Panchayat Tube well	16	3	4	1	7	1	5	1	4	0	1	0	**43**
Public tap	6	66	14	82	11	19	9	1	5	0	0	2	**215**
Neighbour's pond	0	1	4	2	19	59	33	0	3	4	0	0	**125**
Total	**123**	**314**	**100**	**165**	**59**	**127**	**285**	**39**	**32**	**10**	**134**	**23**	**1411**

Though only 952 households experience drying up of wells during summer, 1411 households responded to the questionnaire of their water source during summer. May be that the sources other than wells are also getting dried up and / or some wells though they do not dry up have poor quality of water during summer.

Neighbour's well is the most common source during summer. Ward 2 and 7 have the highest percentage of respondents using neighbour's well. During summer more households are using neighbor’s pond for drinking water purposes.

Distance travelled for collecting drinking water

3809 households responded to this question. 1679 (44.07 %) travel less than 50m. A ward-wise details is given in Table 2.18.

Table 2.18
Distance travelled for collecting drinking water MDW survey 1999- ward-wise

Distance Travelled	Ward Numbers													
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**Total**	**%**
< 50 m	133	151	128	122	166	234	49	131	51	331	31	152	**1679**	**44.07**
< 100 m	171	69	110	77	105	52	47	105	69	12	30	39	**876**	**22.99**
< 200 m	46	112	57	27	15	95	58	71	49	4	113	37	**684**	**17.95**
< 500 m	31	53	8	36	4	4	130	18	20	0	0	5	**309**	**8.11**
> 500 m	2	18	0	30	0	41	78	0	17	5	62	8	**261**	**6.85**
Total	**383**	**403**	**303**	**292**	**290**	**456**	**362**	**325**	**166**	**352**	**236**	**241**	**3809**	**100**

15% of households have to travel more than 200 meters to collect drinking water either routinely or during summer.

A ward wise and social sector wise distribution of households travelling more than 200 meters for collecting drinking water are given below in table 2.19.

9.75% of total households in the area have to travel more than 200 m to collect drinking water. 52.13% of households in ward 7 have to travel more than 200m. Compared to general population greater proportion of SC and ST households have to travel more than 200m (13.16% and 28% respectively).

Table 2.19
Households travelling more than 200 m. -ward-wise and social section-wise

House Holds	*WARDS*												*Total*
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
	GENERAL												
Total responded	535	406	319	421	329	522	362	483	255	553	236	381	4842
No of HH >200m	33	71	8	66	4	45	208	18	37	5	62	13	570
%	6.12	17.48	2.5	15.67	1.21	8.62	52.13	3.12	14.2	0.84	26.21	3.39	9.75
	SC												
Total responded	169	93	82	48	91	73	23	65	42	61	3	14	767
No of HH >200 m	21	1	4	19	1	7	15	8	4	1	2	0	44
%	12.35	22.89	4.87	39.58	1	6	65.21	10	10	1.3	7.5	0	13.16
	ST												
Total. responded	1	0	0	0	23	4	125	35	10	61	17	63	339
No of HH >200m	0	0	0	0	1	0	84	0	0	0	14	0	99
%	0	0	0	0	5	0	67.2	0	0	0	0	82.35	28

Factors for not having an own well for households

Five factors were considered for not having an own well / source of safe water in the survey (a) no own land, (b) water may not be easily available in own land, (c) lack of finance, (d) water is available near by, or any other factors. Wardwise responses are as follows (Table 2.20)

Table 2.20
Factors for not having own water source MDW Survey 1999- ward-wise

Factors	Ward Numbers												Total % oftotal
	1	2	3	4	5	6	7	8	9	10	11	12	
own Land	35	9	22	61	1	173	36	19	4	25	108	8	501 17%
Water scarce area	149	96	38	105	55	82	49	4	8	8	44	15	653 22%
No Finance	64	157	119	36	126	86	189	178	12	138	34	8	1147 39%
Water available	40	10	8	13	57	5	5	50	8	163	1	122	488 17%
Other factors	44	0	89	2	0	0	0	0	0	1	0	0	141 5%
Total	**332**	**272**	**276**	**217**	**239**	**346**	**290**	**251**	**32**	**335**	**187**	**153**	**2930**

Lack of finance (39%) constitute the major factor for not having own water source and again highest rate is in ward 7. No easy availability of water in one's own land is the second major factor and the highest rate (22%)is in ward 1.

Landlessness is the major reason in ward 6. More households who do not think of having own water sources as they have water available nearby, is in ward 10. 'Other factors' predominate in ward 3.

Willingness to participate in neighbourhood based water co-operatives

Of the 2377 households who responded to this question 1411 (59 %) households expressed their readiness to participate. Ward-wise details are given in table 2.21. Percentage of readiness is higher in wards 7,10 and 11 and lower in wards 1, 4 and 5

Table 2.21
Willingness to participate in neighbourhood based water co-operatives
MDW Survey 1999 - ward-wise

Response	WARDS												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
Yes (a)	8	157	191	33	38	232	263	73	6	188	202	20	**1411**
No (b)	270	135	69	73	213	157	32	2	0	5	3	7	**966**
Total (c)	**278**	**292**	**260**	**106**	**251**	**389**	**295**	**75**	**6**	**193**	**205**	**27**	**2377**
% Yes a/c	**2.87**	**53.76**	**73.46**	**31.12**	**15.13**	**89.64**	**89.25**	**97.33**	**100**	**97.40**	**98.57**	**74.07**	**59%**

Willingness to pay an initial capital for house connection of atleast one tap

2123 households responded to this. 393 households (18%) were ready to pay an amount up to Rs. 1000 but 1720 households (81%) reported for not having the financial capacity to pay. Ward-wise details are given table 2.22.

Table 2.22
Willingness to pay an initial capital for house connection of atleast one tap
MDW Survey 1999 - ward wise details

Willingness to pay - amount	Ward Numbers												Total
	1	2	3	4	5	6	7	8	9	10	11	12	
upto Rs 1000	0	8	61	9	14	247	7	26	0	1	6	14	**393** 18%
upto Rs 2000	0	0	0	2	0	1	0	3	0	0	1	0	**7**
up to Rs 5000	0	0	0	0	0	0	0	1	0	0	0	0	**1**
Upto Rs. 10,000	0	0	0	2	0	0	0	0	0	0	0	0	**2**
Financially incapable	59	382	132	20	168	107	327	66	0	249	204	6	**1720** 81%
Total	**59**	**390**	**193**	**33**	**182**	**355**	**334**	**96**	**0**	**250**	**21**	**20**	**2123**

Willingness to pay user fee for house connection of atleast one tap

Of the 2142 households who responded to this question, 643 households (30.01 %) were ready to pay an amount upto Rs 20 per month. But most of the households 1371 (64%) expressed their financial incapability to pay. The wardwise response is as follows (Table 2.23)

Table 2.23
Willingness to pay a monthly user fee MDW survey 1999 - ward-wise details

Willingness to pay - amount	*Ward Numbers*												*Total*
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	
Upto Rs. 20 p.m	6	8	66	3	94	250	164	5	0	19	15	13	**643**
Up to Rs. 50 P.m	0	0	3	7	30	4	4	23	38	1	0	0	**110**
Up to Rs 100 P.m	0	0	4	2	2	0	1	3	2	1	0	1	**16**
Upto Rs 200 P.m	0	0	0	0	0	0	0	1	1	0	0	0	**2**
financially incapable to pay	52	384	36	21	57	102	170	65	10	228	190	6	**1371**
Total	**58**	**392**	**150**	**33**	**183**	**356**	**339**	**97**	**51**	**249**	**205**	**20**	**2142**

Pollution of wells in the study area

Among the households 488 encountered polluted wells in their surroundings. Higher incidence is found in ward 5 (262) and ward 2 (106). No polluted wells were reported from ward 9 and 12. Survey numbers of 61 polluted wells are obtained through the survey. Details in table 2.24

Table 2.24
Households reporting pollution of wells MDW survey 1999 - ward-wise

Ward no.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
No.of households reported pollution of wells	18	106	18	5	262	23	43	1	0	1	11	0

Due to constraints of time and resources no detailed investigation of wells reported polluted were conducted and hence no clear distinction between contamination and pollution are obtained.

In ward 1 there is an area of 10 to 15 acres where the water from wells are saline in taste and cannot be used even for washing of utensils. In ward 2, where paddy fields are extensive it is reported that taste of water from wells turn salty when chemical fertilizers are used in the paddy fields.

Though no documents are obtained it was reported that high fluoride content was detected in water from some of the tube wells dug under Rajiev Gandhi Drinking Water Mission. These wells were abandoned later. But the fact that there are children in the area with mottling of teeth seen call for a detailed study on flourish in the area. Chances of fluoride content being high is said to be more in ground water. In Muthalamada recently there is a increase in the usage of ground water for drinking purposes.

Among households with own wells 117 have reported polluted wells. A ward wise distribution of these households are as follows (Table 2.25)

Table 2.25
Number of wells polluted MDW Survey 1999 - ward-wise

Ward No.	1	2	3	4	5	6	7	8	9	10	11	12	Total
No. of wells polluted	1	23	2	1	74	9	5	0	0	1	1	0	**117**

Public water facilities at Muthalamada (1 to 12 wards)

In Muthalamada panchayath creation of public assets to tackle the drinking water problem started in the early sixties itself. First public well was inaugurated on 8/6/1960 at Chammanampathy area. In the earlier periods public wells were the only mode of public water source for rural areas. Later, programmes with a mission approach changed the strategies by constructing tube wells with hand pumps, and recently, tube wells with motor pumps and distribution networks were introduced. So far in Muthalamada (1-12 wards) there are 69 open public wells, 37 tube wells of which 3 are connected by motor pumps and the remaining ones by hand pumps. A ward wise distribution of these facilities are as follows (Table 2.26)

Table 2.26
Public water facilities at Muthalamada - 1 to 12 wards

Types of public assets	***Ward Numbers***												***Total***
	1	***2***	***3***	***4***	***5***	***6***	***7***	***8***	***9***	***10***	***11***	***12***	
Open wells	7	4	6	8	7	7	3	4	5	5	7	6	**69**
Tube wells	1	0	0	2	3	5	3	1	1	2	9	6	**33**
Tube wells with motor pumps	0	1	0	0	0	1	0	0	0	0	0	1	**3**
Total	***8***	***5***	***6***	***10***	***11***	***12***	***6***	***5***	***6***	***7***	***16***	***12***	***105***

Ward 4 has the maximum no of open wells but ward 11 have a total of 16 public water assets.

In connection with 3 motor pump connected tube well there are around 100 public taps. Information on wardwise distribution of these taps are not available.

Institutions related to drinking water facilities in the area

In 1-12 wards of Muthalamada open wells are the main source of drinking water. Most of the wells are under private household ownership and are constructed by local, self trained workers. So construction of household wells are regulated by local factors like economic status of households, labour charges, and manpower availability. 55% of households are financially incapable of digging their own well. So construction of more public facilities has to be the most effective future mode of intervention.

Institutional agencies involved in public assets creation are mainly Local Panchayath Board (LPB) and Kerala Water Authority (KWA) . Other Govt. agencies like Ground water Department (GWD) Kerala State Electricity Board (KSEB) Irrigation Department, Fisheries Department, Tribal welfare Department etc. are also indirectly involved in connection with drinking water facilities in the area. Recently after the decentralistion efforts by the State Government LPB is directly

involved in budgetary allocation, site identifications, implementation and maintenance of drinking water projects. But with no institutional set up available, LPB is entrusting the implementation and maintenance of public water projects to KWA.There are several problems encountered with all these institutions in the area. Delay in implementation of projects sanctioned, identifying unsuitable locations, irregularity in pumping of water, poor maintenance of facilities etc. are the most common problems. All these are often explained away by lack of either sufficient staff or funds for KWA. Neither people who are the consumers, nor local panchayaths have control over these any of the issues of inefficiency. For example, Kollengode block drinking water project which is under construction by KWA and is sponsored by LIC, is delayed by 10 years. Interdepartmental disputes regarding getting consent to pump water from the Meenkara reservoir which is under irrigation department seems to be the main factor for delay. Apart from the delay in implementation of this 1 crore project by KWA, whether this water supply scheme will improve the accessibility to drinking water for those who are most needy in the Muthalamada area is doubtful because the service area of this project lies within 1 Km on both sides of the (Kollengode - Govindapuram) main road where most of the households have their own sources of water.

Another example of institutional inefficiency is the drinking water scheme in Meenkara colony which is constructed by Fisheries Department where 30 SC families are settled. Housing construction with all plumbing works which was done 4 years ago do not yet have the electricity connection from KSEB for pumping the water from the well. There is another fisheries colony in ward 7 facing the similar predicament. Most agonising experience is met by people of Ambedkar SC colony where more than 300 households have to depend on 3 or 4 public bore wells. At any point of time two or three tube wells remain damaged and its repair is always delayed. Thus all of them have to depend on one or two.

Chapter - 3
Discussion and analysis

If one goes by the norms set by Govt of India for assessing drinking water problems in rural areas there is no drinking water problem at Muthalamada. There

are either private or public water sources within every 1.6km in the plains and there are tube wells or public taps for every 250 people in the area. But not having one's own source of water or having to travel some distance daily to collect water in certain areas by certain sections of people is a disadvantage to that section of people. This comparative disadvantage to some sections is detrimental to their health and well being. Thus from a point of view of quality of life there exist drinking water problems in Muthalamada. This problem of inequality in access to drinking water may be in the form of some households in certain areas having no source of water of one's own and having to walk some distance daily, or certain social sections having lesser facilities than others thus bearing more burden in collecting water. These problems in access to water seem related to the socio economic condition of the people in the area and to inadequacy and inefficiency of institutions involved in drinking water supply in the area, rather than water scarcity in the area.

Muthalamada 1-12 wards is an area blessed by nature with an annual rainfall of 1970 mm with natural water reservoirs like river, streams, springs and 202 ponds. Its rich forest borders and gently undulating terrain with hillocks are suited for water conservation and water harvesting by natural measures and distribution by gravitation methods. 90% of the area is with in five meter depth to water table (as measured in January 1999) Thus scarcity of water in the area cannot be a problem for drinking water.

The assets created for drinking water in the area like wells seem much below the average for Kerala. A comparison of data from NSSO 1988 data for rural Keala and present study shows (Table 3.1) that achievements of Muthalamada for an average rural village in Kerala is much below.

Table 3.1
Comparison of percentage of households using different sources

	Tap Water	***Tube Well***	***Hand Pump***	***Pucca Well***	***Ponds and tanks reserved for drinking***	***Canals river springs***	***Others***
Kerala 1983 (NSSO 1988)	8.71	0.56	0.56	81.77	6.71	1.90	0.99

Muthalamada (Present study 1999)	0.56	7.7	8.61	78.50	2.36	1.54	0

Note:
Households using pucca well for Muthalamada is taken as households using own well + neighbour's well + Panchayath well from the present study (Table 2.14)
Users of canals, river and springs in muthalamada may be include in 'other sources' of the present study (Table 2.14)

In Kerala there is one well for every seven persons (A.K. Varma 1997). No. of households per well in Muthalamada estimated from the present study is as follows.

Table 3.2
Households per well in Muthalamada - ward-wise

Ward No.	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*Total*
No. of HH with own wells	173	132	69	172	85	158	44	192	85	194	45	77	1426
No. of HH Surveyed	540	406	320	425	329	524	329	483	259	569	256	383	4882
No. of HHs per well	3.12	3.07	4.63	2.76	3.87	3.31	7.49	2.51	3.04	2.93	5.68	4.97	3.5

If an average of 6 members are expected for a household rate of well for population in Muthalamada will be one well per 21.3 persons which is much higher than the Kerala average.

The problem of inequality in access to safe water at Muthalamada can be considered as spatial, physical and social inequalities. There are households with difficulties in accessing to safe water in certain localities of the area. This is considered as spatial inequality. There are certain number of households in all wards in the area whose deprivation of physical resources like land or money make them bear more burden in collecting drinking water compared to others is taken as physical inequality. Social inequality are disadvantages arising from social norms for one section of people in relation to other. In Muthalamada more scheduled caste (SC) and scheduled tribe (ST) people are affected by difficulties of access to safewater than the general population. And women bear more burden in collecting

drinking water than men in all wards of the area. These distinctions of spatial , physical and social inequalities with some overlapping are important in adopting strategies for ensuring equity in access to safe water in the area.

Access to water - spatial inequalities in the area

Equity in access to safewater is only ensured at least by having a domestic source of water. So areas with more number of households not having a domestic water source is an indicator of spatial inequality in access to safe water. In the present study information on domestic sources of water is available only on ward basis. Therefore spatial inequality is reported on ward level. To get an idea of the intensity of the problem, number of households travelling more than 50 metres in each ward is also considered.

A wardwise distribution of percentage of households not having own sources of water and percentage of households travelling more than 50 m daily for collection of drinking water are given below : (Table 3.3)

In ward 7 and 11, more than 80% of households are not having own source of water. Ward 7 and 11 are the only wards where more than 50 % of households are travelling more than 50 m daily for collecting drinking water. Ward 7 and 11 also have the highest percentage of wells drying up in summer. Ward 7 has highest percentage of ST population in the area and ward 11 has the highest percentage of SC households. Financial incapacity as a factor for not having own water source is reported highest in ward 7 and landlessness is found high in ward 11. There are some geographical characteristics peculiar to these areas also. Land form of 50% of the area of ward 7 is gentle to high slope, and 42% which is valley type is immersed under Chulliyar reservoir. Remaining 8% of the total area is ridge crest area. In ward 11, land form of 80% of the total area is mild to high slope and 20% is ridge crest, with no valley or plains. Meenkara reservoir is situated here. The degree of land degradation is severe in these wards which may be triggered by the earth work done for construction of dams and canals and the resultant deforestation. All these might have made the area unattractive for the economically

well off households to settle thus slowing these private investments in construction of drinking water facilities in the area compared to other parts.

Table 3.3
Households with no own source and travelling more than 50m- ward-wise

Ward No.	*Total HH*	*No. of households Own source*	*No source*	*Households traveling more than 50 m*
1	539	174	365	250
2	406	133	273	252
3	311	69	242	175
4	425	177	248	200
5	329	86	243	124
6	524	159	365	322
7	379	56	323	313
8	483	192	291	194
9	259	87	172	115
10	559	198	361	21
11	236	48	188	205
12	383	84	299	89
Total	***4882***	***1462***	***3420***	***2160***

A ward wise distribution of the percentage of households not having own source of water and percentage of households traveling 50m daily for collection of drinking water is given below : -

Table 3.4
Percentage of households traveling more than 50m - ward-wise

Ward No.	*% of households with out own source*	*% of households traveling more than 50 metres*
1	66.97	46.38
2	67.24	62.06
3	78.12	86.27
4	57.88	47.05
5	73.86	37.68
6	69.27	61.45
7	81.70	82.58

8	70.25	40.16
9	65.25	44.40
10	64.04	3.75
11	80.93	86.86
12	77.54	23.23
Total	***69.99***	***44.24***

It may be a coincidence that drinking water problem is severely felt in wards where largest number of ST and SC people have settled and they are also areas where two water reservoirs which were constructed 30 yrs ago are situated. But this shows that spatial inequalities in the area are only a manifestation of the underlying physical and social inequalities. It also tells a story of organisational inadequacies of a people in utilising the resources available for achieving higher degrees of equity and well being.

Physical inequalities in the area

Though there are regional variations in inequality in access to safe water, in all areas of the panchayat (1 to 12 wards) there is an average of 70% households with no own source and 44% of households traveling more than 50m daily to collect water. The present study reveals that factor responsible for it is economic incapability of the households. Other factors are lack of own land and water scarcity even if own land is available. These are also factors directly related to economic deprivation. Considering all these factors together, deprivation of physical resources seems a major factor for inequality in access to safe water in the area. A ward wise distribution of percentage of households affected with each of these factors is as follows (Table 3.5)

Table 3.5
Percentage of households with physical resource deprivation-ward-wise

Ward No.	*No. of HH with out*	*Total responded*	*No. of households reponded as Physical*	*Total*	*%*

	own well	*households*	*resource deprivation*				
			No land	*water scarce*	*No finance*		
a	*b*	*c*	*d*	*e*	*f*	*g*	*h = g/c%*
1	361	332	35	149	64	248	74.69
2	274	272	9	96	157	262	96.32
3	250	276	22	38	119	179	64.85
4	246	217	61	105	36	202	93.08
5	243	230	1	55	126	182	79.13
6	363	346	173	82	86	341	98.55
7	326	290	36	49	189	274	94.48
8	291	251	19	4	178	201	80.07
9	169	32	4	8	12	24	75.00
10	358	335	25	38	138	201	60.00
11	191	187	108	44	34	186	99.46
12	297	153	8	15	8	31	20.26
Total	*3389*	*2930*	*501*	*653*	*1147*	*2301*	*78.53*

Social Inequalities in the area

Social discriminations existing in several forms which give rise to social inequalities have historical roots. In India 50 years of attempts to remedy them are still not successful. This is reflected in Muthalamada also with regard to access to drinking water in two ways - a) more schedule caste and schedule tribe households suffer the drudgeries of daily collection of drinking water from distant places compared to general population and b) women members bear the burden of carrying drinking water than men.

An analysis of the sources of drinking water by the Muthalamada Drinking Water Survey 1999 shows that only 13.32 % of SC and 0.29% of ST households have own water sources while 30% households in the general populations have their own water sources (Table 3.6)

Table 3.6
Households without own water source - social section-wise

Social Sections	***No. of Households surveyed a***	***No. of Households with own source b***	***% of Households with own source b/a***

Gen. population	4882	1462	30
SC	767	106	13.82
ST	342	10	0.29

Among the households traveling more than 200 metres daily for collecting water, 11.77% of household of general population are traveling more than 200 m daily, while among SC and ST it is 13.16 % and 28.94% respectively (Table 3.7).

Table 3.7
Households traveling 200 m for water - social section-wise

Social Sections	***No. of Households surveyed a***	***No. of Households traveling more than 200 m b***	***% of Households traveling more than 200 m b/a***
Gen. population	4882	570	11.77
SC	767	101	13.16
ST	342	99	28.94

Deprivation of physical sources like own land, finance etc are also found more among SC and ST households than among the general population (Table 3.8).

Table 3.8
Households with physical resource deprivation - social section-wise

Social Sections	***No. of Households surveyed a***	***No. of Households no land or finance b***	***% of Households no land or finance b/a x 100***
Gen. population	4882	2301	47.52
SC	767	483	62.97

ST	342	227	66.37

As social sections deprived of own sources, more SC and ST house holds depend on public facilities for drinking water. Considering the fact that public facilities are inefficient by several means, these sections are further burdened.

Table 3.9
Households depending on
public water facilities - social section-wise

Social Sections	*No. of Households surveyed* *a*	*No. of Households depending on public facilities* *b*	*% of Households depending on public facilities b/a x 100*
Gen. population	4882	1309	27.02
SC	767	270	35.20
ST	342	297	86.84

Gender inequalities in the area

Gender inequalities in daily collection of drinking water is revealed in MGHSS survey (Table 3.10).

Table 3.10
Member of the household responsible for
collection of drinking water

Total No. of HH with no own	*Member of the household responsible for collection of drinking water*						
source of water	*Mother*	*Father*	*Brother*	*Sister members*	*Other together*	*All*	*Helpers*
542	167	0	26	118	2	229	0
%	30.81	0	4.79	21.77	0.36	42.25	0

In 30.81 % of the households, mothers go for collection of water and in 21.77%, sisters do the work. The highest class in the table ('All together') is a mixture of gender and thus gender bias in the job of collecting drinking water in households is obvious.

Institutional problems in the area

Private household well being the major source of drinking water in the area, internal market should be the principal institution deciding the nature of drinking water facilities in the area. But with no chances of any rapid economic improvement of the households, any rapid growth of construction of drinking water facilities by private households cannot be expected. Improvement in private household income in the area by global forces is also not imminent. But in Muthalamada wards 1-12 is an area selected by World Bank for their rural water supply schemes in Kerala. This scheme proposes to operate through water co-operatives formed by neighbourhood groups. But the extent of empowerment offered by World Bank project for these water cooperatives is not yet clear. If sufficient, the future role of these few hundred water co-operatives may become the most influential institutional setup for drinking water facilities in the area.

With the intensification of the decentralisation process, Local Panchayat Board (LPB) is becoming the centre of decision with regard to public water facilities in the area. For the year 1999 - 2000, it sanctioned six drinking water projects in the area.

Site selection of these projects were not based on any priority based on facts, but by empirical insights of influential board members. The technology opted for by most of these projects are piped water, and thus all the existing inefficiencies of operation and maintenance of pipe lines may also affect it. Digging of well opted for Chukkanpathy project may not be suited to the degraded hilly terrain of that site, and water may not be obtained regularly. But apart from sanctioning of new facilities or extension of existing ones, LPB has not recognised the role of improving the utilisation of existing facilities by effectively intervening in the operation and maintenance services of existing facilities. This can be made more clear by looking into the present utilisation of public facilities in the area. Though the current utilisation is far below the expected level (250 people per public tap/ public post), it is much more than the private household source. At the present rate, 1462 private sources (own well+ pond) are used by 1462 households + 1922 (neighbours well + pond) = 3314 households. ie, one private source is being used by 2.4 households in the area. But one public well is used by an average of 8 households (varying from 20 households in ward 3 & 7, to 2 households each in wards 11 and 12) and one tube well is used by an average of

14 households and one public tap by 3.43 households. Thus in an area where improvement of private investments in the creation of drinking water facilities by households is not expected, the most cost effective method of intervention would be creation of more public facilities. The current underutilization of public facilities in the area, seems to be due to failure in operation and maintenance of the facilities. At present, LPB have neither institutional framework nor any conception about impending issues of inefficiency in operation and maintenance of public facilities owned by it, but simply depend up on KWA for every thing. Santhakumar (1998)(1) argues that institutional inefficiency of KWA arises from its autonomous characterisation of piped water as the only safe water for supply and from its urban bias in the choice of institutional framework for the provision of safe water. With its regional office located at 15 km away in Chittoor it has only few field staff to look after the public water facilities in the 72 sq. km area of Muthalamada. Its new strategy to train local volunteers seems insufficient in numbers and vague with regard to norms of payment of expenses for maintenance. LPB at its 3rd year of Peoples Planning Campaign has not given any thoughts to new institutional setup to realise the drinking water projects sanctioned by it and to new responsibilities entrusted to it by the Kerala Panchayat Raj Act 1994 to implement renovation of ponds and water conservancy measures, repair of wells and tube wells, digging of new wells, drilling of tube wells construction of overhead tanks, extension of existing lands and small schemes and operation and maintenance work of all water supply schemes (Kerala Economic Review 1998)(2) to provide drinking water for all by 2000 AD.

Towards a People's plan for drinking water : Willingness for neighbourhood based water co-operatives

The problem of inequality in access to drinking water in Muthalamada can only be solved by ensuring equity in access to water. Equity can only be achieved by having atleast one tap that would provide 100 litres per head per day for each household. With the present rate of percapita cost (Rs. 1500 to 2000 for providing water supply in rural areas of Kerala (estimated by Govt. of Kerala - Economic Review 1998)(3) it would require 5 to 7 crores of rupees to provide domestic connection to an estimated number of 5600 (70% of 8000) households(4) having

no own source of water in Muthalamada. At the present rate of growth of private investments by households and public expenditure in the area for drinking water supply, it may take 50 years to achieve the level of equity of at least one tap per house for all households. Thus an alternative plan has to be thought of.

As the chances of private investments or investments by private agencies for creation of drinking water facilities are limited, public intervention is the only viable option. In the context of ongoing peoples planning process, the decision making is being decentralised and peoples initiatives for alternate decentralised projects have to be built up. But the present study shows that spirit for co-operation in setting up neighbourhood based water co-operatives is not very promising in many wards of the Panchayat. In the present study, out of 3380 households not having own source of water, only 2377 (66%) households responded to the question about the willingness to participate in a neighbourhood based people's water co-operative project (Table 2.21). This shows that of the total respondent only 59% have express their willingness. If the willingness of actual number of households with no own source is estimated willingness is only 42%(5). Most puzzling finding of the present study is that only 3% of households in ward 1 and 15% in ward 5 expressed their willingness to participate. May be they are more comfortable with their traditional mode of using neighbour's well than going for a formalised water co-operative. Chances for internal mobilisation of financial resources seems meagre as response to willingness to pay an initial capital is also low (Table 2.22). Out of 2123 households 1720 (70.6%) households expressed their financial incapacity to pay. Only 393 (18.5%) out of 2123 are ready to pay upto Rs. 1000. Table 2.23 shows that only 30.01% of households are ready to pay a monthly user fee of Rs. 20. 64% of respondents (1371 out of 2142 respondents) explicitly stated that they were financially incapable to pay. Again in ward 1 and 5, responses for user fee are poor. But in wards 7 and 11 where accessibility to water is more difficult positive responses for a co-operative venture are high.

The information obtained so far intuitively show that in an 75 sq km. area with about 8000 households and natural water sources scattered unevenly only a decentralised water supply schemes will be cost effective. Without further verification of this hypothesis, a rough sketch of possible drinking water zones with geographical advantages and disadvantages in the area is given below. What is expected with these geographical zone formation is that details of a

decentralised plant can be prepared later based on these zone-wise information available. This out line is prepared on another set of assumptions - that practices of collection of drinking water is most often determined by presence of roads, streams, hillocks in the nearby area. So taking main roads, streams and steep slopes as boundaries the study area is divided into 56 drinking water zones. In each zone, geographical advantages and disadvantages are estimated by a scoring system based on (1) presence or absence of natural ponds, (2) percentage of zone area with water table depth less than 5 m and (3) whether slope is present or not. This scoring system followed is given in table 3.11. A map of drinking water zones based on this geographical advantage or disadvantage is given. Score of each zone is given in the table (Table 3.12).

Table 3.11
Scoring system for geographical factors in drinking water zones in Muthalamada area 1-12 wards

Geographical factors considered	***Criteria & Score***		
1. Availability of water source (natural ponds)	No water source 1	one pond available 2	more than one pond 3
2. Area with depth to water table < 5 m.	only < 30% 1	30 to 60% 2	> 60% 3
3. Presence of Slope area	no slope area present 1	moderate slope present 2	Steep slope or Ridge crest present 3

A zone with score 3 or 4 can be considered geographically disadvantages zone for installing decentralised schemes and zone with score 5 to 7 can be considered moderately advantages zone, A zone with score 8-9 can be considered highly advantageous. Average area of each zone may be around 300 acres. Survey numbers included in each zone is given in appendix 7. If social factors like number of households with no own water source, settlement pattern, their willingness to pay etc. are also added by further studies, priority of interventions, financial requirements, cost-benefit ratio etc. can be fixed on zone basis. This will help local panchayat board for a factual decision for improving equity in access to drinking water in the area

As per table 3-2, there are 18 zones which are highly advantageous (with score 8-9) and 36 moderately advantageous zones (with score 5-7) and there are only two disadvantageous zones (with score 3-4).

As new ward divisions are going on in the panchayath drinking water zones are not related to present ward boundaries.

Table 3.12
Geographical advantage score for the proposed drinking water zones in Muthalamada 1-12 wards

DWZ No.	*Geographical Score based on Geographical factors*				*DWZ No.*	*Geographical Score based on Geographical factors*			
	water source	*water table*	*Slope area*	*Total score*		*water source*	*water table*	*Slope area*	*Total score*
dw1	3	1	2	6	dw29	2	3	3	8
dw2	2	2	2	6	dw30	3	2	3	8
dw3	2	2	2	6	dw31	1	2	3	6
dw4	3	3	2	8	dw32	3	3	3	9
dw5	3	3	2	8	dw33	3	2	1	6
dw6	3	3	3	9	dw34	3	3	3	9
dw7	3	3	2	8	dw35	3	3	2	8
dw8	3	3	1	7	dw36	1	3	3	7
dw9	3	2	3	8	dw37	2	2	3	7
dw10	3	2	1	6	dw38	3	2	3	8
dw11	3	3	3	9	dw39	2	1	2	5
dw12	2	1	3	6	dw40	2	2	3	7
dw13	3	3	2	8	dw41	1	2	3	6
dw14	1	2	2	5	dw42	3	2	3	8
dw15	3	3	1	7	dw43	3	2	1	6
dw16	1	3	3	7	dw44	3	2	3	8
dw17	2	3	2	7	dw45	3	1	3	7
dw18	3	3	2	8	dw46	2	2	3	7
dw19	2	2	3	7	dw47	3	1	3	7
dw20	3	3	1	7	dw48	2	3	3	8
dw21	2	3	3	8	dw49	2	1	3	6
dw22	3	2	3	8	dw50	3	3	1	7
dw23	2	3	2	7	dw51	1	3	1	5
dw24	3	3	1	7	dw52	1	1	2	4
dw25	2	3	2	7	dw53	3	1	1	5
dw26	1	1	3	5	dw54	1	1	2	4
dw27	1	2	3	6	dw55	1	1	3	5
dw28	2	3	2	7	dw56	2	2	2	6

Chapter - 4
Conclusions and Recommendations

Conclusions

Muthalamada 1 - 12 wards is an area blessed by nature with an annual rainfall of 1970 mm and with natural water reservoirs like streams, river, springs and 206 ponds. With forest cover at its two boarders (South and West) and its gently undulating terrain with hillocks the area is highly suited for water conservation by natural means, water harvesting by traditional methods, and distribution by gravitation methods. 90% of area is within 5 m depth to water table (as measured in Jan 1999). Considering the two man made reservoirs also - Chulliyar and Meenkara - water scarcity should not be a problem in Muthalamada area.

Extensive land degradation and soil erosion and the evidences of drying up of perennial streams in parts of ward 5,7,11 and 12 show that the sustainabiltiy of existing natural water sources of the area is under threat. Invasion of public sources of water- streams, springs, ponds etc is also increasing via changes in the agricultural practices, in ownership pattern of lands and cultural backgrounds of new owners.

The extent of the problem as identified by the present study in the area is that 70% households in the area do not have own source of safe water and 41% of households have to walk more than 50m to collect water. A locational variation in intensity of these problems is also observed. Ward 7 and 11 seem most affected by these problems - 80% of households in these wards do not have own water sources and 80% of households in these wards have to travel more than 50 m every day to collect drinking water.

In the whole area, households with economic deprivation or landless households with small land holdings have more difficulties - they have no own source and have to walk some distance to collect water. Thus deprivation of physical resources (land and finance) seems a crucial factor leading to inequality in access to drinking water.

Households belonging to social sections like SC and ST are also more affected - lacking own sources and having to travel more than 50 m for water - than the general population. Women members in all wards have to bear the burden of collecting drinking water compared to men. Thus there are social factors (caste and gender inequalities) contributing to inequality in access to drinking water in the area.

The inequalities in access to drinking water in Muthalamada could thus be considered as spatial, physical and social. Any strategies for intervention have to address these issues comprehensively.

Among the existing wells 351 wells (24.61%) are drying during summer which is actually 5 times the number of panchayat wells available in the area. Significant number of wells also remain polluted. Both conditions need detailed investigations for corrective intervention.

The drinking water problems at Muthalamada seem related to poor socio economic conditions of the households. The assets created by private households for drinking water in the area seems less than average for rural Kerala. Efforts of 50 years of public intervention in creating drinking water facilities in this area has also not solved the problem. Assets created by such interventions - 69 public wells, 33 tube wells and around 100 public taps - caters only to 27.02% of the households. Greater percentage of households (38%) depend on neighbour's wells than public facilities. The poor operation and maintenance of these facilities seems to be the central factor for under utilisation of these limited public facilities. The existing public facilities can never be sufficient for ensuring equity in access to drinking water in the area. The inefficiency and inadequacy of existing public water

facilities do not seem to be addressed comprehensively by the ongoing peoples planning process as the local panchayat board has not yet properly identified the drinking water problems in the area and is simply depending on Kerala Water Authority for implementing drinking water projects sanctioned by peoples planning. KWA is known for its inefficiency in rural water supply services by its orientation for centralised piped water supply, poor operation and maintenance services and less experience in decentralised schemes suited to rural areas.

An analysis of the responses for willingness for a neighbourhood-based water co-operatives during the present study show conflicting results. The fact that willingness for participation is high in wards (ward 7 and 11) where difficulties in access to drinking water are more, provide a clue for public interventions by neighbourhood based approach. The factors of inhibition for a co-operative approach in wards 1,4,5 etc have to be studied further.

Negative responses to questions about willingness to pay towards initial capital for water co-opertives show that internal mobilisation of capital for new drinking water projects would be difficult. But a monthly user fee up to Rs. 20 per month can be expected from majority of the households.

In Muthalamada, an area where natural water resources are plenty and private financial resources to create water harvesting facilities are scarce public support with a vision committed to equity can only solve inequalities in access to drinking water.

Recommendations

For Muthalamada, an area blessed by nature with an annual rainfall of 1970 mm in two showers and undulating terrain with streams and river and with plenty of natural water reservoirs (ponds) and two man made reservoirs the prime step for water harvesting should be to conserve water in its land so that water obtained through rain twice a year is retained through out the year in the land. For this, considering the extensive land degradation which took place with in last 50 years in the area, attitudinal changes of people is more important than the requirement of the financial resources. With out this attitudinal change towards sustaining the water resources by conservation measures investment of finance either by public or private sources in more efficient water harvesting methods will be less rewarding. So it could be an imperative that all water harvesting projects implemented in the area - from digging of well in a household to implementing scheme for 300 households - should have a land - water conservation component.

In Muthalamada inspite of irrigation canals and systems created by public investments large quantity of water has been pumped for irrigation either from surface water sources or ground water resources by private farmers. A rough estimate shows that their are one 10 HP motor pump for every 100 acres land in the area. Most of these water are potable or can be purified by simple measures. The Muthalamada Panchayath Board should release an open appeal to the owners of these pumps to allow at least 1% of water they pump daily to be used by neighboring households for drinking water if they required. The board can also be ready to bear the cost for a storage tank and some minimal distribution net work in each area that should ensure the equity in access to households. The understanding principle for this act by the facilitator (LPB) the provider (Private well owners) and the users (Neighboring households) need not be the idea of the charity but that water one pumps out is never a private one but a common property that can be claimed even by future living beings.

The 202 ponds in the area are natural reservoirs for collection and conservation of water. At present most of these natural assets are under private ownership. Legislation should be there to keep the natural status of these ponds as water conserving zones and destruction by any means should be prevented. LPB should initiate these awareness rising action required for legislative action.

The above three ideas of attitudinal change and policy formulation involve less money but more human effort and time. The other possible remedial measures recommended below involves more money and organisational effort but in planning all have to be considered simultaneously.

Upgradation of existing facilities can bring immediate results with less cost than implementation of new schemes. Improvement of seasonal wells and polluted wells may be considered first. But for this a detailed study of each of these wells have to be conducted.

The existing public wells with enough water for pumping can be upgraded by installing a motor and water stored in a near by ground level tank with a tap. By this utilisation of well may be improved and burden of women drawing water can be relieved.

The existing borewells with pumps and distribution line may be upgraded by constructing ground level tanks at different places. But this would take more time as acquisition of land is involved. Still cost-benefit would be more. As a beginning this idea can be taken up as an experiment in ward six where there is an already existing motor pump attached tube well with pipe line and where more households have expressed willingness to contribute to water cooperatives if it ensures household connection. This could be an experiment on neighbor hood based approach if the project is formulated systematically and comprehensively to cover all house holds in ward 6. As it is the economic, political and cultural centre of the panchayath success of neighbourhood based approach here would encourage similar action in other wards also. But the plan of the proposed Kollengode - Meenkara pipeline has also to be consulted before planning for ward 6 as this project may cover lot of area in ward 6

Further suggestions to ensure equity in access to drinking water for all in the 1 to 12 wards can be made only after a detailed survey. The survey should provide an information of households on survey number basis, settlement pattern, their drinking water status, possible neighbor hood clusters, technical feasibility of

nearest water sources and cost of distribution network, identification of individuals suited to training for operation and maintenance, organisational setup for collection of user fee and maintenance works etc.

For this LPB can identify one non governmental organisation (NGO) to each ward capable of organising neighbor hood groups (NHG) of 25- 50 house holds within three months of time. An amount of Rs. 3000/- per month for three months can be allotted to each organisation for this activity. Total amount required will come to Rs. 3000 x 3 months x 13 organisations = Rs. 1,17,000/-. In a memorandum of agreement the tasks of NGO's for organising NHGs should be specified, for example, formation of NHGs, identification of drinking water status in NHG's, status of water inventories in the area etc. Guide lines for bylaws of NHGs should be provided. Completion of registration of NHGs involving all house holds in the area can be the indicator of successful completion of the work. The money can be released in three equal installments - immediately after the appointment of the NGOs, after one and half months and immediately after the completion of the work. One LPB member should take up the responsibilities to coordinate all these NGOs.

LPB can insist on a policy that all its expenditures of drinking water can be through NHGs. As an incentive to active groups five NHGs registered first in each ward can be provided Rs. 1000/- for maintaining the organisational activities for completion of certain specified tasks, say within six months ie, from the date of registration of organisation to identification and acquisition of site of water sources and water tanks and completion of collection of one third of contribution towards the initial capital by each household. Final outcome of these tasks by NHGs should be a plan for drinking water supply to the NHG area with due consideration for equity for vulnerable households and sustainability of water resources. For these, total amount required will come up to Rs. 1000/- x 6 months x 5 NHGs x 13 wards = 3,90,000/-. If an amount of traveling expense of Rs. 2000/- for the coordinating activities by the panchayath member for 9 months (Rs. 18,000/-) are also considered the total amount required will be Rs. 5,25,000/-. Once a facilitator role of local governments are accepted this amount can be included in the budget allotted for drinking water projects. A level of this amount for each year should be visualised for five years under budgetary allocation for drinking water purposes.

and can be spend through the same network but activities targeted and organisations supported can be changed yearly. Priorities can be fixed by refinement of the scoring system proposed for drinking water zones as in chapter 3 above.

If a time schedule is required for the Local Panchayath Board (LPB) activities it may be as follows.

I. Activities to be completed within one year.

1. Decision by LPB to promote NHG based approach to provide drinking water for all house holds in the area.

2. Entrusting an LPB member to coordinate activities like identification of NGOs, formation of NHGs and further activities of implementation of NHG plans.

3. Policy decision to appeal to all motor pump owners pumping water for irrigation to allot 1% of water pumped out for use of neighboring house holds for drinking water if required.

4. Policy decision for preparing a plan and seeking funds (both national and international) for conservation of natural water sources and water soil conservation measures in the area. This can be linked with the proposed watershed plan preparation of block panchayath.

5. Initiation for legislation of conservation of natural ponds as water zones for drinking water purposes.

II. Activities that can be completed with in two years.

1. Upgradation of all possible existing facilities of water pumping in resonance with the plans prepared by the NHGs.

2. Financial and organisational support and making available of expertise for preparing plans by NHGs.

3. Consolidation of conservation measures in NHG plans and preparation of panchayath level plan for natural resources management.

III. Activities that can be completed with in five years.

1. Financial and organisational support for completion of all NHG plans.

2. Implementation and monitoring of plan for conservation of natural resources.

NOTES :

Chapter -1

(1) Page 152 :Govt. of Kerala (1998)
"Kerala Economic Review"
Govt. of Kerala, Trivandrum.

(2) Page 141 :Edwin Chadwick (1842)
"The sanitory conditions of the labouring
population of Great Britain"
EDWIN BURGH at the University Press, 1965.

(3) : CWRDM (1994)
"Resource inventory of Palakkad district"
(Unpublished report from CWRDM) Kozhikode.

Chapter 2

(1) The information for this estimate is prepared from several sources.

Average number of household per ward = $\frac{\text{Total 8000 households}}{}$

13 wards

= 605

(2) Quoted by : Santha Kumar .V (1998)
"Inefficiency and Institutional Issues in the provision of merit goods - A case study of public water supply in rural Kerala"
Working paper no. 285, Centre for Development Studies, Trivandrum.

(3) CWRDM (1994)
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Chapter 3

(1) Quoted by : Santha Kumar .V (1998)
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(2) Page 154 : Govt. of Kerala (1998)
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