EVALUATION OF HANDPUMP PROGRAMME IN KARNATAKA

(Sponsored by the Public Health Engineering Department of Rural Development and Panchayat Raj, Government of Karnataka and UNICEF)

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M. NAGESWARA RAO

C O N T E N T S

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CHAPTER I

INTRODUCTION

1.1 Water - A Source for survival

Air, water and food constitute a triplet of objects that are most essential for the survival of life on the planet earth. Human existence on this globe ends within three minutes without air, within three days without water and within thirty days without food. Thus, everything else comes next to this triplet, including "clothing and shelter".

Initially, air, water and food were made available free of cost as gifts of nature. Over the centuries, however, food became scarce, consequently human efforts were needed to produce and exchange in the general market framework. Subsequently, water too is becoming scarce, insufficient and unsafe for human consumption for various reasons, but, not yet competing with food. Time is not far away when air too may fall in the market mode of exchange, and lose the status of gift of nature. At this stage, it is important to note the inverse relationship between the duration of human survival without air, water and food and the degree of human efforts to consume them. This leads to highlight the basic point that humanity has to make some efforts, either collectively or individually to avail basic essential natural gifts for their own survival and welfare. Collective production assumed the nature of governmental activity in terms of

bearing the major responsibility for survival and welfare of the subjects in particular, and the society/community in general through proper utilisation of the said triplet of essentials.

1.2 Supply of Water - Public Intervention

As food had become a priced and marketable produce, safe water[1] has neither remained as a nature's gift nor a purely private product, it has now turned out to be a quasi-public good. This is so because, it is not that the present time requirement is any water, but safe and potable water free from contamination. To do so, to a large extent, it has become the responsibility of the governments to produce, collect, process and supply safe water for direct consumption to the majority of the community through budgetary resources under social welfare and infrastructure development investments. When public intervention is accepted, it becomes necessary to evaluate and examine to what extent the

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1. World Health Organization defines 'safe drinking water' as the "treated surface waters or untreated but uncontaminated water as from protected borewells, sanitary wells, springs and natural conserved impoundments excluding all other waters of doubtful quality". World Health Organization, Community Water Supply and Excreta Disposal in South East Asia (A Mid-Decade Review), WHO Regional Publications South-East Asia Series, No.4, WHO, New Delhi, 1977, p.2.

   In this study, 'safe drinking water' 'potable water' and 'suitable water for drinking' are used as synonyms, even though they technically differ.

public intervention has benefitted the set objectives of investments. While public investments on economic development programmes are quite easily be evaluated in terms of measurable parameters, investments on social welfare activities require quite different approach.

At this stage, a distinction has to be made between communities to whom this service is provided as quasi-public good.[2] As capital investment and recurring costs are involved in delivering the service to the consumers, it is natural that the government may recover such costs from them fully or partly and directly or indirectly, depending upon their economic capacity. While urban consumers, by virtue of their economic status are justified to pay for the service, the rural communities may be justified to avail it initially, as public service. If this theoretical postulate is accepted, the evaluation of water supply programme for rural communities is justified. Under these circumstances, one of the appropriate technologies to assess the benefits accrued to the community from social welfare programme is the concurrent evaluation of programmes in which the focus would be on the qualitative measurements through contacts with beneficiaries, their assessment, attitudes, perceptions towards the programmes. This study is directed towards this approach to evaluate the drinking water supply programme with reference to rural community.

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2. Nageswara Rao, M. "Rural Water Supply System: Some Observations", Kurukshetra, June 1989, p.4.

1.3 Need for an Evaluation Study of Water Supply Programme

Due to the increasing degree of public intervention, the capital investments under community drinking water supply programmes have also increased manifold for creating community assets. While the creation of community assets is one aspect of community welfare programme, equally important are the optimum, continuous and an uninterrupted utilisation of such assets by the community and prompt attention to maintenance and repairs by the public agency, so that the expected social benefits could be realised over time. The rural community water supply programme has a special and peculiar significance as compared to other social welfare programmes with individual and target oriented approach. The water supply programme has a continuous contact with and direct bearing on the community welfare through direct participation of almost all members of community in the use and operation of such asset. Under the circumstances, it is more important to assess and evaluate the programme starting from various stages of implementation to operation, maintenance, and repairs of the assets on one side, and on the other, the degree of community participation and their willingness to take responsibility for the proper use of such assets. Such evaluations would help in identifying the necessary mid-course corrections and undertake such corrective measures in the project concepts and mechanisms in order to fulfil the socio-economic objectives of the programme and improve the service system wherever necessary.

1.4. Objectives of the Study

Keeping in view the above aspects, this study is intended to make a comprehensive socio-economic and administrative analysis of the rural community water supply programme. The specific objectives of the study are:

1. To examine and evaluate the stages of implementation of the rural water supply programme; nature, distributional patterns, physical, functional, adequacy and qualitative status of safe water sources served to the rural community;

2. To examine and evaluate the installed but non-functional sources, nature of breakdowns and reasons thereof; the management and functioning of the present system of maintenance and repairs and the alternative systems of maintenance and repairs if any;

3. To examine the progressive development patterns in hygiene and sanitation due to the creation of safe water sources;

4. To examine and evaluate the progress of backup system in management of water supply assets; need and nature of imparting training, orientation and extension services to the community; degree of community and beneficiary satisfaction, perceptions and attitudes towards the new safe water sources; scope and feasibility and practicability of capital and maintenance costs recovery and transfer of maintenance system to the community; and

5. To suggest and recommend policy measures based on the findings of the study.

1.5 Approach of the Study:

The above listed objectives are examined in the context of rural water supply programme that is being implemented in Karnataka State. In the course of discussions on the present subject project proposal, it is specified that such an attempt should be directed towards a specific component of

the programme for a specific set of policy formulations - the specific component being the handpump programme, a major part of rural community water supply programme. It was also suggested that the objectives should reflect regional, social, cultural, climatic and economic variations within the state to facilitate to take appropriate policy measures to enhance social benefits further. For arriving at a reasonably precise results, the examination of the programme is tackled through two-fold approach: (a) direct participative observation and physical examination of the handpumps, and (b) recording the individual beneficiary's assessment, their level of satisfaction, attitudes and perceptions towards the programme, and to some extent, (c) recording collective assessments through community group discussions. This part of collective assessments have to be taken seriously, whether it is minority or majority view, since the programme is for the welfare of the community first, and individuals next.

1.6 Design of the Study

The study of this nature, for obvious reasons cannot be undertaken on census count at state level even though the programme implementation agency (viz., Public Health Engineering Department) has a wide network of men and materials throughout the state. It is sufficient to arrive at fairly good estimates through an appropriate statistical sampling design to suit to the given objectives. This study adopts a multi-stage stratified random sampling design to

arrive at the estimates of state as an aggregate, as well as by specific and well defined sub-groups within the state.

While there are a number of approaches to the use of multi-stage stratified random sampling designs, such technique has to be modified and adopted best suited to examine the given objectives. For this study, keeping in view the objectives, approaches and purposes, the state is divided into nine regions by taking into account the agro-climatic, social, regional, economic and political differences. The definitions of these nine regions are given in Table 1.1 and in the following Map. The divisions of these nine regions circumpass the administrative divisions upto taluk level. That is, a region may have whole or a part of a district. From each region, two taluks are selected at random. In each taluk, all revenue villages are classified into two groups - one with "only handpumps" and all the remaining villages as the second group. From the group of "handpump villages", revenue villages are selected at random (without replacement) till we got three villages of large, medium and small by population size. In each selected revenue village, all handpumps in all hamlets/habitations are enumerated on census basis and are taken into account for the study. Thus, at the state level, the sample consists of:

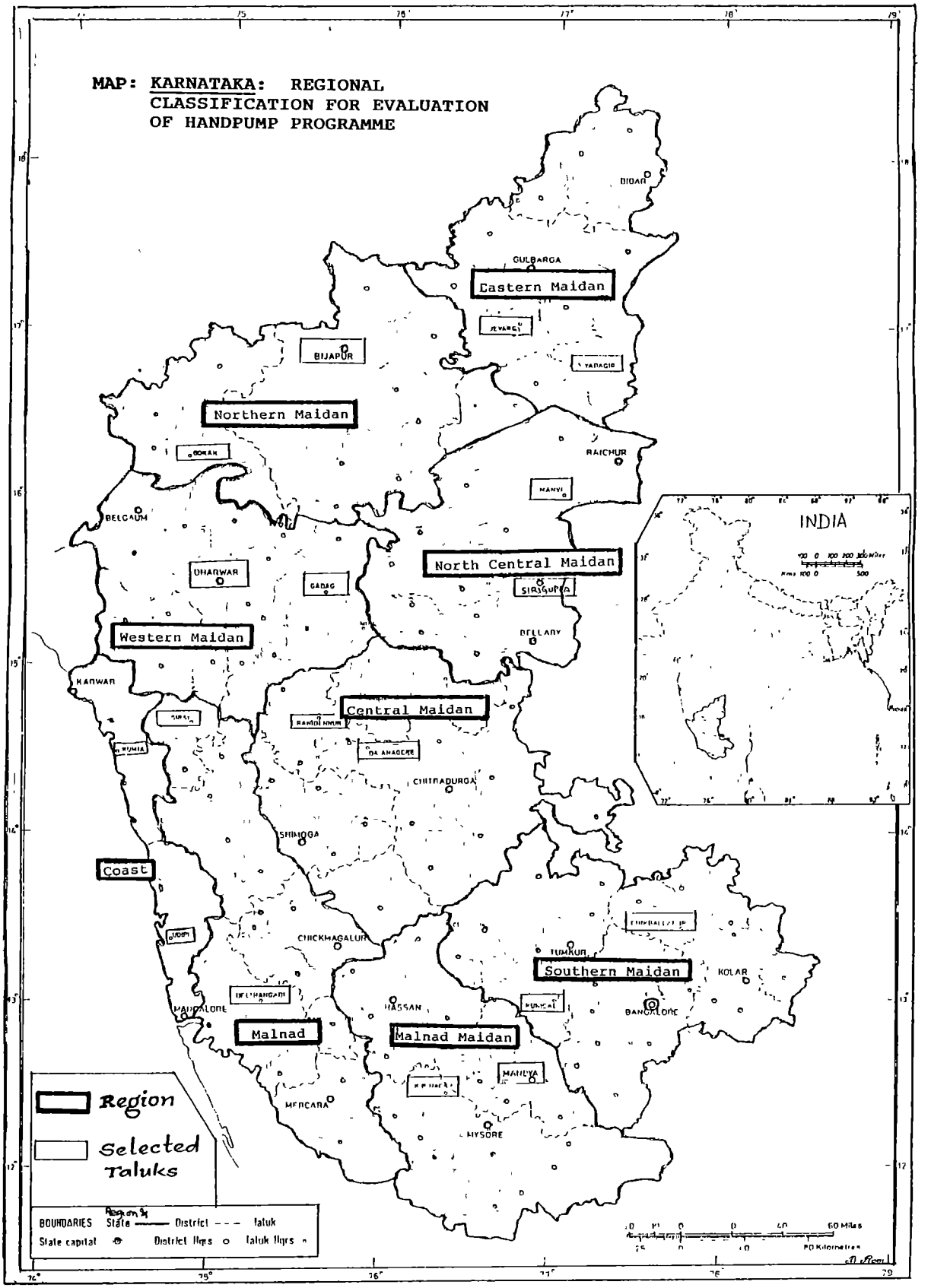
i) 9 regions,
ii) 18 taluks,
iii) 54 revenue villages,
iv) 167 rural habitations,
v) 341 installed handpumps, and
vi) 570 household respondents.

Table 1.1: Regional Classification and Selected Taluks

	Region	Selected Taluks	Characteristics
1.	Coast	Udipi, Kumta	Saline area
2.	Malnad Coast	Belthangadi, Sirsi	Hills and Forest
3.	Malnad Maidan	K.R.Nagar, Mandya	Partly irrigated
4.	Southern Maidan	Chikkaballapur, Kunigal	Arid and dry
5.	Central Maidan	Davanagere, Ranibennur	Endemic and dry
6.	North Central Maidan	Manvi, Siriguppa	Arid and Endemic
7.	Western Maidan	Gadag, Dharwad	Arid & Flouride
8.	Northern Maidan	Gokak & Bijapur	Semi arid and dry
9.	Eastern Maidan	Jewargi, Yadgiri	Cholera Endemic and Flouride

In addition, 52 community group discussions on handpumps are conducted and their views are analysed.

The required information is collected through three types of structured pre-coded schedules. First, a Proforma is used to collect secondary data on demographic and physical characteristics of selected habitations and basic technical and historical data pertaining to the handpumps from concerned departments. This Proforma is the basis for further field survey of the habitations and handpumps. Second, a pre-coded structured Schedule is used to collect physical


MAP: KARNATAKA: REGIONAL CLASSIFICATION FOR EVALUATION OF HANDPUMP PROGRAMME
Eastern Maidan
Northern Maidan
North Central Maidan
Western Maidan
Central Maidan
Coast
Malnad
Malnad Maidan
Southern Maidan
INDIA
BIDAR
GULBARGA
BIJAPUR
RAICHUR
BELGAUM
DHARWAR
GADAG
BELLARY
KARWAR
CHITRADURGA
SHIMOGA
CHICKMAGALUR
HASSAN
MANGALORE
MYSORE
TUMKUR
KOLAR
BANGALORE
MANDYA
MERCARA
Region
Selected Taluks
BOUNDARIES State ——— District - - - Taluk
State capital ⊕ District Hqrs ○ Taluk Hqrs ◦
60 Miles
100 Kilometres

characteristics of the handpumps by direct observation and inspection by the Research Investigators of the study. Third another Schedule is used to collect information from the users about the handpumps, use patterns, views, assessment etc. through interview method.

Research Investigators also convened group discussions and prepared a synoptic note on the proceedings of the discussions keeping in view the set of issues raised and replies given by the participants.

1.7 Analytical Framework:

The above schedules are pre-coded with appropriate choice answers to qualitative questions by using the "Rank and Scale" technique. The analysis of such data is more suitably presented in frequency tables. For analytical presentations, these frequency tables are prepared on four selected controlled parameters for classification. They are: (1) By Region, (2) By Population Size Class of Habitation, (3) By Year of Installation of Handpump and (4) By functional Status of Handpump. Of these, classification by region is found more meaningful. Most of the tables are presented in this classification.

For each table, statistical tests are performed to examine:

1. Significant relationship between the selected classification (rows in frequency tables) and the degree of differences in answers to selected question (columns); and

2. Significant differences (a) due to regionwise classification and (b) due to scaling of answers.

The test used for (1) above is the 'chi-square' test with 95 per cent level of significance and the test used for (2) above is 'F-test' (analysis of variance) separately for rows and columns with 95 per cent level of significance.

Hence, wherever it is stated in the analysis that "there is significant relationship" or "significant differences across regions etc., or across the answers", implies that they are "statistically significant at 95 per cent level".

1.8 Presentation:

The report is organised and presented in the following order: Chapter Two gives a brief account of progress and status of rural water supply programme at different levels of organisations - global, national and regional (state level) levels. Plan approaches, formulations, organisation and implementation processes, financial patterns and administrative setup for the purpose of rural water supply programme. Chapter Three is based on the information collected through the second type of schedule by physical examination of the handpumps; Chapter Four is the analysis of the user's assessment of the handpump programme; Chapter Five evaluates the system of maintenance and repairs of handpumps; Chapter Six gives some broad policy recommendations on handpump programme based on the findings of the study.

CHAPTER II

STATUS OF RURAL WATER SUPPLY PROGRAMME

2. This Chapter reviews the overall status position of community water supply in general and rural water supply in particular. Section One gives the global perspective towards community water supply; Section Two presents the status of rural water supply in India. Sections Three and Four attempt to review national approach and approach of the Karnataka State Government respectively towards rural water supply. Finally Section Five gives a few aspects relating to the economic issues of community water supply.

2.1 Global Perspective[1]

The fast growth of population, more so in the case of developing and underdeveloped countries assumed a primary concern throughout the world and world organizations which were compelled to give increasing attention and to play a major role in taking long-term policy measures to improve the general health condition through community water supply and sanitation programmes. The seriousness of the problem was initially identified by the United Nations Organization and its subsidiary units as early as in 1950s. Subsequently, in 1962 World Health Organization (WHO) conducted a first global

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1. Nageswara Rao, M. "Rural Water Supply Programme" in Abdul Aziz and V.M.Rao (eds.), Poverty Alleviation in India, Ashish, New Delhi. Ch.3.

survey of urban water supply and in 1972 the UN Conference on Environment held at Stockholm gave international expression to the problem pertaining to the provision of safe drinking water and adequate sanitation with special reference to developing countries. Subsequently a second global survey was conducted in 1972 covering community water supply and excreta disposal conditions in both urban and rural areas and led the 25th World Health Assembly to endorse the revised global targets for the Second UN Development Decade. In 1976, the UN Conference on Human Settlements (HABITAT) held at Vancoover, Canada, reiterated the gravity of the situation and recommended that safe water supply and hygienic water disposal should receive priority from governments and international agencies with a view to achieve the targets for serving all the population at least by 1990. These recommendations of the HABITAT conference was adopted in the UN Water Conference at Mar-del-Plata, Argentina, in March 1977 and to achieve the targets, 1981-90 was declared as the International Drinking Water Supply and Sanitation Decade. The targets set for the South East Asian region under rural water supply were, coverage of 35 per cent of the population with reasonable access to safe water and 15 per cent with household sanitary privies.

The global situation as seen from Table 2.1 reveals that only 36 per cent of rural population in the world was targetted to be covered by 1980 from the level of 22 percent in 1975 with an estimated investment of 6075 million US

dollars. The anticipated performance of the South-East Asian region as well as India are relatively better in the coverage of population and the estimated investments to be made during the period.

Table 2.1: Rural Water Supply: Global Perspective[2]

Region	Rural Population Covered (%)		Estimated investments in million US dollars
	1975	1980 (target)	
World	22	36	6075
South-East Asia	19	35	1465
India	18	35	926

2.2 Rural Water Supply in India:

Even though India is predominantly covered by rural population, the community water supply in urban areas received priority over its rural counterpart. While the urban population served by safe drinking water supply was 60 per cent in 1970, 80 per cent in 1975 and 83 per cent in 1980, the coverage of rural population for the corresponding years were 6 per cent, 18 per cent and 22 per cent respectively. Subsequently, by 1985, the rural population coverage was raised to 54 per cent, a jump of more than double that of 1980, mostly due to the thrust given under the auspicious of the 1980-90 Decadal Plan.

2. Compiled from World Health Organization, World Health Statistics Report, Vol.29, No.10, 1976, Geneva.

2.3 National Approach to Rural Water Supply:

India being the most populous country in the South East Asian region, the community water supply unfortunately received a scant attention in the earlier periods in terms of sectoral priorities and allocations of outlays in national and regional plans of India. Even though drinking water supply programme at national level was launched as early as 1954, and progressively but marginally larger allocations were made in subsequent Five Year Plans, the real problem was identified and given due emphasis only since Fourth Five Year Plan. During subsequent plans, it was realised that provision of safe drinking water supply with proper disposal of wastes constitute the principal environmental control measures against the transmission of most water borne diseases which often constitute nearly 80 per cent of public health problems.[3] Further, in recent plan approaches it is acknowledged that there were very few public investments which repay as much in health benefit as the provision of safe water supply and sanitation[4]. By the time the Sixth Five Year Plan was launched, it coincided with the International Drinking Water Supply and Sanitation Decade (1980-90) programme. This gave a real thrust with changed objectives

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3. Government of India, Draft Fifth Five Year Plan, 1974-79, p.263.

4. Government of India, Sixth Five Year Plan, 19809-85, p.397.

and strategies on the programme. The composition of expenditures and trends during the past Five Year Plans on water supply and sanitation schemes as presented in the following table speak for themselves.

Table 2.2: Investments on Water Supply and Sanitation During Plan Periods[5]

(Rs in crores)

Sector	PLAN PERIOD						
	1951-55	1956-61	1961-66 66-69	69-74	74-79	80-85	85-90
	I	II	III+3AP	IV	V	VI	VII
Rural	3 (27.3)	30 (40.5)	48 (21.6)	208 (38.0)	381 (41.4)	1458 (45.4)	3454 (54.1)
Urban	8 (72.7)	44 (59.5)	174 (78.4)	340 (62.0)	539 (58.6)	1754 (54.6)	2935 (45.9)
Total	11 (100.0)	74 (100.0)	222 (100.0)	548 (100.0)	920 (100.0)	3212 (100.0)	6389 (100.0)

Basically, in the early stages, implementation of rural water supply programme was under the state sector and subsequently, with the introduction of the concept of "problem village", Central Government too started sharing or financing some sub-sectoral programmes like piped water supply, accelerated rural water supply schemes, tribal sub-plans and special component plan, some of them within the Minimum Needs Programme introduced by the Central Government. The share of Central sector under rural water

5. Compiled from Nageswara Rao, M. Studies in Urban Public Sector, Ashish, 1985, and Government of India, Seventh Five Year Plan - 1986-90.

supply programmes during the first part of Decadal Plan had increased substantially from a level of 6 per cent in 1980-81 to 30 per cent in 1985-86. By this time, the Government of India identified that the advances of science and technology have to be effectively harnessed for meeting a key human need of water. This resulted in launching of the "National Drinking Water Mission" in 1986.

The thrust of the Mission is towards achieving the following specific objectives:[6]

i) to cover all residual problem villages by 1990;

ii) to supply at least 40 litres of safe and potable water per capita per day;

iii) to evolve and use cost effective technology mix to achieve these objectives within the constraint of plan allocation; and

iv) to take conservation measures for sustained supply of water.

The Action Plans were prepared at all levels and these are under various stages of implementation.

In addition, in some of the states, the help of the international organizations such as UNICEF and DANIDA are received under bilateral assistance for specific components within programmes.

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6. National Drinking Water Mission, Action Plan - 1989-90, Karnataka, Natural Technology Missions, 1990. Also, Anil K. Joseph, "Technology Mission and Rural Drinking Water Supply", Kurukshetra, June 1989, p.12.

2.4 Rural Water Supply Programme in Karnataka:

The rural water supply programme in Karnataka state is planned, designed and implemented by the Public Health Engineering Department under the overall control of the Rural Development and Panchayati Raj Department, Government of Karnataka. Water supply to rural areas is provided through such means as borewells with handpumps, mini-water supply schemes and piped water supply schemes depending upon the size of the village, water sources and level of financial allocations from various heads of budget accounts.

Even though rural water supply programme was started in the State in 1970-71 the progress was slow till 1975-76. From Table 2.3, it can be seen that the number of handpumps fixed in 1970-71 was 54 and by the year 1974-75, the total number of installed handpumps increased to only 4744. Since then, the borewell programme accelerated with higher growth, to reach a total of 29,568 by the year 1979-80, during which time, the attack on "problem villages"[7] was given top priority. In Karnataka state, 20,003 villages out of 27,028 were identified as problem villages and by the end of the Fifth Five Year Plan, about one-third of the problem villages were covered with at least one source of safe water. By the end of Sixth Plan (1984-85), the state achieved the target of not only covering all problem villages (except thirteen left

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7. For details see, Nageswara Rao, M. "Rural Water Supply Programme" in Abdul Aziz and V M Rao (eds.), Poverty Alleviation in India, Ashish, New Delhi, Ch.3, pp.56-57.

CHART: 1 : RURAL WATER SUPPLY SCHEMES IN KARNATAKA
1970-71 TO 1989-90

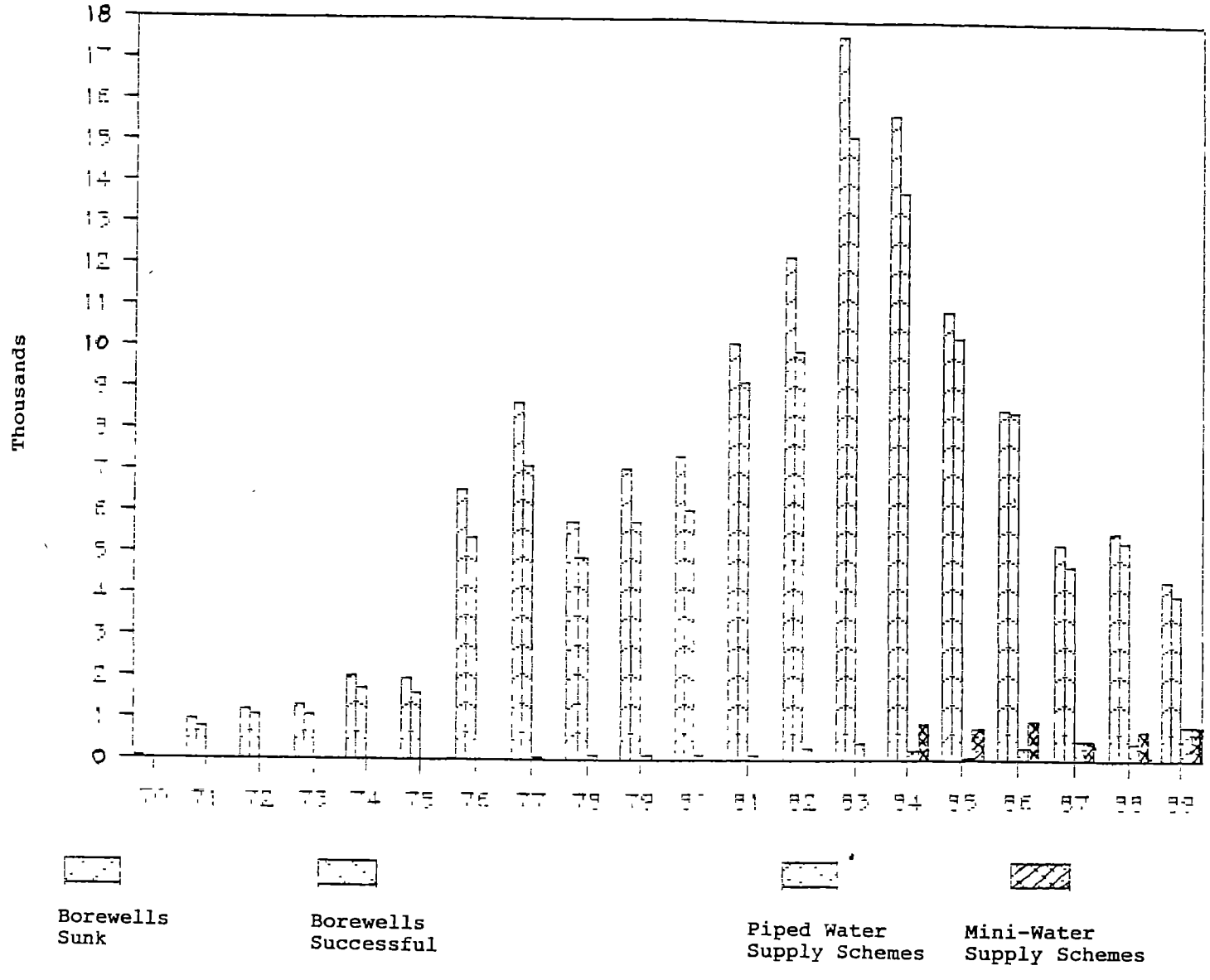
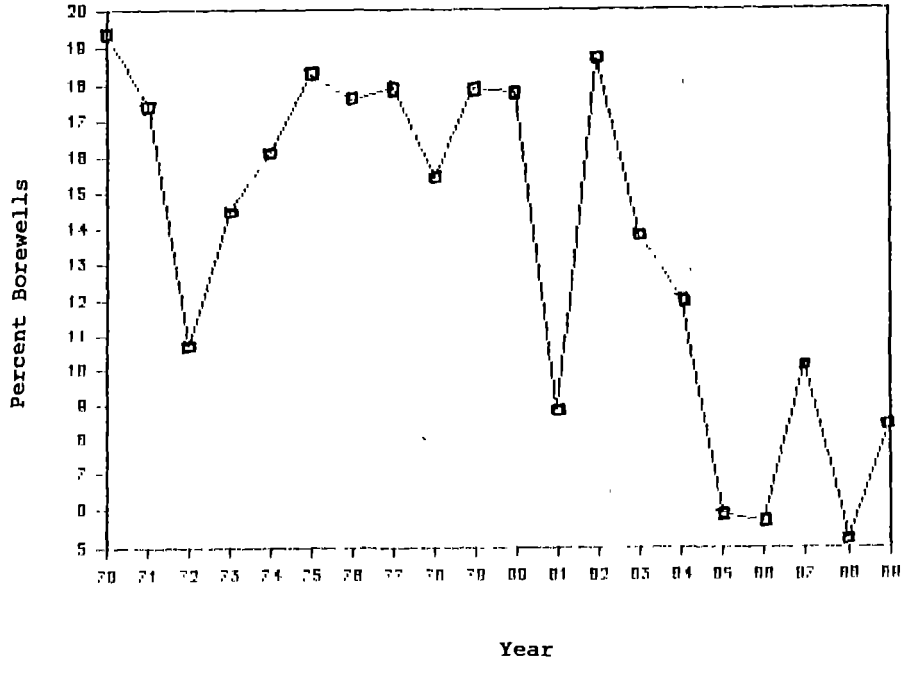


Table 2.3: Rural Water Supply Schemes in Karnataka - 1970-71 to 1989-90*

Year	No.of Borewells		Successful Borewells			Piped water supply scheme (cumulative)	Mini Water Supply Scheme (Cumulative)
	Sunk	Percent failures	Under State Sector	Under Central Sector	Total		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1970-71	67	19.4	54	-	54	-	-
1971-72	948	17.4	783	-	783	-	-
1972-73	1221	10.7	1091	-	1091	-	-
1973-74	1293	14.5	1106	-	1106	-	-
1974-75	2038	16.1	1710	-	1710	-	-
TOTAL (CUM)			4744		4744		
1975-76	1995	18.3	1631	-	1631	NA	-
1976-77	6534	17.6	5387	-	5387	NA	-
1977-78	8674	17.9	6819	307	7126	93	-
1978-79	5782	15.4	4734	156	4890	146	-
1979-80	7055	17.9	4916	874	5790	126	-
TOTAL (CUM)			28231	1337	29568	1507	
1980-81	7384	17.8	5650	417	6067	137	-
1981-82	10141	8.9	6513	2722	9235	173	-
1982-83	12278	18.7	6959	3019	9978	335	-
1983-84	17612	13.9	12086	3132	15218	427	-
1984-85	15719	12.0	9782	4048	13830	284	896
TOTAL (CUM)			69221	14675	83896	2663	896
1985-86	10945	5.9	6582	3712	10294	104	772
1986-87	8534	5.7	4883	3166	8490	289	946
1987-88	5240	10.1	1999	2713	4712	498	479
1988-89	5587	5.2	2308	1459	5297	452	730
1989-90	4375	8.4	2989	2550	4009	870	860
TOTAL (CUM)			87982	28275	116257	4876	4684

* Compiled from Public Health Engineering, Government of Karnataka, Booklet on Water Supply and Sanitation Programme in Karnataka, Bangalore,1987 and 1988.

CHART: 2. : FAILURE RATES OF BOREWELLS IN KARNATAKA: 1970-71 to 1989-90



over villages) but also increased the number of handpumps in each village. The total number of handpumps in the state thus increased to 83,896. Since then, the State Government with the financial assistance from Central Government, introduced the mini water supply scheme and the existing piped water supply programme was given boost, starting with bigger villages. For this reason, the growth in handpump installations has decreased substantially.

In terms of financial allocations, substantial expenditures were incurred during the last two Plan Periods. From Table 2.4 it is evident that Rs.93.04 crores were spent during the Sixth Five Year Plan period which constituted 1.25 per cent in the State total expenditure; out of this, nearly 65 per cent was exclusively for borewell programme and another 8 per cent for maintenance. During the Seventh Five Year Plan, the budget allocation made under rural water supply was Rs.302.50 crores of which Rs. 70.07 crores was for borewell programmes. Against these allocations, the actual expenditure under these two are Rs.234.90 crores and Rs.115.41 crores respectively. The share of expenditure on borewells thus has fallen to 50 per cent. The fall in annual expenditures under borewell programme is mainly due to the increasing share of Mini Water and Piped Water Supply programmes. The share of total expenditure on rural water supply programme in state total expenditures during Seventh Plan period was . In terms of per capita, the expenditure on borewell programme was Rs.3.03 in the

CHART: 3 : TRENDS IN ANNUAL EXPENDITURES ON RURAL WATER SUPPLY: 1980-81 TO 1988-89

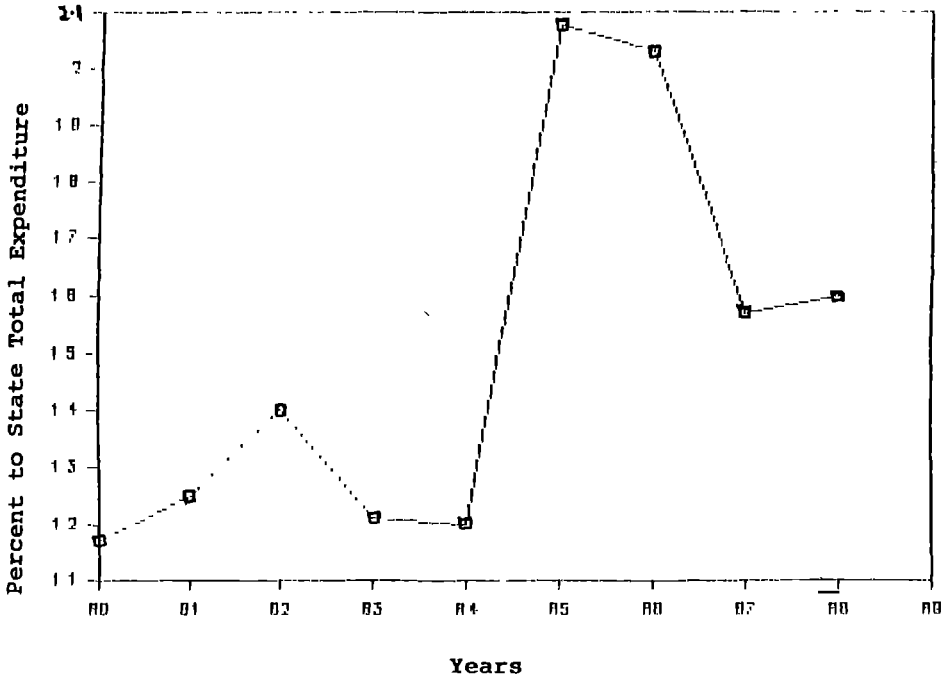


CHART: 4 : TRENDS IN PER CAPITA (Rs) EXPENDITURE ON RURAL WATER SUPPLY: 1980-81 TO 1989-90

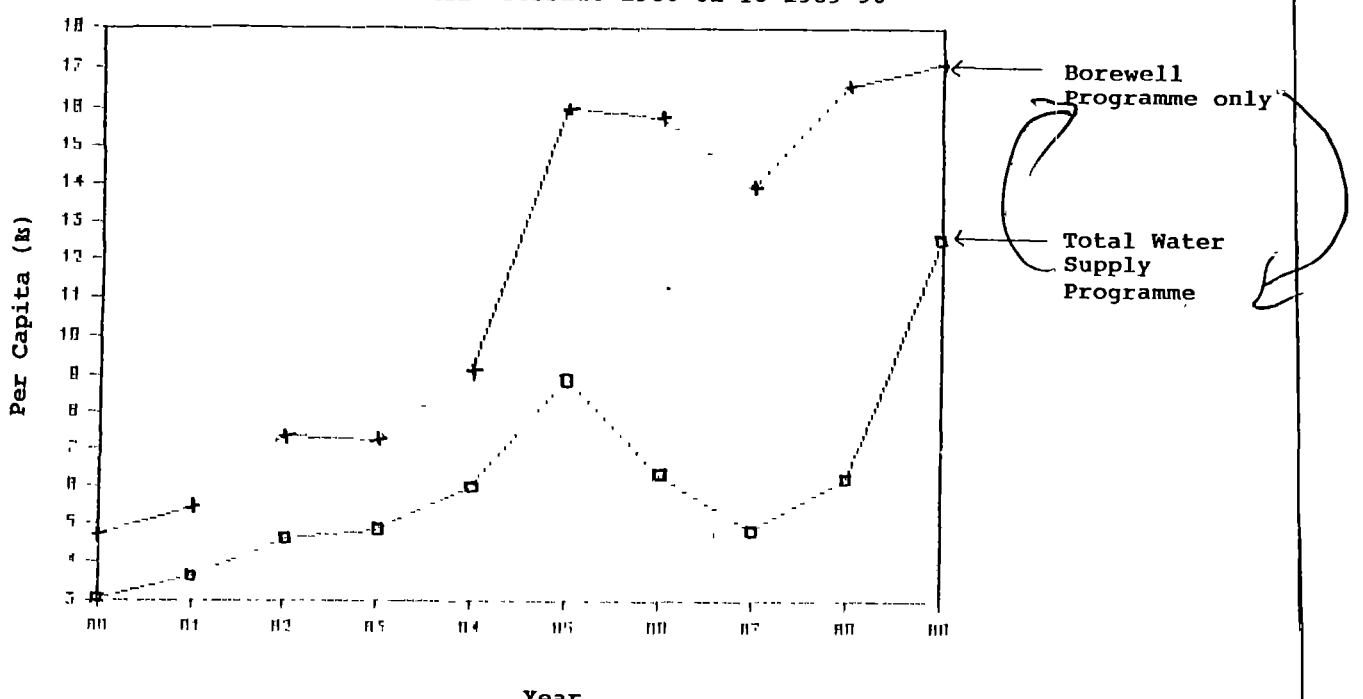


Table 2.4: State Annual Expenditures on Rural Water Supply Programme - 1980-81 to 1989-90**

(Rs.lakhs)

Year	Rural Population (lakhs)	State Total Expenditure	Expenditure under Water Supply Programme				
			Bore Well Programme	Total	% to state total exp.	Per Capita (Rs.)	
						Bore well	Total
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1980-81	264	106700	793	1252	1.17	3.03	4.74
1981-82	269	117300	966	1463	1.25	3.61	5.45
1982-83	273	142700	1260	2003	1.40	4.61	7.35
1983-84	278	165300	1350	2003	1.21	4.87	7.22
1984-85	282	213700	1708	2583	1.20	6.01	9.16
TOTAL (VI Plan)		745700	6077	9304	1.25	22.25	34.08
1985-86	287	219800	2550	4573	2.08	8.90	15.96
1986-87	291	220500	1843	4484	2.03	6.33	15.74
1987-88	296	261700	1429	4115	1.57	4.83	13.91
1988-89	301	310600	1872	4975	1.60	6.23	16.55
1989-90	306	NA	3847*	5243*	NA	12.59	17.16
TOTAL (VII Plan)		-	11541 (7007)	23490 (30250)	-	39.0	79.39

** Compiled mainly from Public Health Engineering,. Government of Karnataka, op.cit.

Note: Figures in brackets are VII Plan allocations.
* Including the expenditures under Technology Missions.

beginning of the VI Plan which increased steadily to Rs.6.01 by 1984-85. But subsequently, in the VII Plan period the per capita was fluctuating from Rs.8.90 in 1985-86 to Rs.12.59 in 1989-90.

With the time bound success of nearly 100 per cent achievement in problem villages, the state is in the process of setting new norms to identify the problem villages and planning to shift towards technological advancement in rural water supply programmes under National Drinking Water Missions.

During the Seventh Plan, the state has also planned to decentralise the implementation and maintenance of rural water supply schemes through the newly introduced Panchayati Raj system of government in the State. The success of the decentralised approach is yet to be examined and evaluated.

2.5 Some Economic Issues in Community Water Supply Projects[8]:

The shift of government policy emphasis from handpumps to higher levels of water supply source technologies, such as mini water supply and piped water supply schemes wherever possible is commendable indeed. This does not mean that it

8. There is no direct bearing of these aspects on the present study and in no way constitute a part of specific objectives for investigation. It is also not sure that the researches conducted elsewhere are relevant to the Indian situation. However, it is necessary to take note of the results for careful consideration at the programme and policy implementations.

circumvents the basic economic principles of programme formulation with a zeal on social benefits to the rural community. In this context, some economic issues have to be brought for a careful consideration for the rural water supply schemes.

(i) Rural Economic Growth, Development and Output

Potable water supply systems in rural areas of developing countries may affect local, regional and national economic output and growth. More so in specific areas such as economic growth, and on development and output.[9] It is argued that a water supply system is both a consumption and an investment good and as a consequence of the latter, it indirectly generates, additional future economic activity and improved wealth of local human resources in turn can increase production. If the village water supply schemes are partly financed out of revenue from new taxes and user changes, then the result is a net shift from short run consumption to investment. This shift could have a net positive effect on long run economic growth in the regional or national economy.[10]

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9. For a detailed discussion see, R.J.Saunders and Warford, J.J. Village Water Supply - Economics and Policy in the Developing World,. A World Bank Research Publication, 1976, Chapter 3, pp. 56-85.

10. Ibid, p.58.

ii) Direct Effects on Development and Output

There are several direct short-run and long-run effects on the economic output of a community or region that can result from the introduction of potable water supply systems primarily for human consumption.

The short-run effects consist of the excess capacity or non peak load timings of the water supply systems can sometimes be beneficially used for irrigating small scale gardens, fish farming, animal husbandry through low cost livestock watering facilities etc.[12] The long-run effects of community water supply schemes basically stem from the frequent economic arguments made in that such a system is an integral part of a community's infrastructure which attract rural entrepreneurship, commerce and increase time for human productive capacity. They in turn stimulate further development with possible linkages. In addition, as an addition to community infrastructure, the revenues, both personal disposal and local public sector - panchayat or mandal in terms of increases in property tax etc.

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11. Ibid, p.61.

12. Such short run secondary benefits to local community have been found significant in some of the underdeveloped and developing countries like Kenya, Jordan, Dominican Republic etc. Ibid, p.61.

(iii) Rural Water Supply Schemes - Technology Options

Before going into the economics of water supply, it is of some importance to dwell upon the technology options available for community water supply schemes. The scheme of technology option as developed by World Bank Institutions are presented in Table 2.5. Under technology options, the types of water supply are listed in descending order. It can be seen that the status of handpumps ranks fourth from above, but definitely superior to the lowest types of traditional and improved traditional water sources measured by their water quality protection variable. It has low capital, as well as operation and maintenance costs; but involves the costs in terms of water collection time. This has the characteristics of good access, good quality without treatment and can be sustainable by rural communities. Any higher order technology option above "handpump" involves cost competitiveness, both capital and maintenance costs including treatment, even though these options are most desirable. Any technology shift from handpumps to stand pipes (approximately mini water supply schemes) and yard taps (piped water) have to be carefully evaluated given the budgetary constraints of the state governments in Indian context.

(iv) Costs, Economies of Scale and Quality of Service

As already explained, on economic principles, the rural community can avail the water as public service at its initial stages, as it is argued that it is the responsibility

Table 2.5: Options for Community Water Supply

Step	Type of Service	Source	Quality Protection	Water use (lpcd)	Costs	General Remarks
5	House connection	G.W S.W	Good, No treatment May need treatment	100 to 150	High Capital and O and M	Most desirable: but high resource needs
4	Yardtaps	G.W S.W	Good, No treatment May need treatment	50 to 100	High Capital and O and M	Very good access to safe water, fuel and institutional support critical
3.	Standpipes	G.W S.W	Good, No treatment May need treatment	10 to 40	Moderate capital and O and M costs	Good access: Cost Competitive
2.	Handpumps	G.W	Good, No treatment	10 to 40	Low Capital and O and M costs: collection time	Good access: Sustainable by villagers
1.	Improved traditional sources	G.W S.W R.W	Variable Poor Good,if protected	10 to 40	Very low capital and O and M costs collection time	Improvement if badly contaminated
0.	Traditional Source (unprotected)	S.W G.W R.W	Poor Poor Variable	10 to 40	very low capital and O and M costs collection time	Starting point for supply improvement

Source: Saul Arlosoroff et.al., Community Water Supply - The Handpump Option, The World Bank, Washington D.C., 1987 p.18.

Note: G.W: Ground Water; S.W: Surface water; R.W. Rain Water

of the government to provide basic minimum needs for economically backward sections of the people. To fulfil the duty of government, it can make investments on schemes which require lowest levels of annual recurring costs. At this stage, if the benefitted community demands for better, easy accessibility and sophistication, the capital costs of the technologies moves upwards pushing concurrently the annual recurring costs. The costs of each technology for a group of 400 persons have been estimated by earlier studies are presented in Table 2.6. The technologies presented here are handpumps, mini water supply and piped water supply schemes for which average capital costs and average annual costs with main components are estimated (in US dollars). From this table, it can be seen that capital cost alone doubles for every shift in technology option. In the case of annual cost, the per capita raises from 5.8 to 8.4 and 11.6 US dollars from handpumps to two higher level options respectively. In Indian context, if haulage cost, that is, the imputed costs of human labour and time are excluded, the per capita annual costs come down to 2.25 and 5.6 US dollars in the case of handpumps and mini water supply projects respectively. While there will not be any change under piped water if house connections are taken. In addition, the maintenance and operation costs constitute 22 per cent in total annual cost under handpumps, the same is about 33 per cent in the case of the other two.

Table 2.6: Community Water Supply Technology Costs

(Minimum Level)

(For 400 persons)

Cost (in US dollars)	Technology		
	Hand-pumps	Stand pipes	Yard taps
A) Capital Cost			
Source of Water	4,000	2,000	2,500
Machinery	1,300	4,000	4,500
Distribution	-	4,500	16,000
Sub-Total (A)	5,300	10,500	23,000
Per Capita	13.3	26.3	57.5
B) Annual Cost			
Annualised Capital	700	1,500	3,200
Maintenancae	200	600	1,000
Operation	-	150	450
Sub-Total (B)	900	2,250	4,650
Haul Cost	1,400	1,100	-
Total (B)	2,300	3,350	4,650
Per Capita	5.8	8.4	11.6

Source: Saul Arlosoroff, et.al., op.cit., p.23.

(v) Rural Water Supply: Cost-Benefit Equation

Finally, converting all economic aspects, an "economic equation" or a "consolidated cost-benefit ratio" can be arrived at for comparison purposes between the technology options. Measured in terms of value of time in US dollars per capita per year with two alternative approaches i.e (i) at the rate of 12.5 cent per hour and (ii) 25 cents per hour, the total cost, total benefits and net benefits are estimated by World Bank for the three technology options and these are presented in Table 2.7. It can be seen that either in absolute terms (net benefit) or in relative terms, the handpump technology option ranks first. The net benefit for handpump is 5.9 and cost-benefit ration is 3.8 (one unit of cost yields 3.8 units of benefit). The net benefit and cost-benefit ratio measures for the other two options are: 3.6 and 1.7 for standposts and 0.5 and 1.0 for yard taps. This implies that if community opts for higher technology options, they have to pay for the indirect benefits they derive compensating the balance in the net benefit and cost-benefit ratios.

Given these economic parameters and the level of economic status of the rural community, the policy options have to be given careful consideration in the choice of water supply technologies suited to Indian context.

Table 2.7: Costs and Benefits of Technology Options

(US$/capita/Year)

Value of Time:	@ 12.5 Cents/hour			25 Cents/hour		
	HP	SP	YT	HP	SP	YT
Cost	2.1	5.5	11.7	3.2	6.5	11.7
Benefit	8.0	9.1	12.2	18.1	19.8	24.5
Net Benefit	5.9	3.6	0.5	14.9	13.3	12.8
Cost-Benefit Ratio	3.8	1.7	1.0	5.7	3.0	2.1

Note: HP : Handpumps
SP : Standposts
YT : Yardtaps

Source: Saul Arsoloroff et.al, op.cit., p.196.

CHAPTER III

AN EVALUATION OF HANDPUMP PROGRAMME IN KARNATAKA

This Chapter presents the results of evaluation analysis on status of handpumps in rural habitations. This analysis is based on: (i) secondary data sources and (ii) direct physical spot examination of habitations and handpumps by the trained Research Field Staff. Broadly, the Chapter contains the following status analysis.

Section One deals with the distributional patterns of habitations, which include, regional, population size class, communication systems and the pattern of handpump sources. Section Two deals with the status of installed handpumps by region. Section three presents the supply pattern and adequacy levels of handpumps; Section four is devoted to the physical nature and potentialities of installed handpumps; Section five presents the analysis of operational status of handpumps; Section Six examines the physical environs and local hygiene of handpumps; Section Seven analyses the use pattern of handpumps for other than water consumption and finally Section Eight analyses the nature of water of handpumps.

3.1 Distribution Pattern of Selected Habitations

The sample set of 54 revenue villages selected from nine regions consist of 167 rural habitations (main

village and its hamlets) as recorded in the taluk revenue records. The distributional pattern by population size classifications, nature of communication system and distance from main village etc., are some of the factors that influence the extent of supply pattern of handpumps in the rural habitations. Hence, before examining the main objectives of the study, as a pre-requisite, it is important to examine these factors for the purpose of understanding.

(A) Regional Distribution Pattern of Habitations:

Out of the total habitations in the state more than half (56.9 per cent) are in the two regions of Coast and Malnad Coast, followed by 13.8 per cent in Southern Maidan. The remaining six regions share the balance 29.3 per cent of habitations ranging from 3.6 per cent in Central and Western Maidans, to 7.8 per cent in Northern Maidan.

(B) Population Size Class Distributional Pattern of Habitations:

An interesting pattern of the habitations in the state is that 34.7 per cent of the habitations are with less than 100 persons (including a small number of uninhabited hamlets) and 38.9 per cent are in the next higher size class, between 100 and 500 persons. Most of these large number of small habitations are spread over in Coast and Malnad Coast regions of the state. There

are 13.2 per cent of habitations in the size class of 500-1000; 5.4 per cent in 1000-1500; and less than 8 per cent in the higher size class of habitations, all of them are in the group of main villages.

(C) Distributional Pattern of Habitations by Communication System:

(i) Distance from Main Village:

While 54 habitations, which are main villages, constitute 40.0 per cent of total habitations, the remaining 60.0 per cent belong to the group of hamlets, colonies, tandas etc. Of them, 14.8 per cent are within a distance of half-a-kilometre from main villages; 8.2 per cent are at a distance of 1 to 1.5 kilometres; 11.11 per cent are 1.5 to 2 kilometres away from main villages and 10.4 per cent are by more than 2.0 kilometres distance from their main villages. All these hamlets are concentrated in Coast, Malnad and Southern Maidan regions only.

ii) Approach Road to the Habitations:

40 per cent of the total habitations (including main villages) are connected by metalled/asphalted roads, 45.4 per cent have some type of cart road and the remaining 14.7 per cent of habitations, majority of them with less than 500 population, are connected by footpath.

iii) Distributional Pattern of Installed Handpumps:

Before examining the status and other characteristics of installed borewells, an attempt is made to examine the degree of successful attempts in installing such borewell. It can be seen from Table 3.1 that out of every 100 borewells sunk in the state, about 81 borewells are successfully installed with handpumps. This varies between 62.9 (in terms of per cent successful borewells) in Northern region to more than 90 in Coast, Malnad Coast and Malnad Regions. The success rate is more than the state level in Southern Maidan, Central Maidan and Eastern Maidans and are between 80 and 90 per cent. Western and North Central Maidans have less than the state average and the rate of success is in the range between 70 to 80.

An interesting success pattern emerges if we examine them under the classification of population size class of habitations. It is noticed that larger habitations have smaller proportion of successful borewells, the proportion increases from 59 per cent in the largest habitations (more than 2000 population) to 83 per cent in smaller habitations with population less than 500.

CHART: 5 : STATUS OF HANDPUMPS

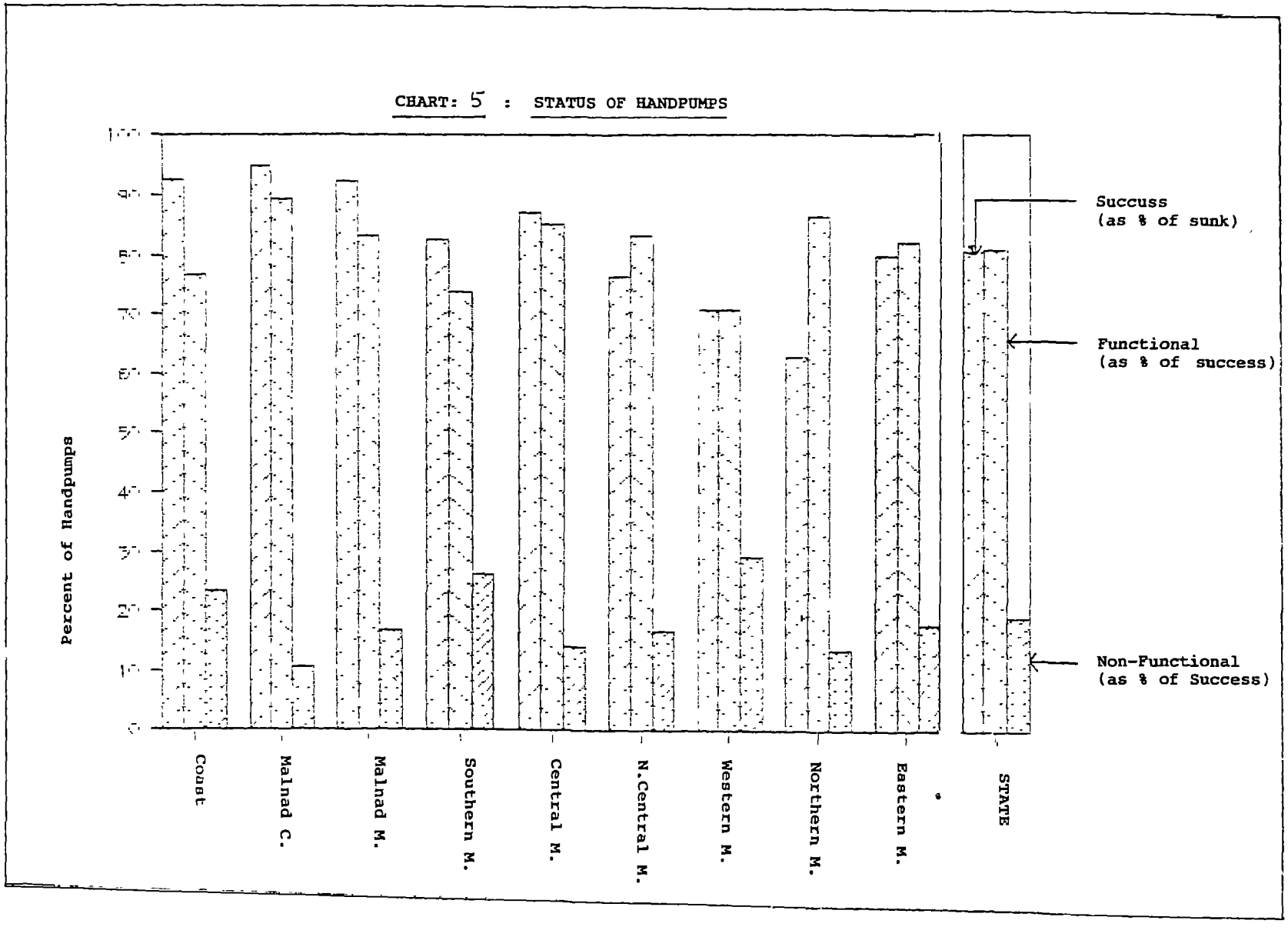


Table 3.1: Status of Handpumps by Regions

Region	Installed borewells as % of sunk	Percent to Installed borewells	
		Functional handpumps	Non-functional and dried up handpumps
Coast	92.7	76.5	23.5
Malnad Coast	95.0	89.5	10.5
Malnad Maidan	92.3	83.3	16.7
Southern Maidan	82.6	73.7	26.3
Central Maidan	87.2	85.3	14.1
North Central Maidan	76.4	83.3	16.7
Western Maidan	70.7	70.7	29.3
Northern Maidan	62.9	86.4	13.6
Eastern Maidan	80.0	82.1	17.9
STATE	80.5	81.0	19.0

3.2 Status of Installed Handpumps:

While more detailed analysis will be made in subsequent sections, a preliminary information on the current status of installed handpumps is introduced here. From Table 3.1, it can be seen that at the state level, 81.0 per cent of installed handpumps are in functional status with varying degrees - and the remaining 19.0 per cent are non-functional,

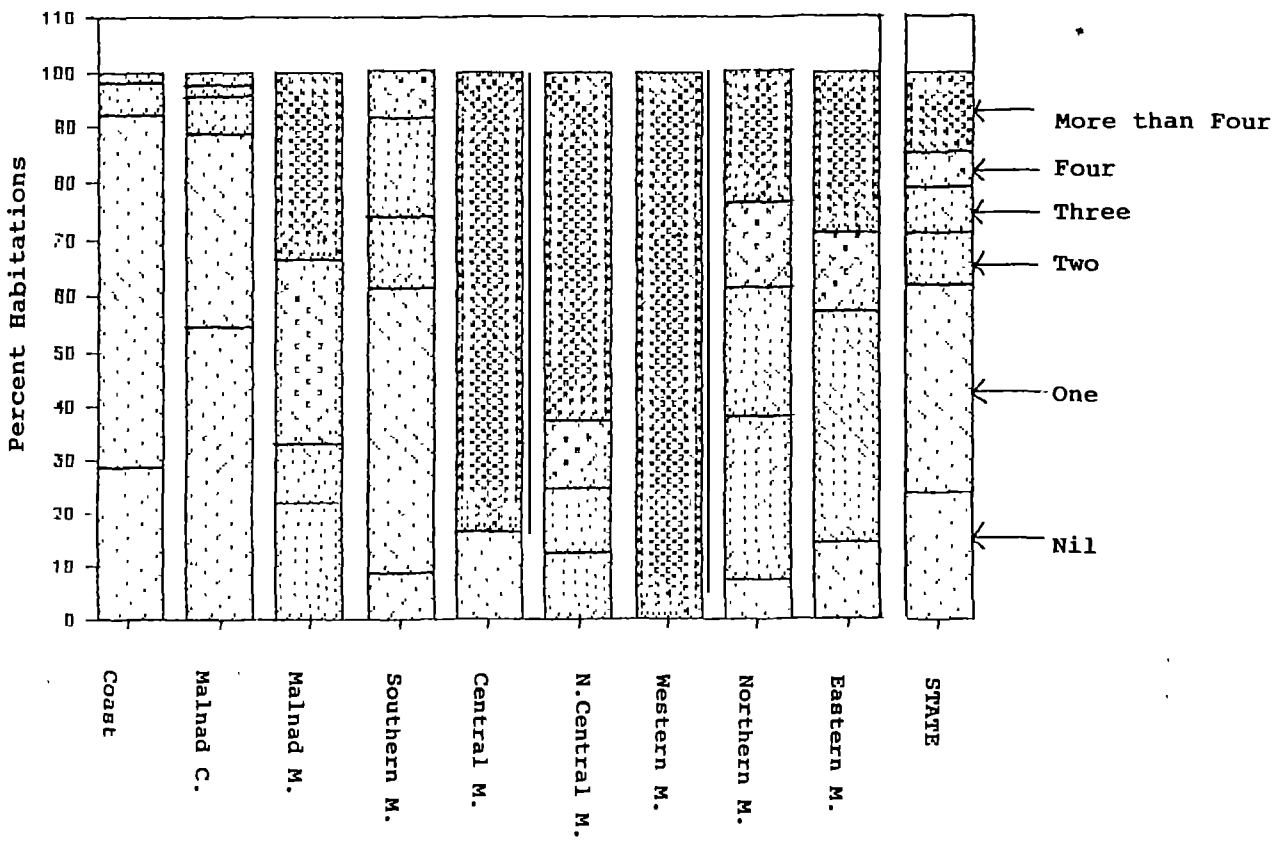
including dried up, as on the day of investigation and as physically examined by the Field Investigators. The pattern of non-functional handpumps across the regions shows that Western Maidan has the largest number of non-working handpumps, followed by 26.3 per cent in Southern Maidan and 23.5 per cent in Coastal Region. On the other hand, Malnad Coast, Northern Maidan and Central Maidan regions have the lower levels, between 10 and 15 per cent and the remaining three regions - Malnad Maidan, North Central Maidan and Eastern Maidan have the middle levels between 15 and 20 per cent of non-functional handpumps. However, there is no significant relationship between geographical regions and non-functional handpumps. So is the case with the classification of handpumps by size class and distance. But, the type of approach road emerges as an important factor for high proportion of non-functional handpumps, 28 per cent of handpumps are in non-working status in habitations connected by "footpath", 26 per cent in habitations connected by cart road and only 14.5 per cent habitations connected by metalled/asphalted road.

While the above analysis gives a broad distributional and functional pattern, further probe on supply of handpumps is of some importance in terms of population coverage and adequacy of drinking water sources for a given population in habitations.

Table 3.2 gives the distribution of habitations with number of installed handpumps. It can be seen that three-fourths of the habitations in the state have at least one installed borewell, and one-fourth of the habitations, almost all in Coast and Malnad Coast regions, do not have borewells with handpumps. This is not surprising because in these regions there are large number of small habitations spread throughout the hills and forests and most of them do not have motorable roads. Where handpumps are installed, 37.5 per cent of habitations have only one handpump, 9.6 per cent have two, 7.8 per cent have three, 6.0 per cent have four and 15.0 per cent habitations have more than four borewells. While regional classification do not exhibit any significant relationship with number of handpumps served, a highly significant positive relationship is observed in the classification of habitations by population size class. This pattern of larger the village, larger number of handpumps is logical and consistent with the meaningful objective of higher population coverage. Unfortunately, but not surprising, lesser number of handpumps are observed in habitations which are far away from the main villages.

Among the regions, once again, we can observe that Western Maidan region has all the habitations with more than four handpumps; followed by Central Maidan with 83.3 per cent and Northern Maidan with 62.5 per cent

CHART: 6 : HABITATIONS BY NUMBER OF HANDPUMPS



habitations with more than four handpumps. On the other hand, Coast, Southern Maidan and Malnad regions have a large number of habitations with single handpump.

Table 3.2: Percentage Distribution of Habitations by Number of Handpumps installed

Region	Habitation without handpumps	One HP	Two HPs	Three HPs	Four HPs	More than Four HPs	Total
Coast	28.8	63.5	5.8	1.9	-	-	100.0
Malnad Coast	54.5	34.1	6.8	2.3	2.4	-	100.0
Malnad Maidan	-	-	22.2	11.1	33.3	33.3	100.0
Southern Maidan	8.7	52.5	13.0	17.4	8.7	-	100.0
Central Maidan	-	16.7	-	-	-	83.3	100.0
North Central Maidan	-	-	12.5	12.5	12.5	62.5	100.0
Western Maidan	-	-	-	-	-	100.0	100.0
Northern Maidan	-	7.7	30.8	23.1	15.4	23.1	100.0
Eastern Maidan	-	14.3	-	42.9	14.3	28.6	100.0
STATE	24.4	37.5	9.5	7.7	6.0	14.9	100.0

3.3. Distribution Pattern of Habitations by Population Coverage:

While the above analysis gives a physical distributional pattern of coverage of habitations by number of handpumps, a more meaningful results are possible through the examination of habitations by population coverage. Table 3.3 gives the distribution of habitations by the size class of population coverage per handpump. Leaving out the habitations without handpumps and uninhabited hamlets, it can be seen that, at the state level, the population coverage is fairly satisfactory. For example, nearly 21.6 per cent of habitations have a handpump for every one hundred persons; 37.9 per cent of habitations with a handpump for a group of population between 100-199 and 20.3 per cent of habitations for 200 to 249 population. The remaining 21.2 per cent of the habitations are with a handpump for more than 250 persons. Population coverage per handpump is larger, in Western, Northern and Eastern Maidan regions and smaller populations in Coastal and Southern Maidan regions. Higher rates are observed in Malnad Maidan and Central Maidan regions.

Table 3.3: Percentage Distribution of Habitations by Population per Handpump

Region	Size Class of Population per Handpump						
	1-99	100-199	200-249	250-299	300-399	400 & above	Total
Coast	16.2	40.6	24.4	5.4	2.6	10.8	100.0
Malnad Coast	35.1	35.1	15.0	4.9	9.9	-	100.0
Malnad Maidan	22.2	33.3	45.5	-	-	-	100.0
Southern Maidan	45.0	25.0	20.0	5.0	-	5.0	100.0
Central Maidan	-	66.7	16.7	16.6	-	-	100.0
Northern Maidan	12.5	25.0	37.5	-	25.0	-	100.0
Western Maidan	-	50.0	-	16.7	16.7	16.7	100.0
Northern Maidan	7.7	30.8	-	23.1	23.1	15.4	100.0
Eastern Maidan	14.3	57.1	14.3	-	-	14.3	100.0
STATE	21.6	37.9	20.3	6.9	7.3	6.0	100.0

Though a well defined adequacy norm of drinking water for rural population is not readily available, the administrative target of "a handpump for every 250 population" may be taken as one such norm to evaluate the adequacy performance. If so, it can be seen that, at state level, 79.8 per cent of habitations with handpumps have already reached the adequacy norm, and with very little effort, the remaining 20 per cent of habitations which are below adequacy level may be brought above adequacy level in terms of population coverage. Such efforts are required more in Western and Northern Maidan regions of the state.

At this stage, a comparison may be made to examine the growth pattern in population coverage in habitations between two time periods 1986 and 1990.

A study conducted in 1986[1] had given a set of such results which are presented in Table 3.4. Clearly, the progress made during the past five years is very significant, particularly the shifts that have taken place in the habitations in population size class of 100-250 and 250-500.

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1. Nageswara Rao, M. "Rural Water Supply Programme" op.cit.

CHART: 7 : IMPROVEMENT IN POPULATION COVERAGE PER HANDPUMP 1986 and 1990: KARNATAKA

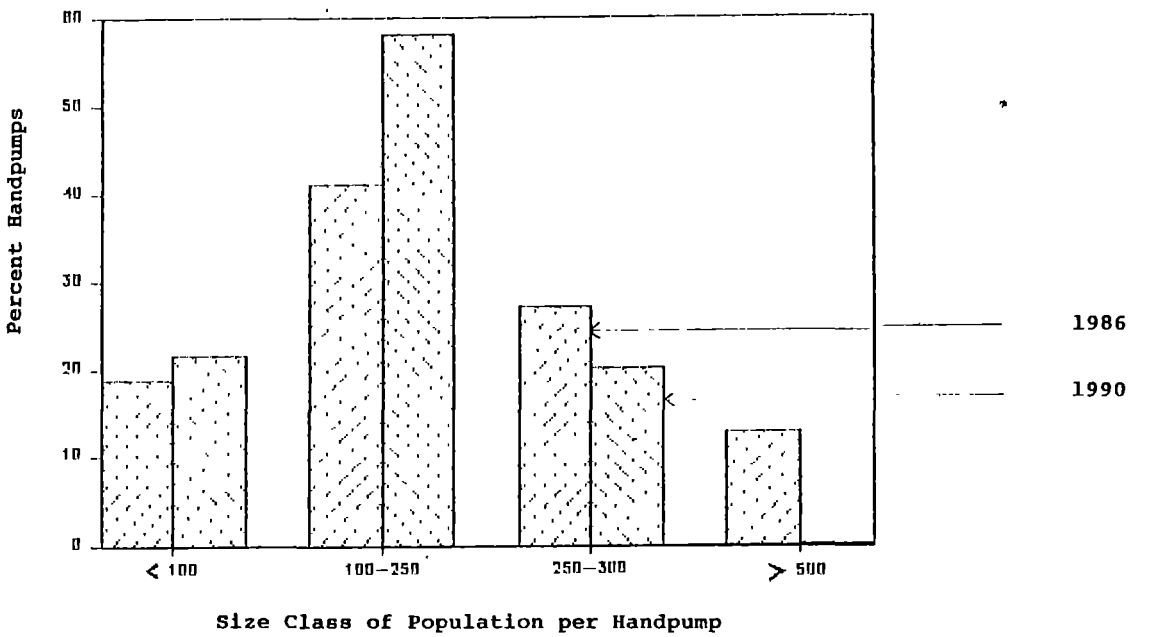


Table 3.4: Improvement in Population Coverage per handpump: 1986 and 1990

Size Classification of population coverage per handpump	Distribution of habitations (%)	
	1986 Study	1990 Present Study
Less than 100	18.9	21.6
100 to 250	41.1	58.2
250 to 500	27.3	20.2
Above 500	12.7	-

While the above analysis reflects the distributional pattern of habitations by size classification of population coverage per handpump, another dimension of population coverage is, without referring to the habitations. It can be seen from Table 3.5 that at the state level, rural population covered per handpump is 214, which, by all counts can be taken as a mark of successful implementation of the programme. Within the state, it can be observed that population coverage per handpump is satisfactory with less than 200 population per handpump in most of the regions. The inadequacy level is high in two regions - Western and Northern Maidan regions with more than 250 population per source. This is consistent with the observation made earlier.

Table 3.5: Population Coverage: Persons Per Handpump: 1986 and 1990

(A) By region	Population coverage per installed Handpump	
	1990 (Present study)	1986 study
Coast	178	310
Malnad Coast	201	
Malnad Maidan	177	210
Southern Maidan	163	
Central Maidan	180	238
North Central Maidan	226	
Western Maidan	319	321
Northern Maidan	273	
Eastern Maidan	191	
(B) By community/locality		
Scheduled Caste	185	210
Scheduled Tribe	498	297
General	259	289
General and others	227	
State	214	273

A comparison of adequacy levels between 1986 study and present study is of some importance to examine whether there is any progress during this period. From the same table we can observe that at state level, the adequacy level has significantly increased from 273 in 1986 to 214 in 1990. So are the cases with all geographical regions in the state and all localities with an exception of scheduled tribe localities.

The population coverage arrived at and presented here is however based on the secondary data on number of handpumps and number of people, collected from PHE and Census reports. But for field level observation, one way of measuring the adequacy levels of handpumps is to count the number of people gathered near the handpump to collect water at the time of visit. The measure is "Larger the number of people, lesser the adequacy of handpumps". This can be examined from Table 3.6. It can be seen that nearly half of the handpumps in the state have a crowd of more than ten persons gathered for water collection. Such crowds can be seen in almost all regions, more so in Central region. On the other hand, nearly 25 per cent of handpumps were observed without any person pumping the water even though the handpumps are in working condition. About 11.0 per cent of handpumps each have the crowd of two to five and six to ten persons respectively. It is however difficult to arrive at the cut-off point for adequacy level based on

the magnitude of crowds near the source. It only provides some indication of level of demand for water at any given point of time in a day during the months of January and February.

Table 3.6: Percentage Distribution of Handpumps by Number of People Waiting to Collect Water from Handpump

(Refernce period in the year: January & February)

Region	None	One Person	Two to Five	Six to Ten	More than Ten	Total
Coast	57.2	7.1	9.5	9.5	16.7	100.0
Malnad Coast	23.5	5.9	8.8	5.9	55.9	100.0
Malnad Maidan	31.4	11.4	25.7	14.3	17.1	100.0
Southern Maidan	18.4	-	10.5	13.2	57.9	100.0
Central Maidan	9.4	3.1	6.3	9.4	71.8	100.0
North Central Maidan	14.6	4.9	14.6	9.8	56.1	100.0
Western Maidan	28.2	5.1	2.6	12.8	51.3	100.0
Northern Maidan	20.9	-	11.6	9.3	58.2	100.0
Eastern Maidan	17.9	3.5	10.7	17.9	50.0	100.0
STATE	25.3	4.5	11.1	11.2	47.9	100.0

It should be emphasized at this stage that population coverage per installed handpump as a measure of adequacy is inappropriate because, at any given point of time, on an

average, about 19.0 per cent of handpumps are under 'non-functional' status (including dry). Even if we treat non-potable handpumps as usable, the effective population coverage per handpump works out to be 264 persons, which falls below the adequacy level of 250. Even then, the effective coverage measure in 1990 is lesser than the measure in 1986.

3.4 Physical Potentialities of Installed Handpumps

Having presented various dimensions of distributional aspects of handpumps in the habitations, a careful examination has to be made on the physical characteristics and water potentialities of handpumps. This section presents an analysis of (a) depth of borewells, (b) static water levels, and (c) water yield rates of the installed handpumps; followed by physical efforts required and time taken to collect a unit of water from the handpumps.

Water Potentialities of Handpumps:

a) Depth of Borewells:

Water potentialities of a handpump is normally measured by the depth of the borewell, static water level and yield rate. Of these three, recording of static water levels are conducted by our Field Investigators with the help of PHE maintenance staff and

the other two are collected from the records of the PHE at sub-divisional level. These are appropriately classified and presented for analysis. Tables 3.7 and 3.8 gives the classification of handpumps by the depth of the borewells under region and year of installation (measures the age of the handpump). It can be seen from Table 3.7 that nearly one-third of the handpumps (33.0 per cent) in the state have the depth of 40 to 60 metres, many of them are in North Central and Western Maidan regions; 29.1 per cent of borewells in the state have their depths between 60 and 80 metres; in this group, Coast and Malnad Coast regions have the large number of handpumps; and only 9.0 per cent of handpumps are more than 80 metres deep, particularly in Eastern Maidan region. The depth of the remaining one-fourth of the borewells are less than 40 metres. This classification of borewells by region and depth do indicate the presence of significant variations in the borewell depths due to regional effect. From Table 3.8 it can be observed that borewells which were installed in earlier years have lower depths which is also substantiated from the statistical tests that, there is a significant relationship between the age and depth of the handpumps - younger the handpumps, deeper the borewell, particularly in the range of 80-100 metres of depth among the borewells dug after 1981.

Table 3.7: Percentage Distribution of Handpumps by the Depth of Borewell (in Metres) at the time of installation

Region	Less than 20	20 to 39	40 to 59	60 to 79	80 to 100	Total Hand-Pumps
Coast	2.4	11.9	31.0	42.8	11.9	100.0
Malnad Coast	11.1	8.3	22.2	44.5	13.9	100.0
Malnad Maidan	-	25.7	40.0	34.3	-	100.0
Southern Maidan	10.5	31.6	23.7	23.7	10.5	100.0
Central Maidan	-	25.0	37.5	31.3	6.2	100.0
North Central Maidan	12.2	19.5	53.7	12.2	2.4	100.0
Western Maidan	10.3	18.0	53.8	17.9	-	100.0
Northern Maidan	18.6	18.6	18.6	32.6	11.6	100.0
Eastern Maidan	7.1	17.8	17.9	28.6	28.6	100.0
STATE	8.4	19.5	33.0	29.1	9.0	100.0

Table 3.8: Percentage Distribution of Handpumps by Depth (in metres) and Year of Installation of Handpump

Year of Installation	Less than 20	20 to 39	40 to 59	60 to 79	80 to 100	Total Hand-pumps
1972-74	20.0	30.0	30.0	20.0	-	100.0
1975-77	-	50.0	37.5	9.4	3.1	100.0
1978-80	3.3	41.9	41.9	12.9	-	100.0
1981-83	3.3	18.9	44.4	27.8	5.6	100.0
1984-86	7.4	8.6	33.8	44.1	5.9	100.0
1987-89	14.0	7.0	19.8	36.0	23.2	100.0
STATE	8.4	19.5	33.0	29.1	9.0	100.0

b) **Static Water Levels of Handpumps:**

Similar to the classification of depth, the handpumps are classified by their static water levels. Tables 3.9 and 3.10 give such classifications. From 3.9 it is evident that at state level, a large proportion of handpumps - nearly 60 per cent - have the static water level within the depth of 10 metres (from top of the handpump). The proportion of borewells with static water level between 10 and 15 metres is 23.3 per cent and the remaining 17.4 per cent have more than 15 metres of static water level. Significant variations in static water levels are observed without any set pattern among the regions. However, when we examine age-wise classification of handpumps, we can easily observe from Table

3.10 that more and more recently installed borewells have deeper water levels i.e in the water level ranges of above 15 metres.

Table 3.9 Percentage Distribution of Functional Handpumps by Static Water Level (in Metres)

(Reference Period: January/February)

Region	Less than 5	5 to 9	10 to 14	15 to 19	20 and above	Total Handpumps
Coast	7.2	38.1	33.3	7.1	14.3	100.0
Malnad Coast	11.1	22.2	47.3	11.1	8.3	100.0
Malnad Maidan	17.1	37.1	42.9	2.9	-	100.0
Southern Maidan	7.9	47.4	28.9	10.5	5.3	100.0
Central Maidan	18.8	21.9	18.7	15.6	25.0	100.0
North Central Maidan	26.8	53.7	12.2	4.9	2.4	100.0
Western Maidan	7.7	48.7	15.4	20.5	7.7	100.0
Northern Maidan	67.4	20.9	-	4.7	7.0	100.0
Eastern Maidan	39.3	35.7	14.3	-	10.7	100.0
STATE	22.8	36.5	23.3	8.7	8.7	100.0

Table 3.10: Percentage Distribution of Functional Handpumps by Static Water Level (metres) and Year of Installation.

Year of Installation	Less than 5 metres	5 to 9 metres	10 to 14 metres	15 to 19 metres	20 and above metres	Total Hand-pumps
1972-74	70.0	20.0	-	-	10.0	100.0
1975-77	28.1	37.5	31.3	-	3.1	100.0
1978-80	29.0	29.0	16.2	12.9	12.9	100.0
1981-83	14.4	38.9	26.7	12.2	7.8	100.0
1984-86	16.2	48.5	17.6	7.4	10.3	100.0
1987-89	29.1	32.5	20.9	7.0	10.5	100.0
STATE	22.8	36.5	23.3	8.7	8.7	100.0

c) Yield Rate of Water:

Next to depth and static water level variables, water yield rate (liters per hour) of the borewell occupies an important place. The yield rates presented here are as recorded by the PHE Department at the time of installing the handpumps. Tables 3.11 and 3.12 present the distributional patterns of handpumps by size class of yield rates and year of installation. It can be seen from these tables that the state has two prominent levels of borewells - one is that the yield rate of nearly one-fourth of the handpumps is more than 3000 lph - and the yield rate of about one-firth of borewells is between 500 and 1000 lph. Among the remaining, almost they are equally divided with14 to 15 per cent each with the yield rates of 200 to 500, 1000 to 2000 and 2000 to 3000 lph respectively. Within the state, we can observe that from Coastal region to Southern Maidan region, the yield rates are

lower as compared to the higher yield rates in Central to Eastern Maidan regions. Statistical tests show that there are significant differences across the regions and also there is a significant relationship between the location (of region) and levels of water yield rates of handpumps. Such striking differences are not visible if the handpumps are classified by age and functional status as presented in Table 3.12.

Table 3.11: Percentage Distribution of Handpumps by Water Yield Rate (lph) at the time of installation.

Region	Less than 200 lph	200 to 400 lph	500 to 999 lph	1000 to 1999 lph	2000 to 2999 lph	3000 and above lph	Total
Coast	11.9	19.0	28.6	12.0	16.6	11.9	100.0
Malnad Coast	27.8	13.9	27.8	13.9	11.1	5.5	100.0
Malnad Maidan	11.4	17.2	17.1	17.2	20.0	17.1	100.0
Southern Maidan	21.1	26.3	23.7	23.7	5.2	-	100.0
Central Maidan	-	12.5	31.3	12.5	15.6	28.1	100.0
North Central Maidan	12.2	4.9	12.2	12.2	19.5	39.0	100.0
Western Maidan	12.8	-	15.4	12.8	15.4	43.6	100.0
Northern Maidan	23.3	2.3	9.3	18.7	16.2	30.2	100.0
Eastern Maidan	3.5	3.6	25.0	21.5	7.1	39.3	100.0
STATE	14.4	11.0	20.7	15.9	14.4	23.6	100.0

Table 3.12: Percentage Distribution of Functional Handpumps by Water Yield Rate (lph) and Year of Installation

Year of Installation	Less than 200 lph	200 to 499 lph	500 to 999 lph	1000 to 1999 lph	2000 to 2999 lph	3000 and above lph	Total
1972-74	20.0	-	10.0	10.0	-	60.0	100.0
1975-77	15.6	6.2	21.9	18.8	12.5	25.0	100.0
1978-80	9.7	16.1	12.9	16.1	19.4	25.8	100.0
1981-83	13.3	10.0	27.8	14.5	13.3	21.1	100.0
1984-86	8.8	14.7	22.1	10.3	17.6	26.5	100.0
1987-89	15.1	11.6	16.3	19.8	13.9	23.3	100.0
STATE	14.4	11.0	20.7	15.9	14.4	23.6	100.0

Taking into account the above three performance variables of the handpumps, one can examine whether there are any significant relations between them and if so, their degree of influence on each other. This part of analysis is not attempted here.

3.5 Operational Status of Handpumps:

The objective of providing a water source to rural community is not only to give access to the safe water but also to make available to them with minimum manual effort. In other words, the new sources should able to reduce the human drudgery significantly as compared to earlier traditional sources. An attempt is made here to examine the

manual efforts required to operate the handpump and the time taken to collect one pitcher of water on direct physical operation of the handpump by the Field Investigators. Table 3.13 gives the classification of handpumps by the degree of manual effort required to operate. The degree of manual effort is measured on five grade scale from "very hard" to "very easy" as given in the table. In this scale, "very hard" and "hard" to operate the handpump are taken where physical strain is significant. In which case, at the state level, 10.9 per cent of handpumps fall in very hard and hard categories; and a large proportion of such handpumps are in Malnad Coast, Malnad Maidan and Central Maidan regions as compared to other regions. While 49.2 per cent of handpumps are on prescribed level of operation, 39.9 per cent of handpumps are in easily operational group even by small children.

Another measure to assess the operational status of handpump, as mentioned earlier, is the time taken to fill one pitcher of water (approximately 15 liters). As in the earlier case, the test is also performed by the Field Investigators with all handpumps. Physical strain is involved significantly in operation of the handpump if it takes more than one minute to fill a pot of 15 liters of water. Table 3.14 gives three measures of time to fill one pot with regional classification.

CHART: 8 : MANUAL EFFORT TO OPERATE THE HANDPUMPS

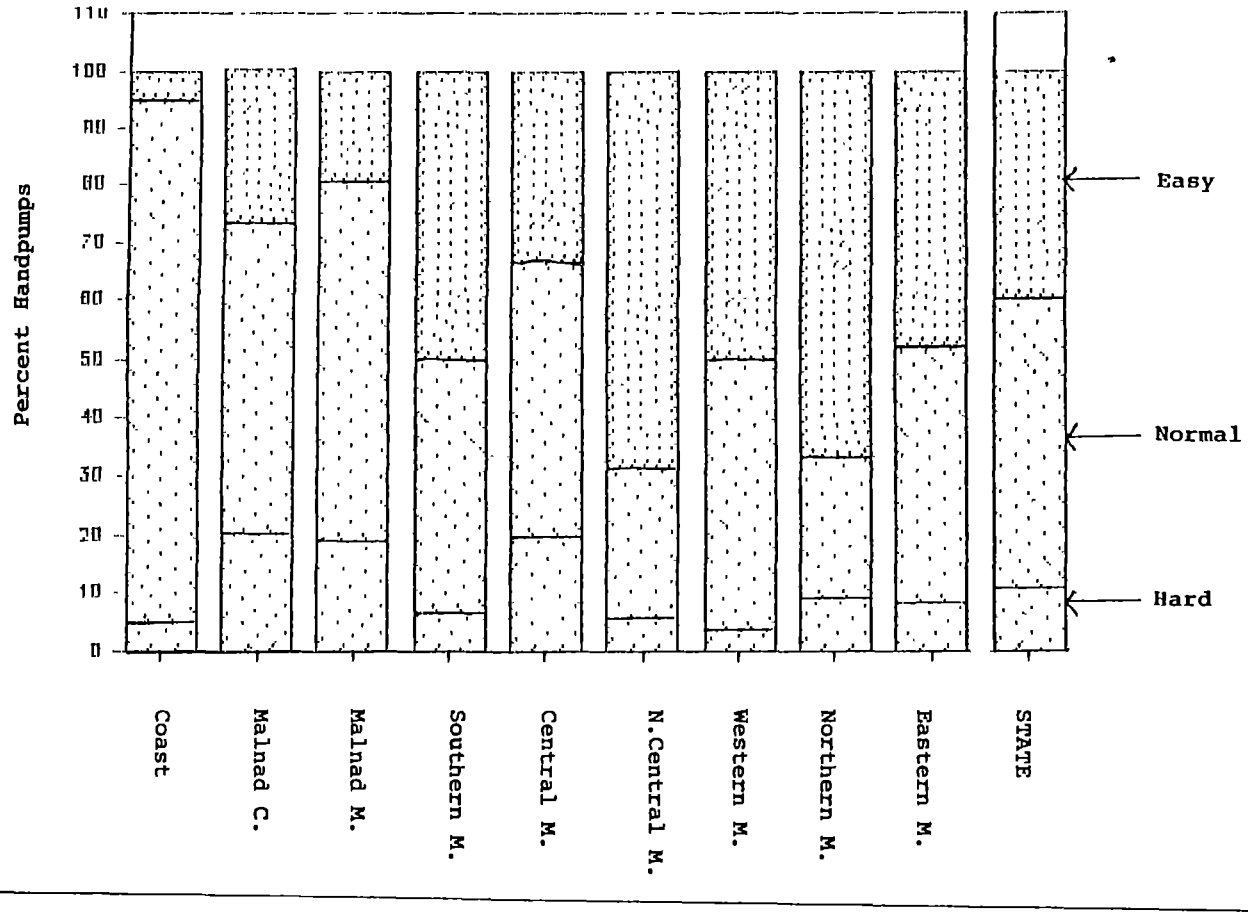


Table 3.13: Percentage of Functional Handpumps by the Degree of Manual Effort to Operate the Handpump

Region	Very Hard	Hard	Normal	Easy	Very Easy	Total
Coast	-	5.1	89.7	5.2	-	100.0
Malnad Coast	2.9	17.7	52.9	26.5	-	100.0
Malnad Maidan	-	19.3	61.3	16.1	3.3	100.0
Southern Maidan	-	6.7	43.3	50.0	-	100.0
Central Maidan	3.3	16.6	46.7	26.7	6.7	100.0
North Central Maidan	2.8	2.8	25.8	62.9	5.7	100.0
Western Maidan	-	3.6	46.4	50.0	-	100.0
Northern Maidan	3.0	6.1	24.3	57.6	9.1	100.0
Eastern Maidan	-	8.6	43.5	47.9	-	100.0
STATE	1.4	9.5	49.2	37.1	2.6	100.0

Table 3.14: Percentage Distribution of Functional Handpumps by the duration of time taken to fill one pot

Region	Half a Minute	Half to One Minute	More than One Minute	Total
Coast	61.5	25.6	12.9	100.0
Malnad Coast	17.9	53.6	28.6	100.0
Malnad Maidan	62.5	24.9	12.5	100.0
Southern Maidan	10.4	55.2	34.5	100.0
Central Maidan	13.8	44.8	41.4	100.0
North Central Maidan	28.6	28.6	42.8	100.0
Western Maidan	7.4	44.5	48.1	100.0
Northern Maidan	38.2	35.4	26.4	100.0
Eastern Maidan	31.0	38.3	30.6	100.0
STATE	30.6	39.2	30.2	100.0

It can be seen that at the state level, high degree of physical strain is involved in 30.2 per cent of handpumps as they require long duration to pump, whatever may be the level of manual effort employed on it. The extent of physical strain pumping the water is more in Central, North Central and Western Maidan regions as compared to others. Coast and Malnad Maidan regions have lesser degree of hardship with the handpump operation One reason for long duration to pump out the water is due to the erratic status of the handpumps (reasons for which will be examined shortly).

However, the degree of manual effort involved with the handpumps is in no way comparable with the real drudgery in terms of physical efforts, time and quality of water of the earlier traditional sources of water like tanks, wells, rivers etc.

3.6 Physical Environs of Handpumps:

While supply of borewells with handpumps is an aspect of the infrastructure for community welfare, maintaining its physical surroundings is another aspect that improves the life of handpump as well as the health of the community. Thus, the nature of physical environs of the handpump has a direct bearing on the health of the community. The standards and quality of platforms and drainages are prescribed in the construction manual of the handpumps. Nearly 5.0 per cent total cost of installation of handpump is assigned to this component. To examine the physical environs of handpumps, three variables are chosen for this study. They are: the quality and conditions of (1) platform, (2) drainage, and (3) extent of water accumulation. The qualities and condition of platform and drainage are measured on five grade scale at the time of field investigation. First two - "very good" and "good" are those, satisfying the required level of standards, and from "satisfactory" to "bad" and "very bad" are the degrees of damaged conditions requiring very minor repairs to complete reconstruction. For analysis purpose, the five grade scale is reduced to three levels - "good", "satisfactory" and "bad".

1) **Quality of Platforms:**

Using this three level scale, the physical condition of the platforms are presented in Table 3.15. It is evident from the table that in the state, 52.6 per cent of the platforms of handpumps are in good condition and 34.2 per cent of handpumps require minor repairs (classified as satisfactory); and 9.9 per cent of the handpumps require major repairs to complete reconstruction of platforms. It can also be seen that there are 3.1 per cent of handpumps without platforms and these are spread over all regions except Coast, Central and Eastern Maidan regions. Large number of handpumps with bad platforms are seen in Malnad Maidan, Western and North Central Maidan regions.

A revealing pattern emerges when the condition of platforms are classified by the age of handpumps. It can be seen from Table 3.16 that the proportion of bad platforms is higher in younger age group of handpumps, even though good platforms are available, particularly after 1980. This shows that a large number of platforms can easily be brought to good condition with minor repairs without delay.

CHART: 9 : CONDITION OF PLATFORM OF HANDPUMPS

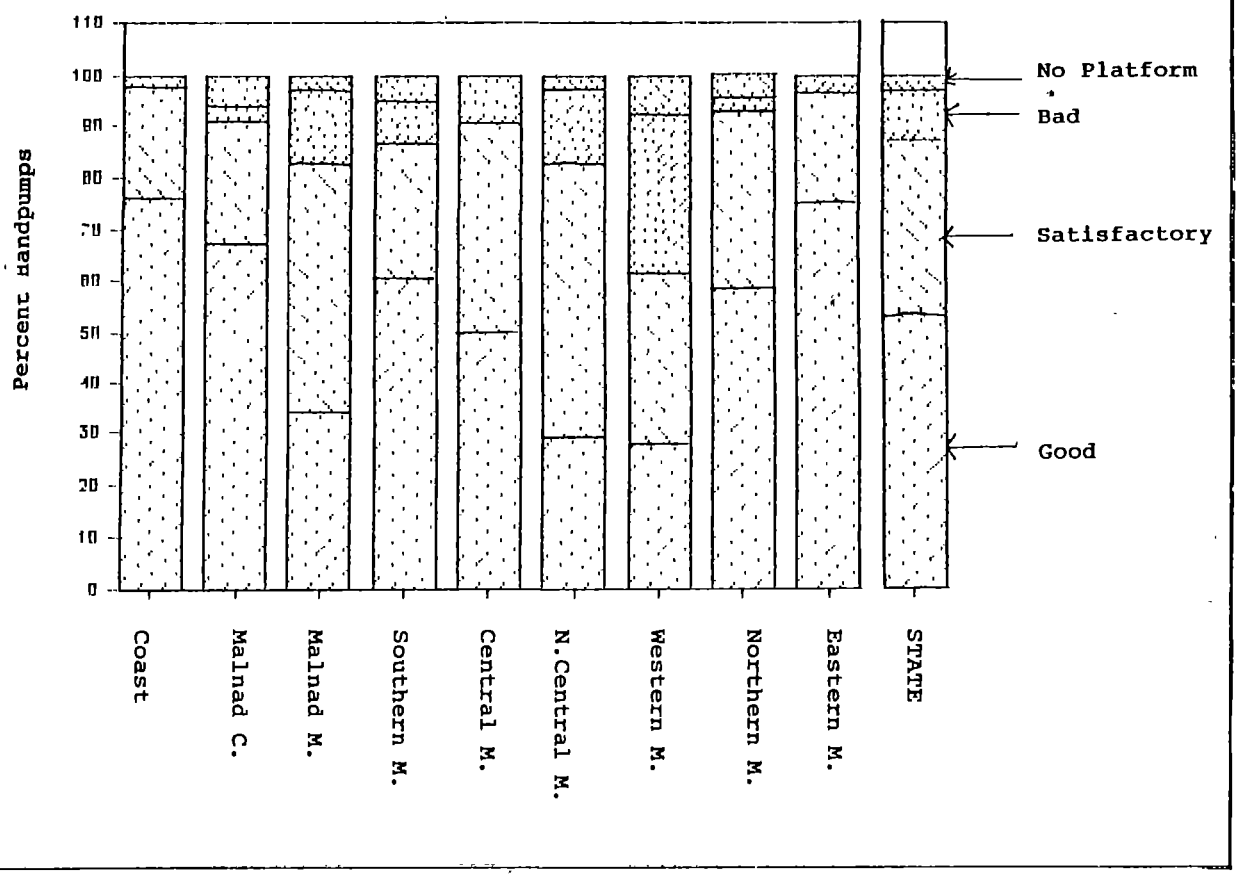


Table 3.15: Percentage Distribution of Installed Handpumps by the Condition of Platform

Region	Good	Satis-factory	Bad	No Platform	Total
Coast	76.2	21.4	2.4	-	100.0
Malnad Coast	67.6	23.5	2.9	5.9	100.0
Malnad Maidan	34.2	48.6	14.3	2.9	100.0
Southern Maidan	60.5	26.3	7.9	5.3	100.0
Central Maidan	50.0	40.6	9.4	-	100.0
North Central Maidan	29.2	53.7	14.6	2.4	100.0
Western Maidan	28.2	33.3	30.8	7.7	100.0
Northern Maidan	58.2	34.9	2.3	4.7	100.0
Eastern Maidan	75.0	21.4	3.6	-	100.0
STATE	52.8	34.2	9.9	3.1	100.0

Table 3.16: Percentage Distribution of Installed Handpumps by the Condition of Platform and Year of Installation

Year of installation	Condition of Platforms				
	Good	Satis-factory	Bad	No Platforms	Total
1972-74	25.0	62.5	-	12.5	100.0
1975-77	40.7	53.1	6.3	-	100.0
1978-80	51.6	35.5	9.7	3.2	100.0
1981-83	48.9	33.3	15.6	2.2	100.0
1984-86	54.4	35.3	10.3	-	100.0
1987-89	64.0	22.1	5.9	8.0	100.0
Total	52.8	34.2	9.9	3.1	100.0

2) **Quality of Drainage:**

Closely connected to the nature of platform, is the water drainage facility given to the handpumps. It can be seen from Table 3.17 that 11.5 per cent of handpumps in the state do not have the drainage at all, and most of them are in Western, Malnad and Maidan regions. Where drainage facility is given, such facility is in bad condition in the case of 13.8 per cent of handpumps. In this case also, poor quality drainages are more in Western, Malnad Maidans as well as Central and North Central Maidans. The proportion of handpumps which require minor repairs to drainages is 34.0 per cent, nearly at the same level of platforms. The remaining 41.6 per cent of handpumps have reasonably good platforms, particularly in Coast and Southern Maidan regions.

Age-wise classification of handpumps (not presented here) indicated that installations made after 1980 have better drainages and lesser proportion of handpumps are with bad drainages. Year of installation appears to be no bar in the case of handpumps without drainages, indicating that such handpumps are left to the natural drainage systems available nearby.

CHART: 10 : CONDITION OF DRAINAGE OF HANDPUMPS.

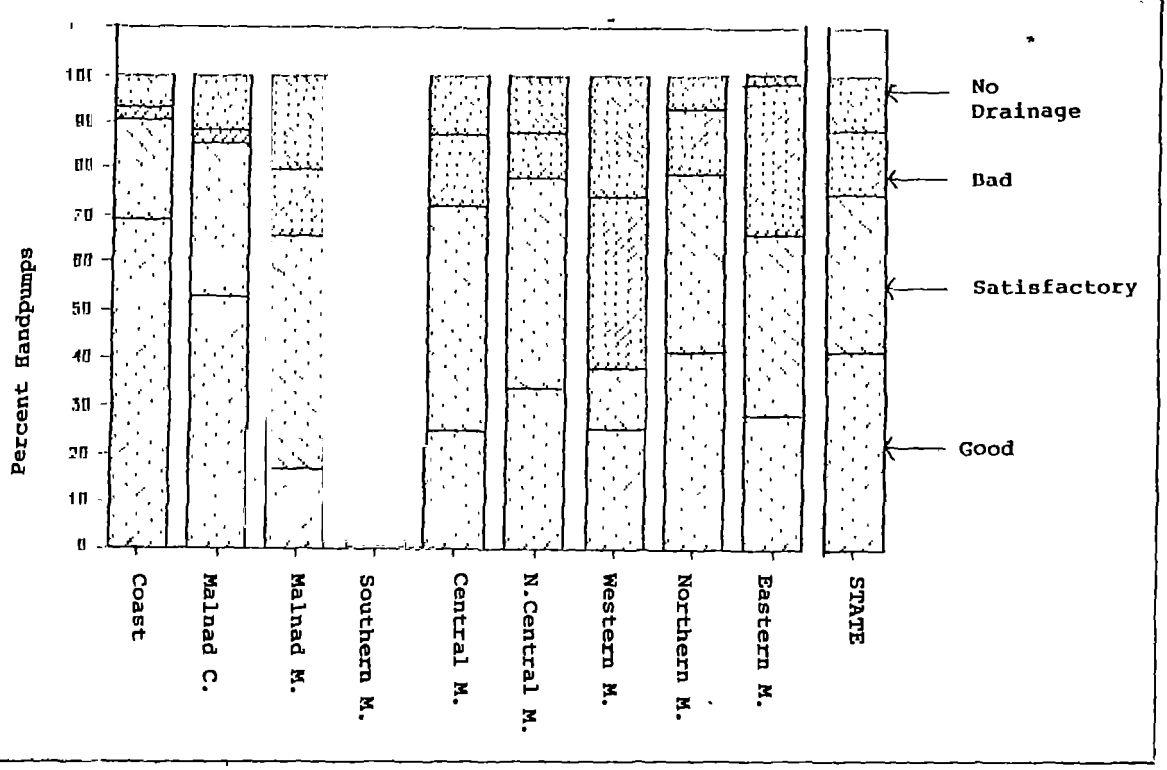


Table 3.17: Percentage Distribution of Installed Handpumps by the Condition of Drainage

Region	Good	Satis-factory	Bad	No Drainage	Total
Coast	69.1	21.4	2.4	7.1	100.0
Malnad Coast	52.9	32.4	2.9	11.8	100.0
Malnad Maidan	17.1	48.6	14.3	20.0	100.0
Southern Maidan	71.1	23.7	2.6	2.6	100.0
Central Maidan	25.0	46.9	15.7	12.4	100.0
North Central Maidan	34.2	43.9	9.7	12.2	100.0
Western Maidan	25.7	12.8	35.9	25.6	100.0
Northern Maidan	41.8	37.2	14.0	7.0	100.0
Eastern Maidan	28.6	37.7	32.1	3.6	100.0
STATE	41.6	33.1	13.8	11.5	100.0

o) Water Accumulation:

The consequence of either bad or damaged platforms or bad drainage facilities, or both, is the extent of water stagnation very near to the handpump. From Table 3.18, it can be seen that 18.2 per cent of handpumps have their surroundings with plenty of stagnant water accumulated for number of days. Relatively lesser stagnant water is observed in 31.9 per cent of handpumps. These two put together

constitute half of the handpumps in the state. Except in Coast and Malnad Coast regions, where use of handpumps are sporadic, and where natural drainages are available,. water accumulation is almost uniformly a common feature in all regions.

Table 3.18: Percentage Distribution of Installed Handpumps by the Extent of Water Accumulation

Region	Large Accumulation	Some Accumulation	No Accumulation	Total
Coast	-	16.7	83.3	100.0
Malnad Coast	-	15.6	84.4	100.0
Malnad Maidan	5.7	48.6	45.7	100.0
Southern Maidan	15.8	31.6	52.6	100.0
Central Maidan	37.4	31.3	31.3	100.0
North Central Maidan	25.0	42.5	32.5	100.0
Western Maidan	33.3	33.3	33.3	100.0
Northern Maidan	11.6	39.5	48.8	100.0
Eastern Maidan	42.9	25.0	32.1	100.0
STATE	18.2	31.9	49.9	100.0

The long term consequence of poor quality physical environs and unhygienic surroundings of the handpumps appear to be completely neglected by the public agencies and local communities. The expected benefits and improvements in community welfare and public health with the supply of safe water for use and consumption by handpump installation may be

defeated by the newly created unhygienic environments resulting in a net loss in huge capital investments. It is also true that the users of handpumps are largely responsible for creating such unhygienic environs and/or misuse of platforms handpumps and their surroundings. The extent of such cases of misuse or improper use of handpumps can be seen in the following section.

3.7 Use of Handpumps for other than Drinking Purpose:

Other than drinking and cooking, water is in any case required for bathing, washing cloths, cleaning domestic utensils and feeding and washing cattle. In many rural areas water sources like tanks, wells, rivers etc., are available for such purposes now, as well as earlier. The installations of handpumps, that too, very near to their habitations have created new types of habits - for convenience, that is, the use of handpump water for non-consumption purpose at the source. The purposes for which the handpumps are used by the people are recorded by the investigators at the time of their visit. Table 3.19 gives the distribution of handpumps that are being used for the purpose given therein.

It can be observed that people are found washing clothes near 14.5 per cent of handpumps; washing/cleaning the utensils near 12.9 per cent of handpumps and washing the cattle near 10.6 per cent of handpumps. Such practices are fairly uniform among all the regions and localities except in Coast, Malnad belt and North Central Maidans.

Table 3.19: Percentage Distribution of Functional Handpumps by Use for other than Drinking Purpose

Region	Washing Clothes	Washing Utensils	Washing Cattle	Water trough for cattle available
Coast	2.4	-	-	-
Malnad Coast	5.9	-	3.0	2.9
Malnad Maidan	8.6	34.3	2.9	2.9
Southern Maidan	21.1	21.1	5.3	10.8
Central Maidan	21.9	25.0	21.9	6.3
North Cenral Maidan	7.3	-	9.8	7.7
Western Maidan	20.5	17.9	33.3	-
Northern Maidan	14.0	11.6	9.3	-
Eastern Maidan	35.7	10.7	10.7	3.6
STATE	14.5	12.9	10.6	3.7

It can also be observed that wherever necessary, there is a provision for water trough near the handpumps for the purpose of cattle. Nearly 3.7 per cent of handpumps in the state have the facility of water troughs. Such troughs can be seen in Southern, Central and North Central Maidan regions.

3.8 Nature of Water:

After analyzing the physical environments and supply patterns of handpumps, an important aspect that require our attention is the nature of water available from the handpumps. In most of the areas, properly constructed borewells do not require treatment and the water drawn from them can be used for consumption purpose directly. However, all borewell waters may not be suitable for drinking, even though these are free from contamination.

Suitability of the borewell water cannot be judged until the bore is finally drilled and water is lifted up. Depending upon the degree of potability, handpumps are installed for community purposes. An examination of the degree of potability of water of the installed handpumps is attempted here. A major part of the information is collected from the records of PHE Department followed by physical verification at the field level. The nature of water is divided into two parts, viz., suitable and non-suitable. In each case again an element of grade is introduced to have deeper examination. For example, under 'suitable' sweet water and non-sweet (normal), and under 'non-suitable' (A) 'normal' - which can be used under emergency purposes even though it is slightly saline and below the quality of 'normal' under suitable class, (b) saline water and (c) others - which include unpalatable odour, oily, brackishness, high flouride contents etc. This classification is however not based on scientific experiments, but classified on the basis of the

experience Field Investigators on the taste of water. Table 3.20 gives the classification of functional handpumps by the nature of water. This table shows that as many as 77.1 per cent of handpumps give water suitable for consumption; of them 52.2 per cent give sweet water and 24.9 per cent normal waters. Coast and Western Maidan regions have lesser proportion of potable water handpumps with 56.7 per cent and 49.9 per cent respectively, as compared to other regions. On the other hand, non-potable handpumps constitute 22.9 per cent in the state and one-half of them endowed with saline water. Salinity is the major problem with the handpumps in Western (43.8 per cent), North Central (18.0 per cent), Central (13.8 per cent) and Eastern Maidan (11.1 per cent) and Coastal region (9.8 per cent). Oily nature of water is observed mostly in Coast (28.3 per cent) and to some lesser extent in Malnad Coast, Northern and in some parts of North Central Maidan regions. Though not suitable for drinking, water with slight salinity are found in almost all regions except Southern region with higher proportions are found in Eastern (11.1 per cent) and Malnad Coast (8.8 per cent) regions.

At this stage, we have to make a revisit to the analysis of 'adequacy' of safe water sources discussed earlier in this chapter. Earlier we found that 81.0 per cent of installed handpumps are under functional status. We have now shown that 22.9 per cent of handpumps give water not suitable for drinking. Thus, both put together, effectively and at any point of time, 41.9 per cent of the handpumps

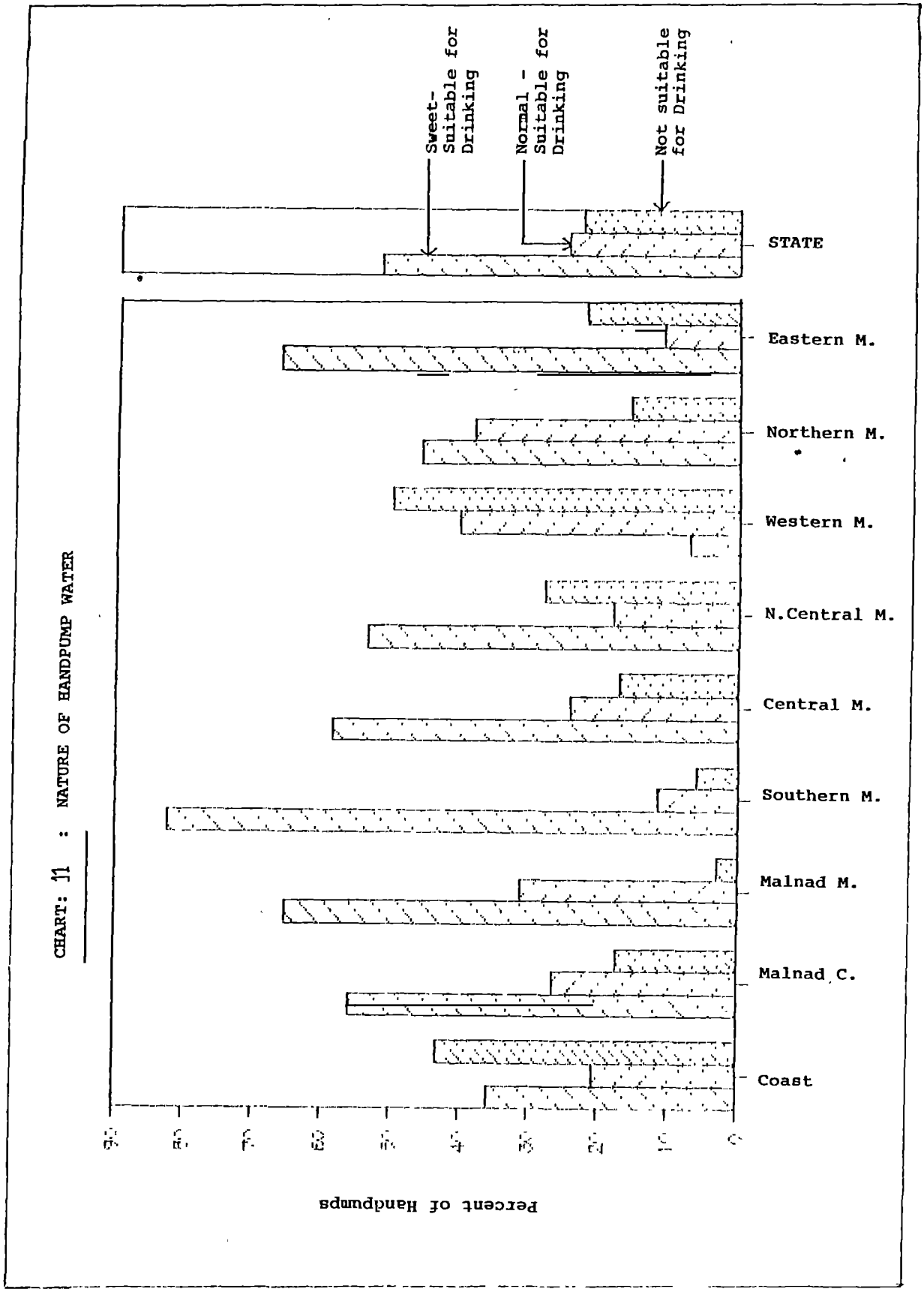


CHART: 11 : NATURE OF HANDPUMP WATER

Table 3.20: Percentage Distribution of Functional Handpumps by Nature of Water

Region	Suitable for Drinking		Not suitable for Drinking			Total
	Sweet	Normal	Slightly Saline	Saline	Others	
Coast	36.1	20.6	5.2	9.8	28.3	100.0
Malnad Coast	55.9	26.5	8.8	-	8.8	100.0
Malnad Maidan	65.6	31.2	3.2	-	-	100.0
Southern Maidan	82.4	11.7	-	5.9	-	100.0
Central Maidan	58.6	24.2	3.4	13.8	-	100.0
North Central Maidan	53.8	18.0	7.6	18.0	2.5	100.0
Western Maidan	9.7	40.3	6.2	43.8	-	100.0
Northern Maidan	46.1	38.4	5.2	5.2	5.2	100.0
Eastern Maidan	66.7	11.1	11.1	11.1	-	100.0
STATE	52.2	24.9	5.6	11.8	5.5	100.0

Note: 'Others' include unpalatable odour, brackishness, high flouride contents etc.

that is, non-functional and non-potable handpumps are not available for consumption purposes at the state level. Consequently, the effective adequacy levels of handpumps - measured in terms of "'Population coverage per handpump' gets reduced to 361 persons per handpump from the level of 214 persons per 'installed' handpump.

CHAPTER IV

USER'S EVALUATION OF HANDPUMP PROGRAMME

In this Chapter, the users' views, attitudes, perceptions, use patterns of water are examined. The Chapter is organized in the following order:

Section One briefly examines the characteristics of the respondents; Sections Two and Three present the nature and problems involved in the use of old sources of water by the households; Section Four deals with the health and changing patterns of habits of households; Section Five presents the views and preferences of users on environs of the handpumps; Section Six examines the users suggestion for operation of handpumps; Section Seven is devoted to examine the accessibility of handpumps for cross section of communities; Section Eight presents the users perceptions and tastes on handpump water; and Section Nine presents the reasons for use of old sources in the presence of handpumps;

4.1 Characteristics of Household Respondents

A total number of 570 households were contacted and canvassed the household schedule. The information collected from household respondents consists of:

i) Water sources used before and after installation of handpumps;

ii) Their knowledge about the process of installations, nature of water, use patterns of water;

iii) Their views and observations on repairs and maintenance,and problems involved with the old and new sources;

iv) Views, attitudes and perceptions on new water sources;

v) Past and present health habits;

vi) Their attitudes towards environs of handpump installations and

vii) views towards cost sharing proposals etc.

Before attempting to present the above aspects in this Chapter and the next, it is necessary to examine the nature and type of respondents themselves. A brief description of respondents is presented here. Three variables are selected for the purpose; they are : (i) Caste (ii)sex and (iii) status of the respondents.

(i) **Caste composition**

Of the total respondents, 56.2 per cent of respondents belong to known general Caste groups,24.9 per cent belong to scheduled caste (SC) and 6.1 per cent belong to scheduled tribe (ST). The Caste of about 12.7 per cent of the respondents could not be classified in view of vagueness. The Caste composition by regions show that, North Central, Western and Northern Maidan regions have a large proportion of SC communities.. The Central and North Central Maidan regions have higher proportion of scheduled tribes. It is also interesting to note that the proportion of scheduled caste respondents are higher in the case of early installations and the proportion decreases as the age of

handpump decreases indicating that in the beginning, more emphasis was given to the scheduled caste localities.

ii) Sex composition

The sex composition of respondents are fairly equally distributed with 50.3 per cent of male and 49.7 per cent of female adults. Female responding rate is higher in coast,Malnad Coast,Southern, and Central Maidan regions. Also, smaller the habitation, larger the proportion of female respondents. Female respondents are very few from scheduled tribes.

iii) Status of Respondents

From among the total respondents, 44.4 per cent of respondents are housewives; 36.6 per cent have the status of 'head of the households'; a small proportion of 0.5 per cent are panchayat members with some degree of political background; and 18.4 per cent belong to other members of the households such as sons, daughters, daughter in-laws, and government servants etc. One third of the respondents among the group of panchayat members are from SC communities and the remaining from general castes.

4.2. Water Sources used before Installation of Handpumps:

Before examining the responses on handpumps, an enquiry was made with the households to know the water sources used before installation of the handpumps.

Table 4.1 presents the sources used by households for drinking and cooking (consumption) and for other domestic purposes. It can be seen that open wells such as community well, own well or private well were the main source for nearly 76 per cent of the households for drinking and cooking, followed by flow water, i.e.,river or canal, which constitute 13.0 per cent. Stagnant water sources such as tanks and ponds were used by 4.5 per cent of households. Use of stagnant water sources were more in Malnad Maidan and Western Maidan regions.

For the purpose of other domestic purposes such as washing clothes and bath,tanks and ponds were used by nearly 22.2 per cent of households, followed by by 24.7 per cent of households using flow water and the open wells were used by the remaining households.

4.3. Main problems with old sources

The respondents have identified some of the major problems with the old sources and have given their order of problems. Some important problems identified with the old sources are presented in Table 4.2. Three major problems appear to be of serious nature to the households. They are (i) distance, (ii) insufficiency and (iii) source going dry. Poor quality and hazardous to health as reported as major problem constituted only 1.4 per cent. This indicates that the respondents felt the physical problems as more serious

Table 4.1: Percentage Distribution of Households by Source used for Drinking and Cooking before Installation of Handpumps

Region	Community Well	Own Well	Private Well	Tank/ Pond	River	Canal	Others	Total
Coast	25.9	33.4	34.6	1.2	4.9	-	-	100.0
Malnad Coast	32.8	31.0	34.5	-	-	1.7	-	100.0
Malnad Maidan	68.3	1.7	5.0	13.3	-	11.7	-	100.0
Southern Maidan	53.7	13.4	22.9	6.0	-	-	3.0	100.0
Central Maidan	63.8	-	19.0	-	17.2	-	-	100.0
North Central Maidan	30.6	2.8	1.4	-	31.9	8.3	25.0	100.0
Western Maidan	47.4	3.5	-	22.8	-	-	26.3	100.0
Northern Maidan	50.0	-	17.7	-	29.0	-	3.2	100.0
Eastern Maidan	72.2	3.7	14.9	-	9.3	-	-	100.0
TOTAL Drinking and Cooking	48.0	10.7	17.3	4.5	10.5	2.5	6.5	100.0
TOTAL Washing and Bath	14.4	8.6	16.3	22.2	14.0	10.7	13.7	100.0

Table 4.2: Percentage Distribution of Households by Severity of Problem in the Use of Earlier Sources

Region	Distance	Not sufficient	Goes Dry	Poor Quality/ Health Hazard	Others/ No Problem	Total
Coast	9.0	91.0	-	-	-	100.0
Malnad Coast	18.2	32.7	45.5	-	3.6	100.0
Malnad Maidan	40.0	40.0	1.7	1.7	16.6	100.0
Southern Maidan	25.8	25.7	48.5	-	-	100.0
Central Maidan	44.8	22.4	32.8	-	-	100.0
North Central Maidan	38.9	22.2	27.8	1.4	1.4	100.0
Western Maidan	32.7	10.9	47.3	5.5	3.6	100.0
Northern Maidan	45.3	3.1	51.6	-	-	100.0
Eastern Maidan	25.9	40.7	27.8	5.6	-	100.0
STATES	30.8	33.6	30.4	1.4	3.8	100.0

than the quality of water or injury to the health. Poor quality of water was reported mainly from Eastern and Western Maidan regions.

Closely connected to the physical problems, the description of the persons who bring water from the old sources also provide an interesting information. From Table 4.3 it can be seen that by and large, adults used to bring water everyday. Of them, the share of female adults was 9[illegible].2 per cent. It is also interesting to see that female children were used to bring water in Southern and Central Maidan regions.

Another problem with old sources was the time involved in collecting one/two pots of water for consumption or domestic purposes. During those days, however, fetching water was treated as one of the daily activities equated with the duties of household members, particularly female adults. It can be seen from Table 4.4 that nearly 5.0 per cent of households reported that they use to take half-an-hour or more to bring one pot, and if the requirement is more than one pot, the time used to be multiple of the above. This is, in addition to the physical strain involved in walking, lifting and carrying the load of water. Longer durations for collecting water are observed from Southern Maidan region to all other upper regions in the state. The distance involved with the old sources in comparison with new handpumps can be seen in Table 4.5. There is significant relationship between time and distance, such as longer the

distance of the source, longer the time consumed. For example, fetching water from the source involved more than half-a-kilometre in the case of 15.9 per cent of the households, mostly from the Northern regions of the state. Sources used within a distance of 100 metres was only in the case of 7.0 per cent of the households particularly in Coastal and Malnad regions, most of them were using own wells. For a preliminary comparison, we can observe that, the installation of handpumps has significantly reduced the problem of longer distances involved with old sources.

At this stage, it is of some importance to state that the use of unsafe water sources for consumption was no doubt affecting the health of the rural communities. There was this problem of the human drudgery involved in securing a pitcher of unsafe water for drinking purposes. Women, by virtue of their predominant functions at home and being the primary users of water for domestic purposes, they were the most affected and most vulnerable to the water borne diseases. To a large extent, the women are the most benefited section of the rural society from the handpump programme.

Table 4.3: Percentage Distribution of Households and Type of Water Carriers before Installation of the Handpump

Region	ADULTS		CHILDREN		Total
	Male	Female	Male	Female	
Coast	2.5	97.5	-	-	100.0
Malnad Coast	-	98.3	1.8	-	100.0
Malnad Maidan	10.0	90.0	-	-	100.0
Southern Maidan	1.5	95.5	-	3.0	100.0
Central Maidan	3.5	94.8	-	1.7	100.0
North Central Maidan	5.5	93.1	-	1.4	100.0
Western Maidan	14.6	85.5	-	-	100.0
Northern Maidan	1.6	98.4	-	-	100.0
Eastern Maidan	5.6	92.6	1.8	-	100.0
TOTAL	4.8	94.2	0.4	0.6	100.0

Table No.4.4: Percentage Distribution of Households by Time (in Minutes) taken to bring one/two pots of Water from Old Source

Region	Less than 15 Minutes	15 to 30 Minutes	30 to 60 Minutes	More than 60 Minutes	Total
Coast	88.9	8.6	2.5	-	100.0
Malnad Coast	87.5	12.5	-	-	100.0
Malnad Maidan	55.0	43.3	1.7	-	100.0
Southern Maidan	72.7	21.2	6.1	-	100.0
Central Maidan	64.8	25.9	5.6	3.7	100.0
North Central Maidan	58.3	36.1	4.2	1.4	100.0
Western Maidan	63.6	29.1	5.5	1.8	100.0
Northern Maidan	73.4	25.0	-	1.6	100.0
Eastern Maidan	74.1	13.0	9.3	3.6	100.0
TOTAL	71.4	23.7	3.7	1.2	100.0

CHART:12 DISTANCE OF WATER SOURCES: OLD SOURCES AND HANDPUMP

KARNATAKA

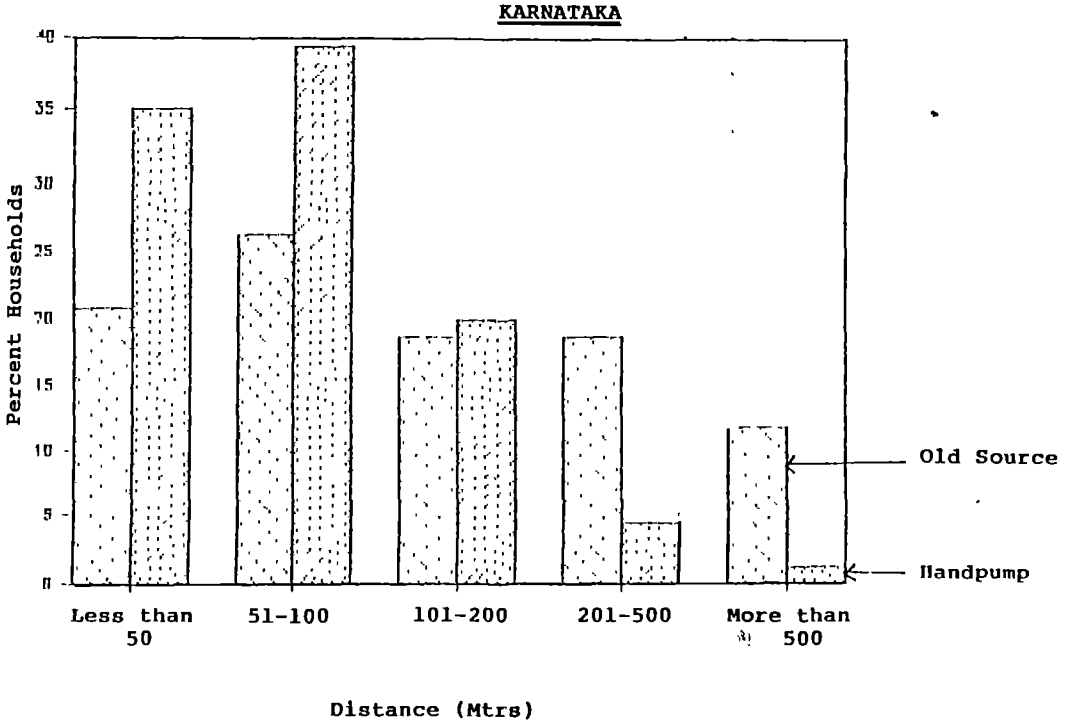


Table 4.5: Percentage Distribution of Households by Distance of the Source (in metres) from the House

Region	Old Source						New Source (Handpump)					
	Less than 50	51-100	101-200	200-500	500-1000	More than 1000	Less than 50	51-100	101-200	200-500	More than 500	Total
Coast	44.4	38.3	7.4	9.9	-	-	25.9	65.4	8.6	-	-	100.0
Malnad Coast	39.7	22.4	18.9	10.3	8.6	-	29.3	31.0	27.6	10.3	1.7	100.0
Malnad Maidan	16.7	31.7	26.7	5.0	13.3	6.7	45.0	40.0	13.3	1.7	-	100.0
Southern Maidan	22.7	37.9	10.6	16.8	7.6	4.5	53.7	19.4	14.9	1.0	1.5	100.0
Central Maidan	15.5	13.8	31.0	29.3	10.3	-	29.3	32.8	34.5	3.5	-	100.0
North Central Maidan	4.2	18.1	18.1	27.8	27.8	4.1	37.5	45.8	13.9	2.8	-	100.0
Western Maidan	5.4	25.0	17.9	21.4	16.1	14.3	35.1	31.6	26.3	3.5	3.5	100.0
Northern Maidan	1.6	15.6	23.4	40.6	12.5	6.3	18.8	43.7	31.3	6.2	-	100.0
Eastern Maidan	33.3	29.6	18.5	5.6	11.1	1.9	43.4	35.9	13.2	1.9	5.7	100.0
TOTAL	20.8	26.2	18.6	18.6	11.8	4.1	35.1	39.5	19.8	4.4	1.2	100.0

4.4. Health and Changing Patterns of Habits

The incidence of diseases like Gastro enteritis, cholera, dysentery, diarrhea etc. which are more endemic, are regarded as water related and water borne diseases caused due to consumption of unsafe water. Though such experiments establishing the extent to which water is responsible are not readily available, some results towards indicating, to what extent 'Morbidity Rates' can be reduced if the improvements in quality, availability and disposal of water is made. From Table 4.6 we can see that if water quality is improved, the DMR is reduced by 16 per cent; if water availability is improved, the DMR decreases by 37 per cent.

Table 4.6: Reduction in Diarrheal Morbidity Rates due to Improvement in Water Quality

Improvement in	% reduction in Diarrheal Morbidity rate (DMR)
1. Water Quality	16
2. Water availability	25
3. Water quality and availability	37
4. Excreta disposal	22

Source: Saul Arlosoroff et.al., op.cit., p.24.

2.

From our earlier examination,we have some evidence that the installation of handpumps has substantially improved the quality and availability of drinking water in rural areas as compared to the old sources.

While this is one important aspect, equally important are the health habits of the rural community that contribute to the hygiene and living standards of the people. In the context of water, the change in health habits can be expected through two indications: i) Change in bathing habits and ii) Change in the frequency of washing clothes.

These two are not exact measures to quantify the improvement in health, but nevertheless, they are the only readily available and easily measurable indicators from the point of social development. Tables 4.7 and 4.8 give changes in the frequency of bathing habits and frequency of washing clothes before and after installation of the handpumps. It is easy to observe that the frequency of taking bath everyday has significantly increased from 24.4 per cent of households to 48.8 per cent. Consequently we can also observe the reduction in bathing once in two to four days from 55.3 per cent to 33.1 per cent and from 19.4 per cent to 18.2 per cent in the case of higher duration frequencies. This habit is however influenced by the local habits in different regions. For example, there is no significant change in regular bathing habits in coast and Malnad coast, as against an enormous shift towards daily bathing among the people in Malnad ,central and Eastern Maidan regions.

CHART:13 : CHANGE IN BATHING HABITS OF HOUSEHOLDS: BEFORE AND AFTER INSTALLATION OF HANDPUMPS

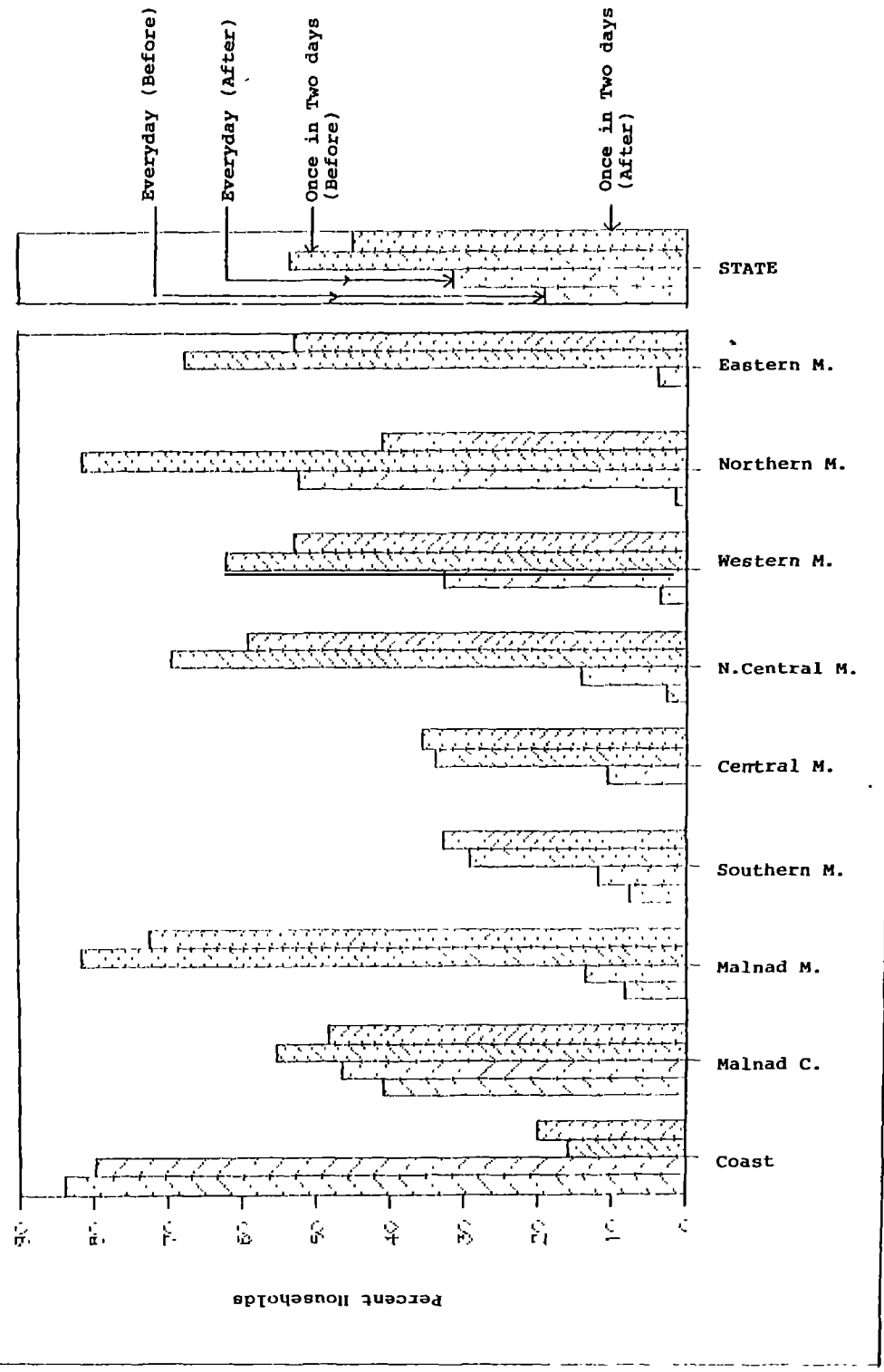


Table 4.7: Percentage Distribution of Households by Frequency of Bathing: Pre and Post Installation of Handpumps

Region	Everyday		Once in 2 to 4 days		Once in more than 4 days	
	Before	After	Before	After	Before	After
Coast	83.3	84.0*	16.7	16.0	-	-
Malnad Coast	79.3	85.1	19.0	14.8	1.7	-
Malnad Maidan	10.8	65.2	82.5	30.8	6.7	4.0
Southern Maidan	10.6	33.3	34.1	50.0	55.3	16.8
Central Maidan	0.9	40.6	55.1	46.9	44.0	12.5
North Central Maidan	4.2	NA	84.7	NA	11.1	NA
Western Maidan	2.8	5.0	75.4	60.0	21.8	35.0*
Northern Maidan	6.3	NA	77.3	NA	16.4	NA
Eastern Maidan	4.6	57.1	72.2	28.6	23.2	14.3
TOTAL	24.4	48.8	55.3	33.1	19.4	18.2

Note: * These should be treatee as 'no change'.

CHART: 14 : CHANGE IN FREQUENCY OF WASHING CLOTHES BY HOUSEHOLDS: BEFORE AND AFTER INSTALLATION OF HANDPUMPS

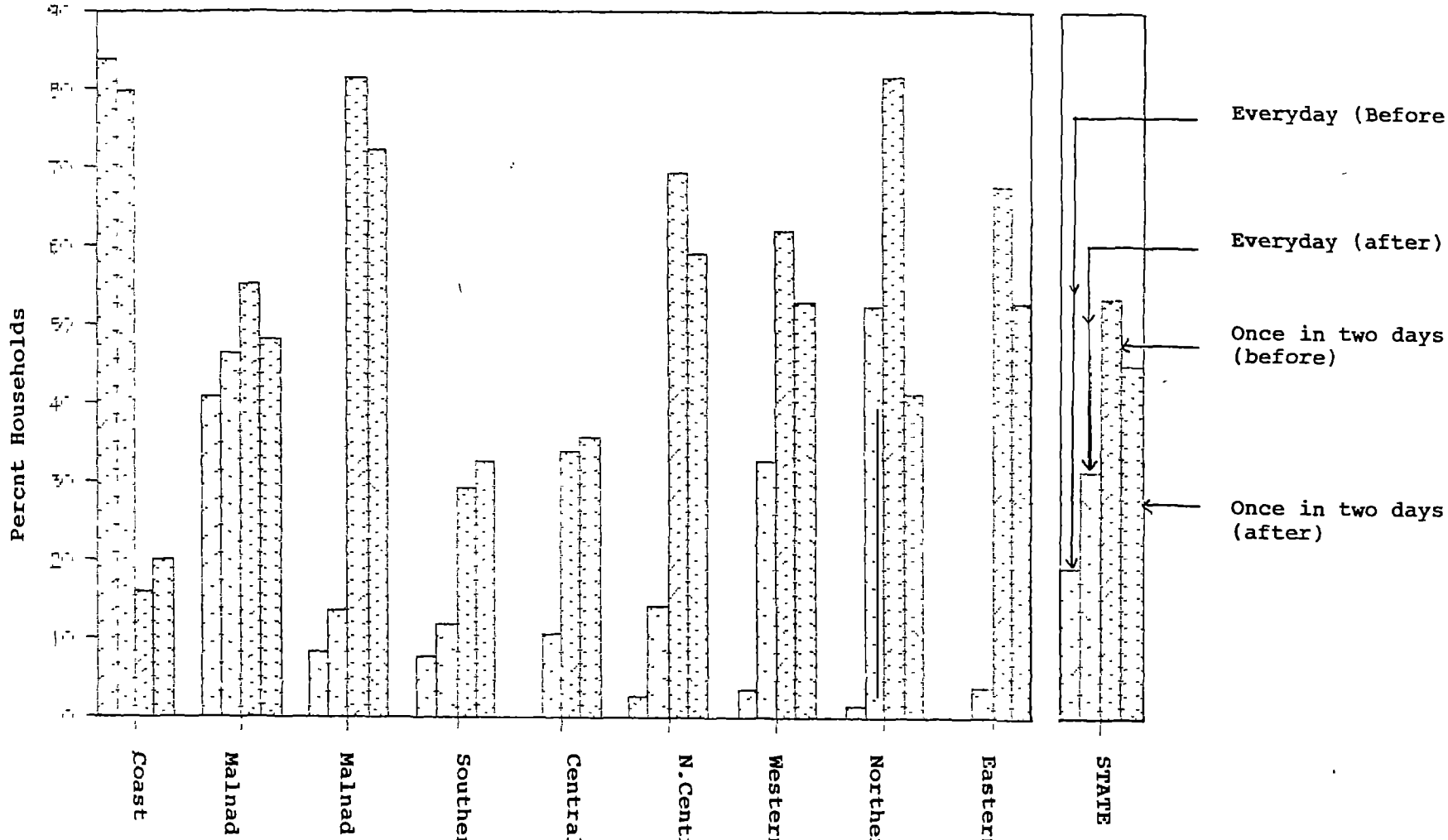


Table 4.8: Percentage Distribution of Households by Frequency of Washing Clothes: Pre and Post Installation of Handpumps

Region	Everyday		Once in 2 to 4 days		Once in more than 4 days	
	Before	After	Before	After	Before	After
Coast	84.0	79.8*	16.0	20.3	-	-
Malnad Coast	41.1	46.6	55.4	48.3	3.6	5.2
Malnad Maidan	8.3	13.8	81.6	72.4	10.0	13.8
Southern Maidan	7.7	11.9	29.2	32.8	63.1	55.2
Central Maidan	-	10.7	33.9	35.7	66.1	53.6
North Central Maidan	2.8	14.1	69.4	59.2	27.8	26.8
Western Maidan	3.8	32.7	62.2	53.1	33.9	14.3
Northern Maidan	1.7	52.4	81.7	41.3	16.7	6.4
Eastern Maidan	-	4.1	67.9	53.1	32.1	42.9*
TOTAL	19.1	31.5	53.8	45.1	27.2	23.5

Note: * These should be treatee as 'no change'.

Similarly, the change towards higher frequency of washing clothes can be seen from Table 4.8. It is evident that 19.1 per cent of households used to wash their clothes everyday before installation of handpumps, and after installation, 31.5 per cent of households joined the group. The regional variations are similar to those of changes in bathing habits. The changes in longer durations i.e., washing clothes once in 2 to 4 days and once in more than 4 days, are indicative of a positive influence of handpump installations. It should be reminded here that in general, easy access to safe water alone may not bring drastic changes in maintenance of clothing. Other factors and influences such as sophistication and economic conditions also play an important role. Yet, availability and easy access to water is foremost in bringing better and healthy habits, particularly in drought prone areas like Northern, Western and North central Maidan regions of the state, where significant changes are noticed. In addition, it is a common feature in rural areas that children coming from school or coming from work and on their way, using the handpump to wash their feet and hands or sometimes taking bath also. If these habits are appropriately fashioned, people might unconsciously become aware of cleanliness and hygiene. What is required is a systematic awareness campaign with suitable messages on health and water use through visual, audio and folk modes of communications.

4.5. Views and Preferences of Users on Environs of Handpumps

Before going into use patterns, the users were asked to give their views on the environs of the handpumps and based on their views, they were asked to give their preferences or suggestions on upkeep of the surroundings and the proper operation of the handpumps. Without going into minute details like platform, drainage etc., they were asked to rank the quality of surroundings similar to the quality ranking maintained by the investigators on platforms, drainage etc. Their qualitative ranking of surroundings of handpumps is presented in Table 4.9.

Table 4.9: Percentage Distribution of Households by their Views and Preferences on the Surroundings of the Source

Region	Good	Satisfactory	Bad	Total
Coast	34.2	58.2	7.6	100.0
Malnad Coast	69.7	23.2	7.1	100.0
Malnad Maidan	20.7	69.0	10.3	100.0
Southern Maidan	40.0	29.2	30.8	100.0
Central Maidan	58.4	18.3	23.3	100.0
North Central Maidan	68.5	26.0	5.5	100.0
Western Maidan	70.0	20.0	10.0	100.0
Northern Maidan	83.8	16.2	-	100.0
Eastern Maidan	69.4	24.5	6.1	100.0
TOTAL	56.1	32.6	11.3	100.0

It can be seen that 56.1 per cent of users reported that in their opinion, the surroundings of the handpump they are using is "good". 32.6 per cent of households expressed a satisfactory mark, while 11.3 per cent reported that the surroundings are "bad". These views are only indicative of the feelings and grading capacities of the local users about the handpumps which they are using for days together. Yet, when specifically asked, they started thinking about the qualitative nature. This is what is required, such that a clear feeling emerges express in appropriate form. It should also be cautioned that substantial variations are present between what is "recorded" by Investigators and what is "reported" by the users. These may be treated separately as two different views.

4.6. Users Suggestions for Operation of Handpump

Here again, after a series of questions on cleanliness of the handpumps, the users were asked about their suggestions for operation of handpumps. By this time, the users have realized the usefulness and importance of handpumps and they were convinced that "smooth and careful operation" by the users is most important aspect to sustain the handpump for longer duration. From Table 4.10, it is evident that nearly 83.2 per cent of respondents are positive towards careful use of handpumps; 14.1 per cent of respondents had the bad experiences of observing misuse of handpumps and they suggest not to allow rough, careless and

misuse of handpumps by users. This phenomena is observed mostly in northern parts of the state.

Table 4.10: Percentage Distribution of Households by their Suggestions on Operation of Handpump

Region	Smooth and Careful operation	Rough careless and misuse of HP should be avoided by all users	Users should understand the usefulness of HP	Total
Coast	96.9	-	3.0	100.0
Malnad Coast	100.0	-	-	100.0
Malnad Maidan	100.0	-	-	100.0
Southern Maidan	88.9	2.8	8.3	100.0
Central Maidan	100.0	-	-	100.0
North Central Maidan	75.5	23.9	-	100.0
Western Maidan	-	100.0	-	100.0
Northern Maidan	13.6	82.4	-	100.0
Eastern Maidan	57.1	42.9	-	100.0
TOTAL	83.2	14.1	2.7	100.0

4.7. Access to the Handpump for Other Community

As a public service, the use of community water supply in principle, is not restricted to any one class or caste of the society. But in reality, the traditional practices and social systems of the country are creating barriers in achieving the national objective of social justice and equality. The specially earmarked central and state government budget allocations under social and economic services for the upliftment and benefit of the socially backward sections like SC and ST communities have to some extent reduced the social conflicts. Yet, the symptoms of caste discrimination are prevailing at least in the context of the public service like community water supply in rural sector. An attempt is made here to examine the extent of discriminatory attitudes towards accessibility of handpumps to other communities in their respective localities and the main reasons thereof. Table 4.11 gives the responses of one community users about type of accessibility to other communities. It can be seen that 65.5 per cent of general caste (other than SC/ST) respondents mentioned that there is a regular access to SC and ST community people. On the other, extreme 3.2 per cent of general caste households reported that there was no access to SC or ST caste people. From Table 4.12, the main reasons given for "no access" to SC and ST are: (i) 47.2 per cent told that other community people have a separate source; 38.2 per cent gave the reason of "distance" and the remaining 14.6 per cent of respondents

mentioned that the main reason is local tradition of caste differences, mostly from North Central region. For general caste users, political difference is of little importance.

In the case of SC respondents about the accessibility of handpump in their area to other caste and ST communities, 58.2 per cent of them reported that other caste people have access and 13.8 per cent clearly said that other caste users have no access. The main reason given by them is the distance of sources. They have a mix of local political differences and caste barriers as reported by 6.1 per cent of users. Such cases are more so in coast, Southern and North Central Maidan regions. In the case of ST users, accessibility to other handpumps is not serious (in terms of "no problem" response). Where such problem is involved, the main reason appears to be political differences of local nature.

Table 4.11: Percentage Distribution of Households by Their Views on Access to Other Community People to the Handpump

Region	Other Castes to SC/ST		SC to ST/ Other Castes		ST to Other Castes/SC	
	Access	No Access	Access	No Access	Access	No Access
Coast	96.6	-	36.7	-	16.4	-
Malnad Coast	64.3	7.1	48.3	10.7	10.7	7.1
Malnad Maidan	91.7	8.3	80.0	20.0	28.3	3.3
Southern Maidan	79.7	3.1	72.7	8.0	37.8	-
Central Maidan	57.0	8.9	74.2	17.3	75.0	7.1
North Central Maidan	50.7	-	38.9	31.9	50.0	8.8
Western Maidan	46.0	2.7	56.0	24.0	20.0	-
Northern Maidan	44.2	-	60.6	21.2	21.3	2.1
Eastern Maidan	37.0	-	66.7	1.9	25.9	1.9
TOTAL	65.5	3.2	58.2	13.8	31.8	3.5

Table 4.12: Percentage Distribution of Households by Main Reason for No Access to Other Caste Households to the Handpump

Region	From Other Caste			From S.C			From S.T		
	Sep. Source	Distance	Others	Sep. Source	Distance	Others	Sep. Source	Distance	Others
Coast	100.0	-	-	16.7	33.3	50.0	-	-	100.0
Malnad Coast	100.0	-	-	-	100.0	-	-	66.6	33.4
Malnad Maidan	33.3	50.0	16.7	54.6	45.4	-	37.5	37.5	25.0
Southern Maidan	72.7	-	27.3	42.9	50.0	7.1	25.0	50.0	25.0
Central Maidan	-	100.0	-	31.3	68.8	-	50.0	50.0	-
North Central Maidan	-	66.6	33.4	31.8	54.6	13.6	-	83.3	16.7
Western Maidan	33.3	66.4	-	-	100.0	-	-	-	100.0
Northern Maidan	-	-	-	-	100.0	-	-	-	-
Eastern Maidan	50.0	50.0	-	50.0	50.0	-	50.0	50.0	-
TOTAL	47.2	38.2	14.6	28.1	65.8	6.1	25.09	47.7	27.2

NOTES: 'Others' include caste differences, traditions, political differences, not used by anybody etc.

4.8. Users Perceptions on Quality of Water and its Use Patterns

It was already reported in the earlier Chapter about the nature of water of handpumps as examined by the Investigators. In addition, the users were also asked about their views on the suitability of water for consumption as they felt it. To a large extent, there is a close relationship between the Investigator's assessment and users' assessment on the taste of water. From Table 4.13, it can be seen that 48.8 per cent of users graded the water as 'suitable and also sweet' (as compared to 47.9 per cent by Investigators); 24.0 per cent have reported as 'suitable but normal'. The only difference (minor) appears to be under 'unsuitable but normal', a large part of it fall under 'suitable' category of Investigators. The difference of opinion is wide in Southern region. In any case, the proportions of unsuitable handpumps between the two parties (i.e. users and investigators) closely comparable with each other.

When once the users categorize the nature of water, the use pattern of water also changes accordingly. Table 4.14 gives the distributional use pattern of water by the users. It can be observed that sources used exclusively for drinking and cooking purpose is very low, about 2.5 per cent only. This is because, most of the handpump waters are for multipurpose, such as, all domestic purposes as reported by 27.6 per cent of respondents: 30.8 per cent of users use the

water for all domestic and also for animals. 27.6 per cent have reported that they use the handpump water only for other than drinking purposes, mainly non-potable water. A peculiar use pattern in Coast and Malnad coast regions is that most of them use the handpump water completely for non-domestic purposes, like cleaning, washing clothes etc. This use pattern is consistent with the assessment of the water by the investigators.

Table 4.13: Percentage Distribution of Households by their Taste of Handpump Water

Region	Suitable for Drinking		Unsuitable for Drinking			
	Sweet	Normal	Normal	Saline	Others	Total
Coast	20.5	17.9	12.8	33.3	15.5	100.0
Malnad Coast	42.6	13.0	11.1	13.0	20.4	100.0
Malnad Maidan	61.7	21.7	3.3	3.3	10.0	100.0
Southern Maidan	74.6	7.5	6.0	6.0	5.9	100.0
Central Maidan	55.6	40.7	-	-	3.7	100.0
North Central Maidan	49.3	19.7	16.9	12.7	1.4	100.0
Western Maidan	3.0	47.2	13.2	5.7	-	100.0
Northern Maidan	40.6	40.6	15.6	-	3.1	100.0
Eastern Maidan	66.7	14.8	13.0	3.7	1.8	100.0
TOTAL	48.8	24.1	10.5	9.6	6.8	100.0

Table No.4.14: Percentage Distribution of Households by their Use Pattern of Water from Handpump

Region	Water is used for				
	Drinking and Cooking	All Domestic	All Domestic and Animals	Other than Drinking and Domestic	Total
Coast	3.7	12.3	-	74.1	100.0
Malnad Coast	1.7	15.5	24.1	53.4	100.0
Malnad Maidan	3.3	66.7	13.3	16.7	100.0
Southern Maidan	4.5	52.2	32.8	9.0	100.0
Central Maidan	-	36.2	41.4	19.0	100.0
North Central Maidan	1.4	20.8	33.3	44.6	100.0
Western Maidan	5.5	-	43.6	50.9	100.0
Northern Maidan	1.6	-	62.5	32.8	100.0
Eastern Maidan	-	50.0	35.2	14.8	100.0
TOTAL	2.5	27.6	30.8	39.2	100.0

4.9. Continuous or Occasional use of Traditional Water Sources:

In spite of a large number of handpumps very near to their houses, some people continue to use the old traditional sources, particularly ponds, tanks and wells. Some of these sources are protected waters, but not always. The pattern of use of such old sources in the presence of new handpump installations and their reasoning for their behaviour are enquired and presented in Tables 4.15 and 4.16. These two tables present two types of situations respectively: (1) use of old sources even though the handpumps are installed, and (2) the alternative sources used when their handpump goes out of order. In the first case, it can be seen that 35.1 per cent of households use old sources only and regularly and another 18.4 per cent use occasionally. Regular use of old sources is very high in Coast and Malnad coast regions with more than 70 per cent of households using, mostly their own wells. Such practice is very less in Central Maidan region.

The reasons given for use of old sources either regularly or occasionally, consist of unsuitable water of their handpump with 23.9 per cent response, followed by non-functional handpumps with 12.1 per cent response. If we leave these two as genuine reasons, 8.4 per cent have given a reason of poor quality of handpump water and another 3.9 per cent gave the reason of inadequacy of water from the source. It should be remembered that the reasons given here

Table 4.15: Percentage Distraibution of Households Using Other Old Sources also (in the presence of Handpump) and by Main Reason

Region	Other sources not used	Used regularly	Used Occassionally	Reasons for using Old Sources				
				H.P water unsuitable	H.P not functioning	H.P water Inadequate	H.P water Poor Quality	Others
Coast	11.2	80.2	8.6	54.3	2.5	3.7	22.2	4.9
Malnad Coast	20.7	70.7	8.6	31.0	10.4	-	20.7	12.0
Malnad Maidan	72.5	10.3	17.2	10.0	1.7	11.7	3.3	1.7
Southern Maidan	58.2	13.4	28.4	66.0	11.9	9.0	11.9	-
Central Maidan	72.4	5.2	22.4	-	12.1	-	8.6	10.3
North Central Maidan	58.4	34.7	6.9	29.6	7.0	-	2.8	-
Western Maidan	51.9	34.6	13.5	33.3	10.4	4.2	-	-
Northern Maidan	23.5	35.9	40.6	20.6	42.9	6.4	-	-
Eastern Maidan	63.0	14.8	22.2	22.2	13.0	-	-	-
TOTAL	46.5	35.1	18.4	23.9	12.1	3.9	8.4	

NOTES: 'Others' include distance, own source, no access, always crowded etc.

Table 4.16: Percentage Distribution of Households by Alternative Sources used when the Handpump goes out of Order

Region	Other hand-pump	Other wells	Own well	River/ Canal	Tank/ Pond and Others	Total
Coast	3.7	59.3	32.1	4.9	-	100.0
Malnad Coast	6.8	69.0	24.2	-	-	100.0
Malnad Maidan	59.3	19.7	-	6.8	14.2	100.0
Southern Maidan	56.7	22.4	7.5	3.0	10.4	100.0
Central Maidan	93.1	3.5	-	-	3.5	100.0
North Central Maidan	69.5	8.3	-	22.2	-	100.0
Western Maidan	78.4	-	2.0	-	19.6	100.0
Northern Maidan	67.2	14.1	3.1	12.5	3.1	100.0
Eastern Maidan	61.1	18.5	-	16.7	3.7	100.0
TOTAL	53.2	25.0	8.5	7.6	5.7	100.0

are with reference to handpumps and not the other sources they use. This is one way of expressing their dissatisfaction towards the utility of the handpumps.

On the other hand, when a question is asked about the alternative sources used when the handpump goes out of order, 53.2 per cent of the respondents reported that they use other nearby handpump as can be seen from Table 4.16. All other respondents turn their choice to old traditional sources. Well water (own or others) is used by 33.5 per cent of households, flow water by 7.6 per cent and stagnant water by 5.7 per cent of households. Except Coast and Malnad coast regions, preference to well water is very less. preference to canal or river is more in Northern, North central and Eastern Maidan regions with nearly 12 to 22 per cent households using them and tank water is preferred by 19.6 per cent of households in Western Maidan.

Though inter-temporal comparisons are not readily available to examine the changing pattern, it is heartening to note that, majority of the people now shifting to handpumps, even though other old sources are available - a clear evidence of changing attitudes of users towards safety and cleanliness of water for consumption.

CHAPTER V

AN EVALUATION OF WORKING STATUS AND MAINTENANCE AND REPAIRS OF HANDPUMPS

After examining various perceptions and attitudes of users towards handpumps, this section examines the views and experiences of the beneficiaries with the functional status of handpumps, their knowledge with the procedures and resultant outcomes towards upkeep, maintenance and repairs.

5.1. Status of Maintenance and Repairs of Handpumps in Karnataka

In addition to installation of handpumps in rural habitations in the state by the Public Health Engineering Department, the maintenance and repairs of handpumps are also the responsibilities of the PHE for which the state budget provides funds under the sector. The repairs of handpumps are carried out by mobile van units stationed in each PHE-Sub-Division (mostly, taluk headquarters) with necessary crew consisting of a driver, a mechanic and two or three helpers. These mobile van units will attend to the complaints received from various villages in such a way that a group of handpumps can be repaired in a day's trip.

In recent years, the Karnataka state has accepted the two tier system of maintenance and repairs of handpumps. The two tier system consists of (1) mobile van unit as first tier and (2) village level caretaker for each borewell.

In the second tier level, the care-takers are identified within the habitation and one among the regular users of handpump, and given training to look after minor repairs above ground level like tightening of screws, greasing etc. and they are expected to inform the mobile van unit if their visit is required for repairs.

The state has also evolved a "route map system" (RMS) method for mobile van unit for a systematic and regular visit of all habitations in a specified route and time to check or repair the handpumps.

It was also proposed to handover the responsibility of maintenance and repairs of handpumps to the Mandal Panchayats so as to reduce the problem of centralized monitoring at PHE Sub-Division level. This has been implemented in many Zilla Parishads and the new experience of decentralised and active participation of beneficiary rural communities have revealed mixed experiences. Given the above system of maintenance and operation of handpumps in the state, the following sections evaluate the system as revealed by the users/households.

5.2. Working Status and Maintenance of Handpumps

To start with, the users were asked about the present functional status of the handpumps that they are using. Table 5.1 gives the classification of the replies given by the users. Firstly, it can be seen that, 58.8 per cent of

Table No.5.1: Percentage Distribution of Households by thir Views on Present Working Status of the Handpump

Region	Functioning				Non-functioning because		
	Good	Satis-factory	With diffi-culty	Erratic	Dry	Handle and its parts not	Others
Coast	27.8	48.4	13.9	1.3	-	7.6	-
Malnad Coast	55.2	10.3	34.6	-	-	-	-
Malnad Maidan	64.3	14.3	17.9	-	-	3.6	-
Southern Maidan	34.3	28.4	29.9	-	-	3.0	4.5
Central Maidan	66.7	10.0	13.3	-	3.3	3.3	3.2
North Central Maidan	86.5	-	2.7	-	-	10.8	-
Western Maidan	72.0	-	4.0	-	-	24.0	-
Northern Maidan	71.9	-	12.5	3.1	3.1	9.4	-
Eastern Maidan	58.0	8.0	8.0	8.0	2.0	10.0	6.0
TOTAL	58.8	14.7	15.2	1.3	0.9	7.7	1.5

Notes: 'Others include other minor repairs and stand post broken.

households reported that the handpumps that they are using are in good condition, and 14.7 per cent of households noted that their handpumps are in "satisfactory" level. 15.2 per cent of the respondents reported that the handpumps are working but with difficulty; and a small proportion of 1.3 per cent have identified that their handpumps are functioning erratically. The two degrees of 'erratic' functioning and functioning with 'difficulty' as experienced by the users are to some extent intermixed. On the other hand, a total of 10.1 per cent of users reported that the handpumps are "non-functional". According to 7.7 per cent of users, the reason for non-functioning of their handpumps is due to one or other mechanical malfunctioning, either handle is broken, or other parts are not working etc. About 1.0 per cent of users reported that the borewell had gone dry and hence non-functional.

The sources of their knowledge about the "reasons for non-functional status" are not clearly given. Wherever they can see and experience, they are definite of their opinion.

The working status of handpumps and the reasons for non-functional status as given by the users are classified by year of installation of handpumps. This classification will give an idea about the relationship between "age of the handpump" and its "working status". Table 5.2 gives such distribution pattern. It can be observed that, while the distribution by user's views on handpumps under the

functional status of 'good' and 'satisfactory' have some specific patterns, the handpumps categorized under 'difficult operation' show that more and more newly installed handpumps, particularly after 1981, are falling under this category. It is also evident that the handpumps under 'repair' are also largely of the newly installed group. From this, it is evident that the new handpumps, particularly installed after 1981 are in the process of going out of order very soon.

Table 5.2: Status of Handpumps by Year of Installation

(Based on the response of Households)

Year of installation	Functioning			Non-functioning because			
	Good	Satisfactory	Difficulty	Erratic	Dry	Repair	Others
1972-74	84.6	7.6	-	7.7	-	-	-
1975-77	70.0	16.0	4.0	-	4.0	6.0	-
1978-80	56.4	21.8	7.3	1.8	-	12.7	-
1981-83	54.6	20.3	14.7	0.6	1.9	4.3	2.4
1984-86	53.8	12.8	19.7	3.4	-	9.4	0.9
1987-89	62.9	8.3	19.7	-	-	8.3	0.8

5.3. Duration of Non-functional Status of Handpumps

With reference to non-functional handpumps, the users were asked a related question about the duration of the present non-functional status of the handpump. This will give the extent of time taken to attend to the repairs of the handpumps. This is necessary, because even though creation of rural community assets

is the first and the most important task for public agency, it is equally important that such assets are maintained for the use of community. In the case of installations of safe water sources which are continuously operated by the community users themselves, it is still important to attend to the repairs in a short duration so as to put them back into operation as early as possible so that the objective of the service is fulfilled. However, in view of the communication systems available and the location of agencies responsible for attending to the repairs, one has to give a reasonable margin of, say three days. Any degree of deviations from "three days" may be treated as delay in prompt attention. Thus, by taking three days (excluding the day of the handpump going out of order) as the time for prompt attempting, it can be seen from Table 5.3 that 11.5 per cent of households reported that their handpumps were out of order and the remaining 88.5 per cent of households told that their handpumps are under "non-functional status" for a period ranging from four days to more than a month. An interesting phenomenon is that the handpumps used by as many as 48.7 per cent of households are in non-functional status for a period of "more than one month". The seriousness of such status handpumps is more in Central, Western and North Central Maidan regions in the state. The handpumps used by 14.1 per cent of households are non-functional for the past 15 to 30 days, most of them are in Eastern and Malnad Maidan. The handpumps under non-functional status for a medium

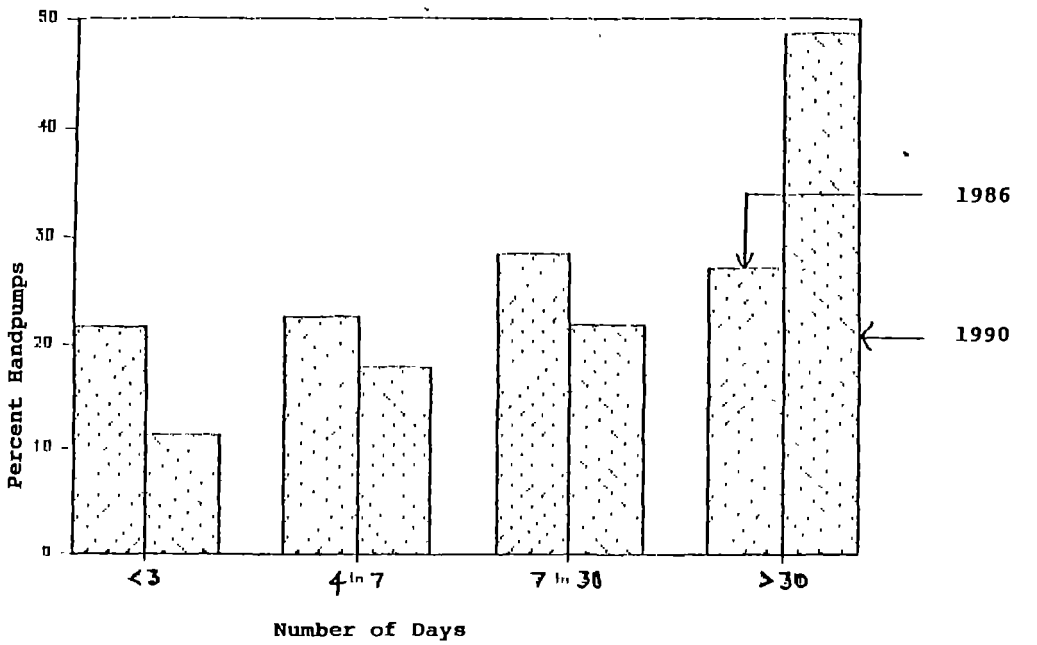
duration i.e., one week to 15 days is reported by 7.7 and that of less than a week by 17.9 per cent of households.

Table 5.3: Percentage Distribution of Households by their Knowledge about the Duration of Non-functional Status of Handpumps

Region	Since 3 days	4 to 7 days	8 to 15 days	15 to 30 days	More than 30 days
Coast	-	16.7	-	16.7	66.6
Malnad Coast	-	100.0	-	-	-
Malnad Maidan	50.0	-	-	50.0	-
Southern Maidan	23.6	23.5	23.4	-	29.4
Central Maidan	-	-	-	-	100.0
North Central Maidan	-	20.0	-	-	80.0
Western Maidan	-	-	9.1	-	90.9
Northern Maidan	33.3	44.4	-	-	22.2
Eastern Maidan	-	10.0	10.0	70.0	10.0
TOTAL	11.5	17.9	7.7	14.2	48.7

The above situation portrays a pathetic picture of the non-functional status of the handpumps waiting for repairs. Under these circumstances, the arrangements made under the present organizational set up calls for a thorough review.

CHART: 15 : HANDPUMPS BY DURATION OF NON-FUNCTIONAL STATUS: 1986 and 1990



At this stage, an attempt is made to compare the durations of non-functional status of handpumps "before" and "after" introduction of the panchayati raj system which is playing an important role in rural water supply programme. From Table 5.4 it can be observed that in 1986, the duration of non-functional status of handpumps with more than one week was only 55.8 per cent, of which the share of handpumps under "more than one month" was 27.2 per cent. comparing this with the durations of non-functional status of handpumps in 1990, the distribution of handpumps are progressively increasing towards longer durations of non-functional status.

Table 5.4: Percentage Distribution of Non-Functional Handpumps by Duration

Duration of Non-Functional Status of handpumps	1986 Study	1990 (present study)
Less than 3 days	21.7	11.5
4 to 7 days	22.6	17.9
7 to 30 days	28.6	21.8
More than 30 days	27.2	48.7

5.4. Agency for Maintenance and Repairs of Handpumps

The users are fairly aware of the agencies responsible for maintenance and repairs, if not with exact designations and names. Out of the total users, only 9.7 per cent expressed their ignorance about the repairing agency, as

shown in Table 5.5. In the present transitional period of change of responsibility from departmental agencies (PHE) to Mandal Panchayats, there is some confusion in the minds of people about the repairing agencies. To this extent, users who gave the names of Mandal and village Panchayats are to some extent intermixed. Users who are disappointed with the existing system opted to say that "nobody is taking responsibility" and they constitute 13.2 per cent of the total respondents. An important development that requires the extent of knowledge of users is, the process of introduction of local Care Taker system for handpump maintenance and responsibility to get the handpumps repaired. It is found that only 3.6 per cent of users put the responsibility on Care Taker, even though the system is already initiated in almost all divisions and the caretaker is given only maintenance part of the system. About 11.4 per cent of users feel that the Mandal or village Panchayat is responsible for maintenance and repairs. This view appears to be very close to reality. However, prompt attention to repair also depends on how quickly the message is sent to the concerned agencies.

Table 5.5: Percentage Distribution of Households by their Knowledge about the Agency for Maintenance and Repairs of the Handpump

Region	PHED	Mandal Panchayat	Care Taker	Local People	Nobody	Not Known
Coast	88.3	5.2	-	-	-	6.5
Malnad Coast	16.7	61.1	2.8	13.9	5.6	-
Malnad Maidan	91.4	1.7	3.5	-	-	3.5
Southern Maidan	56.7	3.0	4.5	13.4	13.4	9.0
Central Maidan	45.4	-	1.3	25.0	21.7	6.7
North Central Maidan	13.9	4.2	1.4	29.2	40.3	11.1
Western Maidan	8.0	46.0	-	8.0	24.0	14.0
Northern Maidan	70.1	4.7	2.4	-	-	23.0
Eastern Maidan	47.1	3.0	5.9	35.3	-	8.8
TOTAL	51.6	11.4	3.6	12.6	13.2	9.7

Given the knowledge of the agency for repairs, their knowledge about the communication sent for repair and mode of such communication used were also probed. From Table 5.6 which gives the response of users about the complaint, we can see that except a proportion of 16.0 per cent, others have the fair knowledge of whether communication has been sent or

Table 5.6: Percentage Distribution of Households by their Knowledge about Communication Sent for Repair

Region	Communicated	Not yet communicated	Not Known	If communicated, when?				
				Same day	After one day	After 3 days	After 7 days	Not known
Coast	100.0	-	-	-	-	25.0	75.0	-
Malnad Coast	50.0	50.0	-	-	-	-	100.0	-
Malnad Maidan	60.0	20.0	20.0	-	-	-	83.3	16.7
Southern Maidan	46.2	15.4	38.5	-	35.3	29.4	5.8	29.4
Central Maidan	50.0	-	50.0	-	50.0	30.0	20.0	-
North Central Maidan	60.0	30.0	10.0	12.5	25.0	12.5	37.5	12.5
Western Maidan	77.8	-	22.2	-	20.0	30.0	40.0	10.0
Northern Maidan	50.0	50.0	-	16.7	16.7	-	-	66.7
Eastern Maidan	46.2	30.8	23.1	9.1	-	18.2	45.5	27.3
TOTAL	68.1	16.0	16.0	4.1	18.9	20.3	36.5	20.3

not and if sent, how early. 68.1 per cent of the users informed that the message about repair has been already sent, and 16.0 per cent told that the message is not yet communicated. However, among those who informed about the communication, 20.3 per cent were not sure whether the communication was sent or not. On the other hand, it can be seen that, only 4.1 per cent of cases, the message has been sent on the same day itself and 18.9 per cent of cases, it was sent the next day. In which case, nearly 23.0 per cent of messages have been sent promptly. Delay in sending the massages ranges from 20.3 per cent in the case of 3 to 7 days, and 36.5 cases after 7 days.

The above situation shows that delay in prompt attention is significantly influenced by delay in communication also. This reflects the amount of local responsibility and the degree of urgency shown by the local agencies also.

The type of mode of communication used to send the message for repair to the concerned agencies is presented in Table 5.7. 45.1 per cent of households informed that a Special messenger was used to convey the message. The messenger may be an elected member of Mandal Panchayat or a person visiting the place of repairing agency (PHE), and in most of these cases, combining with their other personal/official work and again in many cases, a oral complaint. These two modes constitute 56.7 per cent (oral

Table 5.7: Distribution of Households by their Knowledge about the Mode of Communication used to repair the Handpump

Region	By Word (oral)	Spl. Messe-nger	Care-Taker	Periodic visit of Repair Van	No specific system
Coast	-	55.5	-	-	44.5
Malnad Coast	-	-	-	-	-
Malnad Maidan	14.2	28.6	14.2	-	42.9
Southern Maidan	13.3	60.0	6.7	13.3	6.7
Central Maidan	3.8	84.6	7.7	-	3.8
North Central Maidan	-	14.3	14.3	71.4	-
Western Maidan	87.5	-	-	-	12.5
Northern Maidan	-	22.2	66.6	11.1	-
Eastern Maidan	40.0	-	20.0	-	40.0
TOTAL	16.5	45.1	14.3	8.8	15.4

and spl. messenger) of the mode of communications used. Care Taker took the responsibility to communicate in 14.3 per cent of cases, particularly in North Central, Northern and Eastern Maidan regions. A few cases have been in Central Maidan region about sending the message by post card. Some areas wait for the periodic visit of repairman/van to their

locality to attend to repairs, about 8.8 per cent of such cases have been reported, mostly from North Central Maidan regions. On the whole, the system of special messenger or caretaker are the major modes of communication system for repairs.

5.5. Response of Representatives of Rural Habitations

At this stage, the views of rural community represented by elected members and elders of the villages have to be given some weightage. Such community group discussions were conducted by the Field Investigator in 52 important habitations. There was no such pre-coded schedule for canvassing as is done in the case of individual household members, but a set of issues were put before the participants in sequential order in the course of dialogues and broad consensus were noted down on their agreement or disagreements. Based on these notings some of the points were found to be worth examination.

(i) One of the aspects relating to their opinion on the present status of handpump repairs. Out of group discussions where there was some positive opinion the following pattern emerges on the present status of repairs.

1. poor : 31.8 per cent
2. Satisfactory : 17.1 per cent
3. Status-quo : 28.0 per cent
4. No opinion : 23.0 per cent

(ii) If majority feels that the system of arrangements are not working properly, will they take over the responsibility of repairs themselves (say, Mandal/village Panchayats)? The response is as follows.

1. already taken over : 41.0 per cent
2. partly taken over : 39.0 per cent
3. No opinion (inconsistent): 9.0 per cent
4. old system is good : 11.0 per cent

(iii) The above responses show that they know that the responsibility is already taken over by Mandals and they know also that the arrangements for repairs is in poor state of affairs. For a definite question that whether they can take full responsibility and do themselves, the replies are as follows:

1. Yes, we can do it - unconditional : 18.1 per cent
2. Yes, we can do it - (conditional)* : 64.3 per cent

   (*the conditions refer to finance and technical expertise)

3. Let government do it : 15.0 per cent
4. No opinion : 2.6 per cent

iv) Regarding the introduction of Caretaker system, the group opinions are widely different as given below:

1) Do they agree that caretaker system is good?

1. Yes 43 per cent
2. No 52 per cent
3. No opinion 5 per cent

v) However, their views and observations on the working performance of Caretaker are not encouraging:

1. 61 per cent of them expressed their opinion that Caretaker is not really functioning as per his/her responsibilities;

2. 18 to 21 per cent of the groups do not feel that the caretakers are of little use;

3. 58 per cent of them are of the opinion that if any cost is involved in maintaining the caretaker, it is difficult for them to bear the burden.

(The above three categories are not independent and and hence they need not be summed up to 100 per cent).

Comparing the views expressed in group discussions with that of the individual household opinions on Caretaker system for maintenance of handpumps, we can see from Table 5.8 that only 13.0 per cent of households have expressed their confidence on the work of Caretaker - mostly in Malnad and Eastern Maidan regions and partly in Southern, Central Maidan regions. All others - 87.0 per cent of households felt that there is no improvement in the maintenance of handpumps in the presence of caretakers.

But, it was not clearly explained by the respondents that what type of improvements they want or what they really expect from caretaker. Most of the respondents view that, perhaps wrongly, the Caretaker should able to repair the

handpumps when they go out of order. If the users are given proper direction and arrangements made through extension services, this opinion may partly change.

Table 5.8: Percentage Distribution of Households by their Response to Improvement in the Maintenance of the Handpump after Appointment of Care Taker

Region	Yes	No Improvement
Coast	-	100.0
Malnad Coast	-	100.0
Malnad Maidan	87.5	12.5
Southern Maidan	18.2	81.8
Central Maidan	6.7	93.3
North Central Maidan	3.2	96.8
Western Maidan	-	100.0
Northern Maidan	-	100.0
Eastern Maidan	23.5	76.5
TOTAL	13.0	87.0

5.6. Overall assessment of the users on Handpumps

Summarizing the issues discussed earlier, the users were asked to give over all assessment on the handpumps as compared to the old sources. Majority of the households are in full agreement that the handpumps have very much improved their water requirements and in overcoming the age old problems involved with old water sources. This can be seen from Table 5.9. 47.0 per cent of users expressed their

Table 5.9: Percentage Distribution of Households by their Assessment on Handppump Installation as Compared to Old Sources

Region	Very Convenient	Convenient	No Difference	Not Convenient
Coast	5.1	54.4	19.0	21.5
Malnad Coast	29.3	50.0	17.2	3.5
Malnad Maidan	51.7	46.6	1.7	-
Southern Maidan	51.6	37.5	6.3	4.7
Central Maidan	53.3	46.7	-	-
North Central Maidan	54.1	35.1	9.5	1.4
Western Maidan	84.0	12.0	4.0	-
Northern Maidan	65.0	26.7	3.3	5.0
Eastern Maidan	46.0	50.0	-	4.0
TOTAL	47.0	40.5	7.4	5.1

extreme satisfaction - more so from Western, Northern, North Central and Central Maidan regions. To a lesser degree of satisfaction, 40.5 per cent of households are of the opinion that handpumps are "convenient". 7.5 per cent of the users are of the view that they do not find any difference after installations of handpumps, particularly in Coast and Malnad

coast regions; and a small proportion of 5.1 per cent of households feel that the handpumps are not convenient, or not useful at all, these are the households whose handpumps are non-functional for months together or, the handpumps are not used by them at all.

5.7. Users Willingness and Ability to Pay for Use of Handpumps

An important part of the public service programme consists of introducing a system to share the burden of maintenance and repairs of the community assets created for community purpose by the community itself. As already discussed, if not immediately, at least after sometime, the community should be able to take over the assets created for them and should be able to bear the burden of maintenance and repairs. This may be in the form of direct users charges or indirect payment by tax - the logistics may be prepared accordingly. However, for some of the community assets such as handpumps for drinking water, public opinion has to be assessed and payment system has to be introduced at an appropriate time. From this study, it appears that such an occasion has come now to introduce the concept of payment to the use of community asset. From Table 5.10 it can be seen that, there is a wide agreement across all regions that the users are willing to pay for the use of handpumps. 27.8 per cent of households readily agreed to pay; 36.4 per cent have agreed and are ready to pay if necessary. Both put together, nearly two-thirds of the rural households using handpumps are

CHART:16 : USERS' WILLINGNESS TO PAY FOR THE USE OF HANDPUMPS

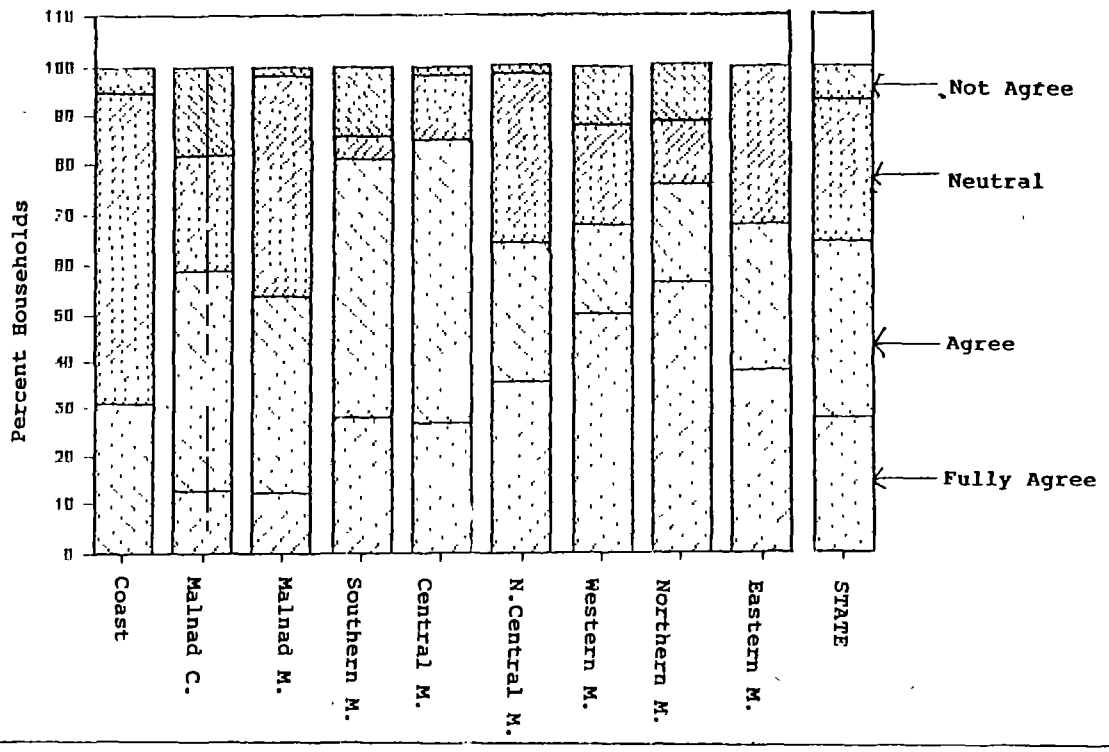
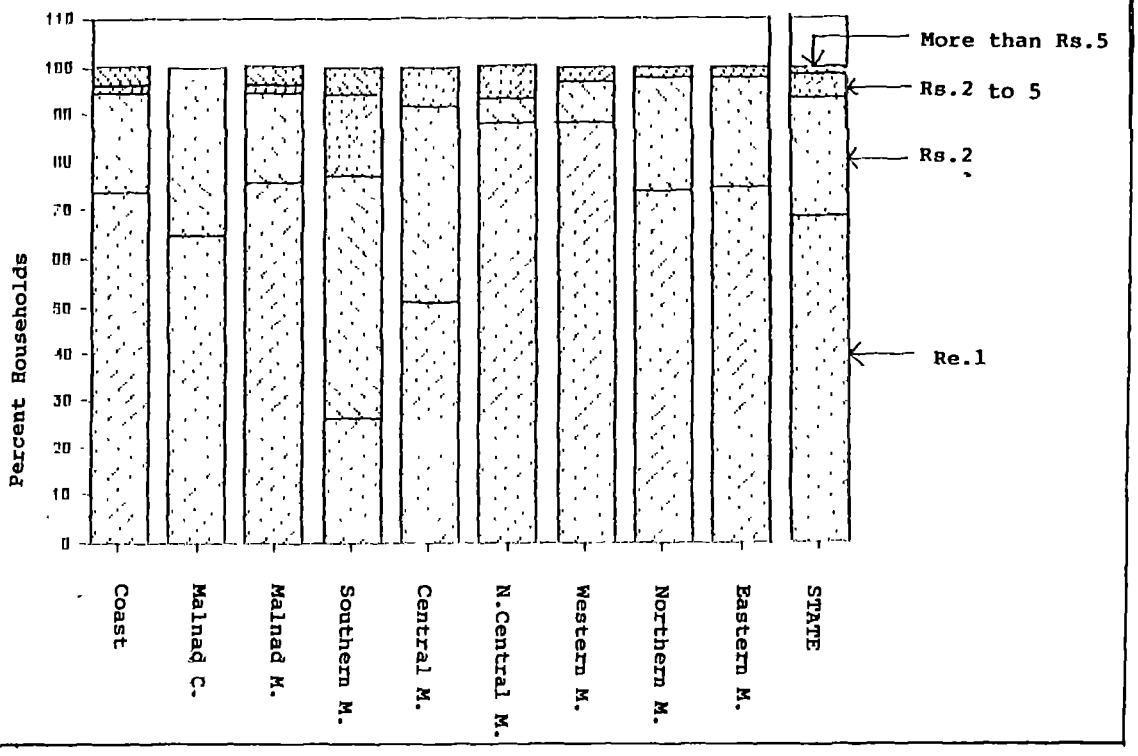


Table 5.10: Percentage Distribution of Households by their Willingness to Pay for the Use of Handpumps

Region	Level of Agreement to Pay			
	Fully	Agree	Neutral	Not Agree
Coast	-	31.2	63.6	5.2
Malnad Coast	12.5	46.4	23.2	17.9
Malnad Maidan	12.1	41.4	44.8	1.7
Southern Maidan	28.1	53.1	4.7	14.1
Central Maidan	26.7	58.3	13.3	1.7
North Central Maidan	35.6	28.8	34.3	1.4
Western Maidan	50.0	18.0	20.0	12.0
Northern Maidan	56.5	19.4	12.9	11.3
Eastern Maidan	38.0	30.0	32.0	-
TOTAL	27.8	36.4	28.7	7.1

ready to pay for the use of handpumps. There are 28.7 per cent of households maintaining neutrality - perhaps, may "finally agree when all others agree". As expected, there are also some households - about 7.1 per cent - who "do not agree" or "never agree" to pay for water for various reasons and reservations.

CHART: 17 : USERS' ABILITY TO PAY (PER MONTH) FOR THE USE OF HANDPUMPS



The positive trend towards sharing or bearing the burden of costs of handpump maintenance and repairs show that the government can initiate, initially as water tax or water cess along with the house tax or, a development tax from the households.

When they say that they are ready to pay, the next question that require answer is the extent of payment. The users are asked to express their ability to pay in monetary terms. The pattern that came out is presented in Table 5.11. 68.1 per cent of the households gave their voluntary choice as one rupee per month. 25.2 per cent of households are willing to pay Rs. 2 per month. More than Rs.2 per month appears to be a difficult proposition, since, only 5.0 per cent of households were ready to pay. The ability and willingness to pay for handpumps is unanimous, and cuts across caste, size class of habitations and old or new handpumps.

Table 5.11: Percentage Distribution of Households by their Ability to Pay for the Use of Handpumps

Region	Ability to pay (Rs.) per month			
	Re.1	Rs.2	Rs.2-5	Cannot/ Never pay
Coast	73.7	21.1	1.8	3.5
Malnad Coast	64.9	35.1	-	-
Malnad Maidan	75.9	19.0	1.7	3.5
Southern Maidan	26.4	50.9	17.0	5.7
Central Maidan	51.0	40.8	8.2	-
North Central Maidan	88.2	5.1	6.8	-
Western Maidan	88.2	8.8	2.9	-
Northern Maidan	73.8	23.8	2.4	-
Eastern Maidan	74.5	23.4	2.1	-
TOTAL	68.1	25.2	5.1	1.6

CHAPTER VI

A FEW POLICY RECOMMENDATIONS

The findings presented in the earlier chapters of this study on evaluation of handpump programme in the state have clearly shown the merits of the programme as well as the departures or deviations from the desired levels on each aspect of the objectives of the programme. As they are self-evident and self-explanatory, the concerned authorities may take necessary and corrective measures to further improve the performance. To this extent, the purpose of any 'evaluation' study fulfills the objective. However, this study goes a step further (within the framework of its set objectives) to suggest a package of policy measures (some of them are interrelated) to strengthen the programme as a whole, keeping in view the overall findings of the evaluation of the programme. These policy measures are very broad and selective which may be taken up on priority basis. Many other minor policy measures could be formulated by the department for effective monitoring and maintaining the community assets such as handpumps.

Policy Recommendations

1. The rural water supply programme has to be integrated with rural community health programme as soon as the asset is created. This is necessary, because the programme is being implemented independently without

linking with environmental sanitation, public health and hygiene. Consequently, in the long run, the consequences of the programme may adversely affect the public health in terms of diseases due to unhygienic surroundings of the water supply installations.

2. The introduction of easily accessible water sources in rural communities also require proper education and awareness among the people on the importance and use of these community asset, and its relation with health and hygiene, for improving the living conditions. To impart health education and awareness, the media, the visual publicity machinery and the services of village level public health personnel have to be intensively used.

3. The maintenance and repairs of <u>all</u> water supply installations in rural communities should be retained with Public Health Engineering department as an apex body upto taluk level (Zilla Parishad Engineering - Sub-division level) as existed before introduction of Zilla Parishad legislation. The expenditure and financial transactions should be between PHE and Zilla Parishads and not between PHE and Mandal Panchayats. However, Mandal Panchayats may be given a part of responsibility on water supply (as suggested below).

4. Mandal Panchayats should be made responsible for periodical cleaning and upkeep of the environment of the water supply installations and they should also

undertake minor repairs to drainage and platforms from their own funds.

5. Caretaker system should be strengthened in addition to the responsibility of educating and creating awareness among the users. They should also take responsibility of policing, watch and ward on the use of handpumps by the people, and to take initiative in getting the handpumps repaired by the 'Mandal Mechanic'.

6. While retaining the Caretaker to perform the above duties on voluntary basis, there are multiple benefits in introducing a 'Mandal Mechanic' system. As an employee of Zilla Parishad institution, the Mandal Mechanic should be a literate and trained through Zilla Parishad Engineering Department, in mechanical and plumbing works so that, he can attend to the immediate requirements of specifically assigned works and repairs of handpumps, mini water supply and piped water supply installations within the assigned jurisdiction. During the transitional period for major repairs, the Mandal Mechanic could make arrangements to convey the message to the ZPE sub-division and coordinate the repairs with the mobile repair team.

Some problems may arise in initial stages of introduction of the Mandal Mechanic in terms of remuneration, equipment and material requirements, stores and costs involved. But the 'Mandal Mechanic'

system would greatly benefit the community in course of time and reduce the heavy burden on ZPE.

7. Sufficient evidence has come out from the study that the rural communities have realised the benefits of handpumps and that they are ready to pay for the services made available. Hence, it is time to initiate and introduce, in a phased manner, either water tax or water cess along with the house tax/land tax, the modalities of which can carefully be formulated by the concerned authorities. This will enable the local community to be more self-reliant. (Such water tax collections are already in vogue in some larger villages with mini water supply and piped water supply schemes).

8. The shift from handpump to higher technologies such as mini water supply and piped water supply schemes in some rural habitations is welcome as a further improvement of living conditions in the rural communities. While doing so, the economic aspects of such shifts should also be given due consideration, keeping in view the cost effectiveness against the newly created benefits.

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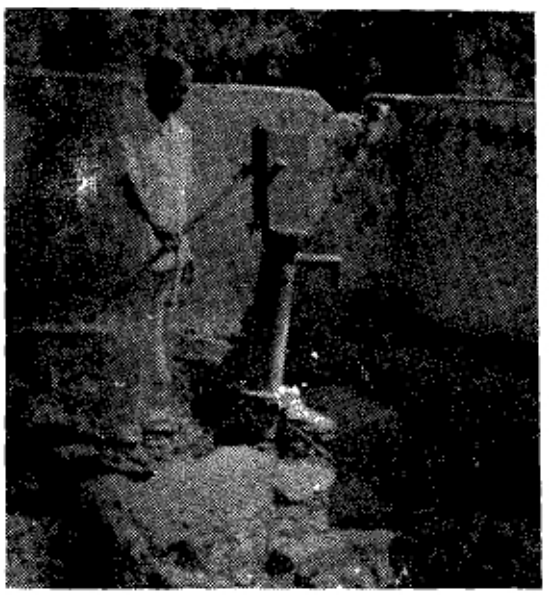
Annexure

PLATES

PLATE - 1

TYPES OF NON-FUNCTIONAL HANDPUMPS



1. Dried up and Broken Handle Assembly

2. Dismantled Head and Handle Assembly

3. Handle Assembly Not Working

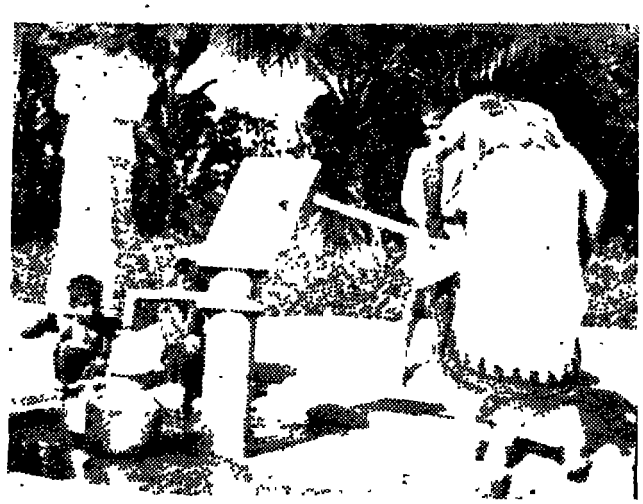
PLATE - 2

TYPES OF HANDPUMP USERS

1.

2.

Young Children Collecting Water From Handpumps



3. A Woman Operating the Hand Pump

PLATE - 3

PHYSICAL ENVIRONS OF HANDPUMPS

1. Good Platform and Drainage but Water Accumulation Near Drainage

2. Good Platform but Damaged Drainage

3. Bad Drainage and Platform

PLATE - 4

PHYSICAL ENVIRONS OF HANDPUMPS

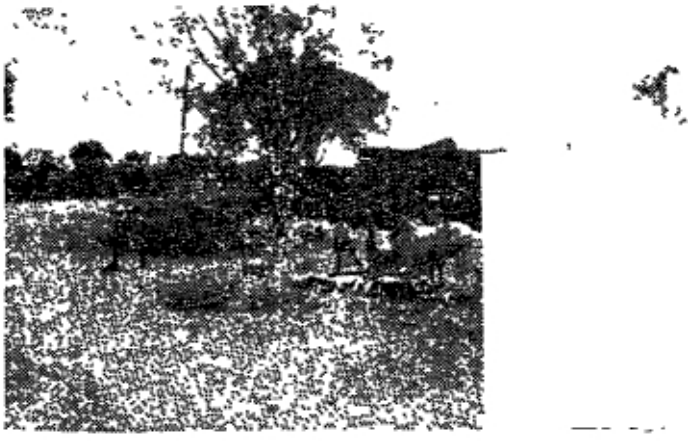
4. Bad Drainage and Platform

5 Bad Drainage and Platform

PLATE - 5

HANDPUMPS USED FOR OTHER PURPOSE

1. Washing Clothes



2. Washing and Feeding Cattle

3. Bathing and Washing Clothes

PLATE - 6

TYPES OF WATER SOURCES USED FOR DRINKING BEFORE AND AFTER INSTALATION OF HANDPUMPS

1. Open Well

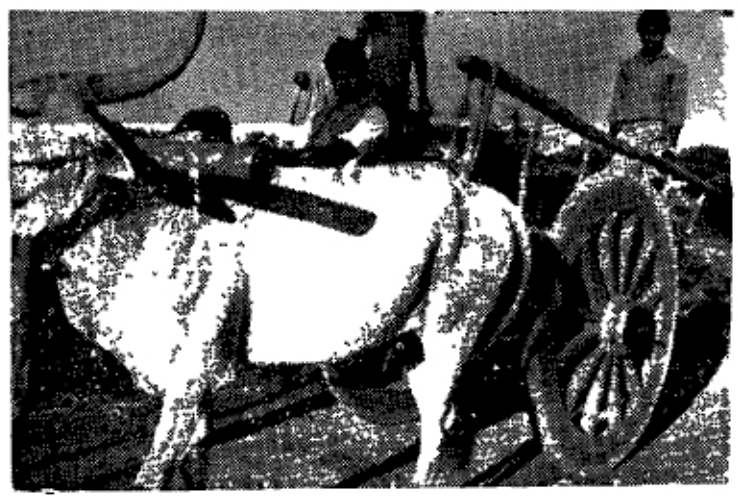
2. Tank

3. Shallow/Well Spring

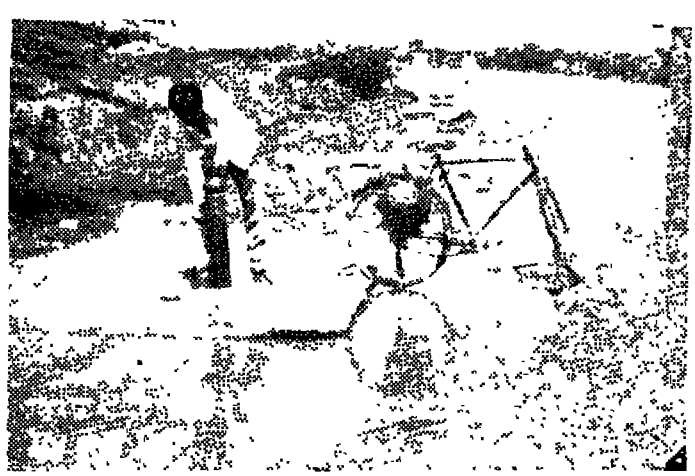
PLATE - 7

TYPES OF WATER CARRIERS

1. Water Carried by Animals



2. Water Carried by Bullock Carts



3. Water Carried by Bicycle

PLATE - 8

RESPONDENTS

1. Mandal Pradhan Being Interviewed
by Research Team

2. Woman Caretaker Being Interviewed
By the Project Director