Water Use and Village Participation in Operation and Maintenance

A pre-evaluation study of DANIDA funded
rural water supplies in Tanzania

May 1987

Danish International Development Agency, Asiatisk Plads 2, DK-1448 Copenhegen K

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TANZANIA


UGANDA
Lake Victoria
Bukoba
RWANDA
KAGERA
MARA
KENYA
MWANZA
SHINYANGA
ARUSHA
BURUNDI
KILIMANJARO
KIGOMA
TANGA
TABORA
ZANZIBAR
SINGIDA
DODOMA
DAR ES SALAAM
RUKWA
ZAIRE
IRINGA
MBEYA
PWANI
MOROGORO
LINDI
ZAMBIA
MALAWI
RUVUMA
MTWARA
MOZAMBIQUE

1. INTRODUCTION

1.1 Purpose of the study

This report presents the findings of a study of village participation in operation and maintenance and of water use in six villages with an improved water supply installed (developed) with the assistance of DANIDA in Iringa and Mbeya regions of Tanzania. The objective of the study was to provide data on water consumption reflecting on sources used, distance travelled in search of water, quantities obtained and uses as well as on people who normally collect water. The other objective of the study was to gather and present information on how the villages participate in the operation and maintenance of village schemes as well as the structuring of the village water committees.

Since the data gathered during this study is intended to be used by a team which will later on evaluate the whole DANIDA water project, its presentation is done in a way that will facilitate its compaerison with similar data collected during the preparation of the Water Master Plan for the regions of Iringa, Mbeya and Ruwuma. The details of the data intended to be collected are contained in the terms of reference included in this report as appendix.

1.2 The study team

The study was commissioned by DANIDA and was executed by Jannick Boesen from the Centre for Development Research (CDR) Copenhagen, Mark R. Mujwahuzi from the Institute of Ressource Assessment (IRA) University of Dar es Salaam and Hans Egerup, CCKK representative to the DANIDA Water Project stationed in Iringa, as the principal researches. Field data collection and processing was carried under the guidance of the above principal researchers by the following people:

Helle Munk Ravnborg, Else Øllgaard and Kristine Juul from CDR, Martha Maganga, (IRA). Saada Hamisi, David Luhanga, and Vicky Myavilwa from DANIDA implementation office (DIO) Iringa, and Johansen Kalokola, Elias T. Kajurunga, George B. Kazimoto, and Kitolo Kisuda from the Regional Water Engineers office, Hydrologysection Iringa.

During the entire two month study period, the research team was given all conceivable help and support from DANIDA steering unit, Dar es Salaam, the DANIDA implementation offices in Iringa and Mbeya, and Tanzanian authorities in the study areas in the two regions.

IRA provided office and EDB facilities, and Fred Hedquist of IRA was of great help during EDB processing of the data.

2. METHODOLOGY

2.1 Participation and water use study methodologies.

This study has two major subjects, peoples participation in operation and maintenance, and water use, which lend themselves to quite different methodologies . While water use can be dealt with primarily through quantitative analysis, the study of peoples participation in operation and maintenance calls for a more qualitative approach.

Both types of methodologies, however, demands a certain general knowledge about the area, and its development problems so it was decided to carry out the two parts of the study simultaneously in the same villages.

2.2 Selection of villages

Based on considerations of time, manpower, and financial constraints on one hand, and of obtaining a reascnable coverage on the other, it was further decided to carry out the study in the 4 villages with a piped water supply (where meter measurements of water use would take place) and 2 villages with hard pump schemes (where metering would not be possible).

As the purpose of the study is to collect information on DANIDA funded water supplies only villages with such supplies have been included.

The DANIDA water project covers three regions, so to avoid regional bias, at least two regions had to be covered by the study, but for logistical reasons it was decided unnecessary on the other hand to cover all three.

For the actual selection of villages the following criteria were applied as far as possible:

- The water supplies should have been in operation for at least a year.
- The water supply should have been established under the procedures and criteria laid out in the Water Master Plans, i.e. preferably in the presently ongoing phase 2 of the project.
- There should be both villages of a more and less semi-urban character in the sample.
- Besides covering both hand pump and piped water schemes, among the latter both group and single village schemes should preferably be represented.

In reality it was not possible to select 6 villages in two regions while complying strictly with all the above considerations. So, trying to get as close as possible the following villages were selected (with the advice of DANIDA implementation offices in the regions) :

Kiponzelo : Iringa region, single village piped water scheme, rehabilitated, started in the projects interim period between phase 1 and 2 (1983). Completed 1984.

Mbalamaziwa: Iringa region, piped water group scheme, new scheme started in phase 2 (1986). Completed (almost) 1986. In operation 6 - 7 months.

Kasamulu : Mbeya region, very large piped water scheme, started in the interim period (1983), completed 1985.

Mlangali : Mbeya region, small piped water group, scheme (3 villages), started in the interim period. Completed in 1984.

Nzivi : Iringa region, handpump scheme, phase 2 (started 1985), completed 1985.

Nyeregete : Mbeya region, hand pump scheme, started in phase 2 (1984). Completed 1986.

It would have been preferable, especially for the participation study, if the schemes in the selected villages had already been handed over to the village governments as their property and responsability, as stipulated for all finished schemes. However it was virtually impossible to find phase 2 schemes or even schemes from the interim period which have yet been handed over so this consideration had to be discarded and among the selected villages only Mlangali has had its scheme handed over. The consequences of this problem for operation and maintenance are further discussed in ch. 9.

2.3 Water use study

Since all methods of studying water use at village level in a Tanzanian context have weaknesses in terms of uncertainties regarding the reliability of the information obtained and/or of gaps in the coverage of relevant aspects, this study has employed three different methods.

The Water Master Plan study based its analysis and conclusions on water use mainly on data from the socio-economic sample household interview study - supplemented with case study observation of water use at - very few -

Domestic Points (DPs).

The present study has also used - similar - interviews with sample households. These interviews were, however, supplemented with more systematic observation at selected DPs/pumps in each village. Finally, in order to get the most exact figures on waterflows and losses in the supply systems, water meters were installed on each DP, supplemented by a master meter for the whole distribution system, in those study villages with a piped water supply.

2.3.1 Household interviews.

In each of the six villages a random sample of 25 hoseholds were selected for interviewing. To simplify the procedure the random sampling was carried out in two steps: first 5 ten house cell leaders were selected, using random numbers, from a list of all ten cell leaders (swahili: barozi) in the village. From each of these, a list of all households belonging to the ten house cell was obtained, and 5 households selected, again using random numbers. In Tanzanian villages, where usally no records of all households - not to speak of inhabitants - exists, this procedure greatly reduces the work involved in acquiring a random sample (both for researchers and the village authorities). On the other hand it may give the sample a certain bias, in the sense that the first selection of 10-house cells gives the final sample a certain geographically clustered character. This may bias especially the individual village results, by leaving out distinct geographical problems, or by overstressing them. But when results from all 6 villages are generalised this should not pose too great problems.

The same sampling method was used during the WMP study.

For each hosehold an interview would be carried out with the wife of the head of household - or any one of the wives, the head herself, if she was a female, or a male head, if he was single, with no adult woman in the house. Just as during the WMP survey the women were interviewed because they ase expected to know most about water use, being the principal watercollectors. This time, however, we did not interview the husbands also - in order to simlify the procedure, and because husbands views were deemed less important for the present study.

The household questionnaire had four parts: Socio-economic data about the household, watercollection, wateruse, and views upon operation and maintenance. Much emphasis was put on reducing the comprehensiveness and complications as compared with the WMP questionnaire, while at the same time trying to obtain comparable data on essential aspects.

The strength of the household interview, compared with

other methods, is that it makes it possible to relate water collection to types of water use, as well as to socio-economic characteristics of the household. It probably also gives a reasonably reliable account of the household size with which to relate water use. The weakness of course is that answers depend entirely upon the respondents recollection - and her willingnes (deliberately or undeliberately) to reveal certain aspects of her reality in an interview - with somebody coming somehow from the authorities.

Consequently it is most likely, e.g. that figures on childrens watercollection are underestimated, because it is forgotten, and wateruse at the domestic point likewise, because it is forbidden.

In 3 villages only 24 households were actually interviewed, but apart from this minor bias each village has equal weight in calculations including the whole sample. In calculations of water use per capita, though, villages with larger families would carry slightly greater weight than those with smaller hh. size. Mean hh. sizes are shown in table 3.1.

2.3.2 Observation at DPs/pumps.

In each village DP/pump observation was carried out for three days at three different DPs/pumps from 6 am to 8 pm. All watercollectors during the day were registered with their sex/ages, name of head of household, no. of householdmembers, estimated amount of water collected, and activities at DP/pump - if any. This method gives particularly reliable information on amounts of water collected and at which periods of the day, on sex/age of watercollectors, and on activities at the DP/pump.

Relating this wateruse to the acquired data on households and populations has some difficulties, however, because the latter are somewhat unreliable and unsystematic: First, the identification of the household to which water collectors belong is not always straightforward, as some heads of households may be called by several different names, or because in housholds with several wives som people would mention the husband (of all wives) as head of HH. while others would mention the wife who lives in a certain house with her children. Secondly, quite a few households collect water from different DPs/pumps during the day, e.g. on their way from some erand or visit, or for different purposes.

Table 2.1. presents the basic data for DP/pump observations. In calculations across the villages they do not carry equal weight, since the number of persons collecting water, the number of households they belong to, the total population in these households, and the amount of water collected, vary widely between the different DPs/pumps. In order to counteract the

TABLE 2.1 : BASIC DATA FOR DP/PUMP OBSERVATIONS

DP/Pump - Date	No. of Persons Collecting Water	Lts. Collected By:		HHs	Persons	Pers/hh.
		Identified hh.	Unidentified hh. or non-hh.			
Kiponzelo						
DP 11 - 5/3	127	1599	22	56	340	6.1
DP 4 - 10/3	130	1054	700	29	145	5.0
DP 13 - 12/3	90	1147	22	38	179	4.7
Mbalamaziwa						
DP 2 - 5/3	232	2136	592	59	286	4.8
DP 4 - 10/3	118	1263	30	33	148	4.5
DP 8 - 11/3	52	663	0	25	113	4.5
Kasumulu						
DP 10 - 26/3	107	1114	2	31	155	5.0
DP 11 - 29/3	88	942	10	27	103	3.8
DP 4 - 31/3	58	580	13	23	94	4.1
Mlangali						
DP 12 - 27/3	82	1283	0	42	178	4.2
DP 17 - 29/3	78	946	0	23	114	5.0
DP 11 - 1/4	70	1007	0	39	153	3.9
Nzivi						
Well 422/10 - 5/3	114	1240	53	52	240	4.6
Well 422/14 - 10/3	35	351	2	16	72	4.5
Well 422/2 - 11/3	26	201	0	12	52	4.3
Well 422/7 - 12/3	55	649	0	34	163	4.8
Nyeregeti						
Well 3 - 26/3	159	2368	0	78	375	4.8
Well 4 - 28/3	204	2721	90	92	437	4.8
Well 6 - 31/3	224	3579	39	103	563	5.5

particularly low figures for Nzivi a fourth well was included there.

Table 2.2 shows that in sum, in terms of persons estimated to be using the observed DPs/pumps on the observation days, we have reached a reasonable balance between piped water users (51 %) and hand pump users (49 %) and between Iringa (44 %) and Mbeya regions (56 %).

TABLE 2.2 : DISTRIBUTION OF SURVEY POPULATION IN DP/PUMP OBSERVATIONS

Name of Village	Persons Using Observed DPs/ Pumps	% of Total
Piped Water:		
Kiponzelo	664	17
Mbalamaziwa	547	14
Kasumulu	352	9
Mlangali	445	11
Total Piped Water	2208	51
Handpumps:		
Nzivi	527	13
Nyeregeti	1375	35
Total Handpumps	1902	49
GRAND TOTAL	3910	100
Iringa	1738	44
Mbeya	2172	56

2.3.3 Metered waterflows

The most exact and reliable measure of waterflows in a watersupply is of course obtained by installing meters on all DPs and the main distribution line, registering both periodical and total water flows - including waste as well as system losses.

This was done in the four piped water villages and all meters were read once every hour from 6 am to 9 pm. The distributionline master meters were on some days further read once every quarter of an hour, and some nights once every hour.

Even this more technical method has its problems however. For one thing, the meters used seemed to have problems with the amounts of solid matter passing through a Tanzanian water supply especially in the rainy season so on some days they did not work. But more important perhaps, is the difficulty of getting population data to which the measured waterflows can be related.

For planning purposes the meter data alone give important information on variations in waterflows over the day and between days, on system losses and major periods of waste. For broader planning use they must, however, be related to population figures. In the piped water villages, therefore, a population count was made, in two of them by two project assistants passing every house in the village asking for information on the number of people in the house, while in the other two village authorities were used to collect the same information. To get total village populations both methods seem reasonably reliable - though neither is completely sure - but relating them to DPs used by them gave lists of households varying widely from the lists of households actually observed using some of the DPs.

Of course measured waterflows cannot be related to water use purposes - neither at home or at the DP, nor do they inform us about watercollectors.

In calculations of totals across all 4 piped water villages this method gives a certain bias towards the larger villages (population figures are presented in section 3.3 below) and towards villages with more succesfull metering days, such as Mbalamasiwa with 11 days against 10 in Kiponselo and 9 each in Mlangali and Kasumulu.

2.4 Study of village participation in operation and maintenance

Apart from a few questions in the household questionnaire, information on this subject was primarily obtained through discussions with village leaders, especially those with specific responsability for the water scheme, i.e. members of village water commitees (VWCs) and scheme and tap/pump attendants, but also village chairman and secretary and selected barozis.

No formal questionnaire was used, but a structured checklist of subjects to be covered had been prepared in cooperation with the interviewers, as well as a list of persons, with whom to discuss these subjects.

The form of the discussions was not predetermined, and might be both group- and individual discussions.

Reporting has taken the form of individual village reports, which are extensively extracted as case studies in chapter 9, on the basis of which the chapter summary was written.

2.5 Procedure in the villages

In each village the procedure started with a meeting of the VWC and all barozi, where one of the principal researchers introduced the study and the research assistants, who would be staying in the village for 2 weeks. One of the main purposes of this meeting was to try to allay any fears the study might cause, such as of introduction of water levy, or of tinkering with the waterquality.

In each village information was collected by two socio-economic assistants, in the piped water villages supplemented with two assistants who organized and supervised the meter-reading. The actual reading of meters was done by a villager employed for each meter. In two villages two more socio-economic assistants carried out the population count mentioned above.

2.6 Follow-up research.

2.6.1 Water use study.

A major weakness of the water use study - which was also pointed out by villagers in all the introducing village meetings - is that it has been carried out at the peak of the rainy season (the timing being primarily determined by the timing of the coming evaluation of the project, for which this is a pre-study).

In the rainy season use of water from improved water supplies is likely to be reduced on several accounts:

- more people have alternative sources of water nearer to their house, which they may use for all or selected purposes; this may be seasonal streams or ponds, as well as roof catchments of rainwater.

- people use less, or probably no, water for purposes such as watering crops or animals, making bricks, or even beerbrewing (as the favourite wet season brew in most study areas is bamboo- "wine", which demands only rain, compared with the water based maize beer made in the dry season).

- Quite a few villagers spend days or even days and nights on their fields, which may be located far away from the villages - and their water schemes.

In the Water Master Plan study the results are in a way an average of dry and wet season situations since the household interviews were carried out over a period including both wet and dry season.

In order to supplement the present study with a minimum of comparable information from the dry season, it is proposed therefore to repeat at least the waterflow measurements in the same villages in August or September. This would - especially - give indications of the size of variation in water use between seasons.

2.6.2 Village participation study.

As chapter 9 will show, one of the conclusions of the present study is, that a major problem with village participation in operation and maintenance is the lack of clarity concerning the relations between the different organs of the village structure - and in particular in relation to how the specific water related institutions are - or could be - situated within the village structure. This study, however, did not have the capacity to get further than to illuminate the apparent confusion existing in most villages.

It is suggested therefore that the ongoing anthropological studies within the project, being carried out by a volunteer from the DVS, should be redirected, so as to concentrate on this aspect: i.e. to pursue in-depth studies on the formal and especially informal leadership structure in a limited number of project villages. The aim should be to uncover the patterns that must exist, despite the apparent state of confusion, especially as regards the implementation of village projects, and handling of village money, and find ways in which these patterns may be clarified, redirected, supported and formalized to the mutual benefit of the village and the water project.

This study should be carried out as an anthropological study in a few case study villages, where the researcher would stay for extended periods, in order to get a real first hand acquaintance with the village leadership and

villagers. The location and "representativeness" of the villages selected would be of minor importance in this study.

It has, finally, been discussed to include the DANIDA waterproject in the World Bank initiated universal study of cost recovery and "willingness to pay" in rural water schemes, and it seems clear that the project is very feasible as study case with its strong policies on cost recovery and payments to be communally organised, where the study can also in practical terms, benefit from the strong project organisation, while the project ought to be interested in having its particular problems studied in a broader context.

3. STUDY AREAS

3.1 Geography and agro-ecology.

The six study villages were primarily selected on the basis of criteria related to their water supplies - as outlined in ch. 2.

However their distribution between two regions, and between 6 different waterschemes has also ensured a certain diversity geographically, in ecological and climatic terms, as well as agriculturally and economically.

4 of the villages, i.e. Kiponzelo in Iringa district Nzivi and Mbalamaziwa in Mufindi district, Iringa region, and Mlangali in Mbozi district, Mbeya region are located in what might be termed the most "typical" areas of the two regions, that is areas of medium high altitude, rainfall and soilfertility, with maize as the predominant food and cash crop. They are relatively easily reached by road, and have fairly well developed economic and communications lines with regional and national centers. All four have permanent traditonal water sources within a reasonable distance - though not within "easy access".

Kiponzelo and Mbalamaziwa are fairly concentrated villages, while Nzivi and Mlangali have a somewhat more scattered settlement pattern, though they are villagization villages. In Mbalamaziwa a new sub-settlement of cattle owners has been created in recent years at some distance from the village centre. In Kiponzelo a rather large number of villagers seem to move out and live on their fields in the rainy season.

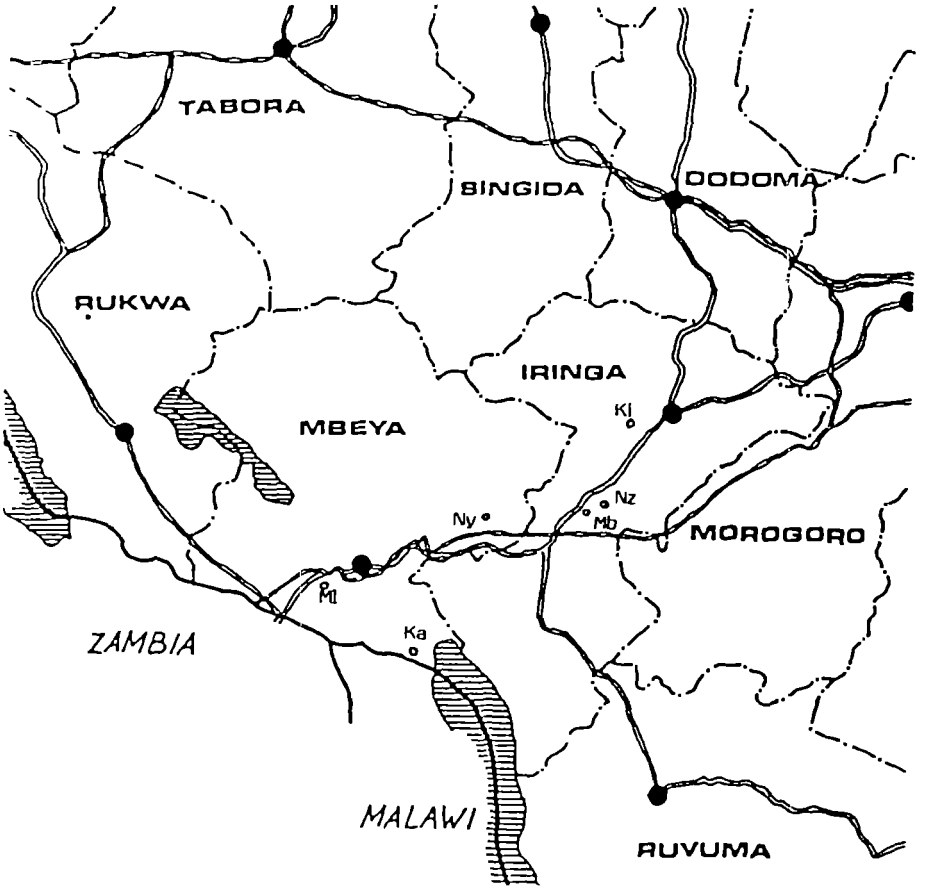
Kasumulu in Kyela district, Mbeya region, is located in one of the high rainfull areas, the low lakeshore area at the Northern end of Lake Nyasa. Due to the warm and humid climate a host of different tropical fruits are grown, with rice in the lower and maize in the higher parts as the stapple cereals.

Because of its dense population, villagization did not take the form of a major population movement in this area, so while the area as a whole is more densely populated than those of the other study villages, the village itself has a less concentrated settlement pattern, with most households living on their land, and thus at some distance from their neighbours.

There are a number of permanent streams within the village.

The new road to Malawi passes through Mlangali, vastly improving the accessibility of the village.

The last study village, Nyeregete, located on the Usangu Plains, in Mbeya district, represents the areas of low rainfall, which in the dry season have real scarcity of



Map 3.1: Location of Study Villages.
Ki - Kiponzelo; Mb - Mbalamaziwa; Ka - Kasumulu,
Ml - Mlangali; Nz - Nzivi; Ny - Nyeregete.

natural water sources.

In the rather short rainy season, however, soil and water conditions are such that roads in many places are impassable, while paddy is a feasible and profitable stapple cereal crop.

The abundance af land (so far), and profitability of paddy cultivation has lead to an increasing permanent, but also seasonal, imigration into the plains from the surrounding highlands, thus resulting in generally fast growing but also seasonally varying village populations.

The locations of the stydy villages are shown on map. 3.1.

3.2 Socio-economic characteristics.

In table 3.1 a few basic socio-economic characteristics of the study villages have been extracted from the household interviews. The villages seem fairly typical for Tanzanian villages, both in terms of averages across the whole sample, but also as regards the wide variations between villages.

Table 3.1 Basic Socio-Economic Data for Sample Households.

	% Distribution of HH by Village						% of ALL HH
	Kiponzelo	Mbalama ziwa	kasumulu	Mlangali	Nzivi	Nyeregete	
% Male Respondents	4.0	8.0	4.0	2.0		8.0	8.0
% Female Head of HH	17.0	16.0	8.0	29.0	16.0	8.0	17.0
Mean HH Size	5.3	4.5	4.9	3.9	5.3	5.0	4.8
No. of Males	1.4	0.8	1.3	0.9	1.0	1.4	1.1
No. of Females	1.4	1.3	1.3	1.2	1.3	1.2	1.3
No. of Children	2.5	2.3	2.3	1.8	3.1	2.3	2.4
Mean Years of school Education	2.8	1.8	2.3	1.5	1.6	2.3	2.0
Mean Acres Cultivated	3.5	3.2	3.6	2	3.7	3	3.2
% HH with any Employment	21.0	20.0	16.0	13.0	36.0		18.0
% HH with Livestock	17.0	16.0	68.0	54.0	32.0	17.0	34.0
% HH with Corrugated Iron Roof	29.0	28.0	12.0	17.0	28.0	8.0	20.0
% HH with Mud Walls	79.0	80.0	36.0	75.0	100.0	83.0	76.0

A few differences go beyond normal intervillage variations: Kasamulu and Mlangali are located in areas with much more livestock than the other villages - and also with more widespread oxculivation; and Kasumulu has had a program of improved housing.

The information given on cultivated area, seems - as usually in questionnaire surveys, and therfore as expected - extremely unreliable and incompatible with any cursory observation we could make in the villages. 2 acres per household in Mlangali, where oxcultivation is widespread, is obviously a gross underestimation, probably partly caused by fear of taxation or other interference from the authorities, partly by less knowledge among women, who were the interview persons, of area-measurements (e.g. the difference between the officially used hectare and the more popular acre).

All six villages are basically rural in character - and as such a significant proportion of hoseholds have one or more members in waged employment!

Kiponzelo and Mbalamaziwa are probably the most "urbanised" - Kiponselo as a rural administrative and economic centre, Mbalamaziwa as a typical service centre for the main road traffic. Both have shops, milling machines, restaurants, teahouses, questhouses and bars - Mbalamaziwa probably more of the latter - and Kiponselo has a rural health centre and ward and divisional administration.

Kasumulu has experienced increasing economic activity since the opening of the Tanzania-Malawi mainroad, affecting its small marketplace with a couple of shops, bars and milling machines.

Nyeregete has a small and badly supplied shop, while Nzivi and Mlangali have no shops at all. Neither do they have many other non-agricultural economic activities.

All villages have a school. Apart from the health centre in Kiponselo, there is a dispensary in Mlangali and another is just about to be opened in Nyeregete.

3.3 Population.

No reliable population figures exist for Tanzanian villages. Some af the best overall figures are probably those from the 1978 census, but for individual villages even they are not allways reliable, and their use depends on weak estimates of growth rates. Many villages have their own population statistics, which are equally

unreliable, and rough estimates may also be made based on number of children registered in the village schools (which are more reliable!).

As mentioned above (section 2.3.3) this study included a population census in the piped water villages.

From these sources the following population estimates may be derived:

Kiponselo: A village census in 1984 registered 2394 inhabitants, of whom 66 % were children. Our census gave a total af 2237 persons - living in the village at present and using the water scheme. The difference (including some likely growth between ⁄84 and ⁄87) may be accounted for by people who do not use the waterscheme.

Mbalamaziwa: According to village statistics it has 11-1200 inhabitants (which is also the figure on which the waterproject design was based). There are 280 registered school children or approximately 25% of the population estimate. Our census counted a total af 1146 inhibitants.

Kasumulu: No village statistics have been made since the former subvillage, Ushirika, was separated from Kasumulu. According to our census it has 1916 inhabitants, which fits well with the taxcollectors figure of 955 ablebodied adults. Only 320 children are registered in the village school, but quite a number of children from the village are reported to frequent schools in neighbouring villages.

Mlangali: Village authorities estimate the number of villagers to be 1314, while our census gave 1407 inhabitants (divided almost 50-50 between adults and children). We have no explanation, however, of the relatively small number af children in the school, i.e. 240.

Nzivi: According to village statistics the village has 1442 inhabitants of which 350 (24%) are school-children.

Nyeregete: A 1983 population figure of 2269 seems to include seasonal imigrants, as there are only 300 registered school children and 650 ablebodied adults in the village workforce, making an estimate of approximately 1300 permanent inhabitants likely. This figure corespond with estimates made by village chairman and schoolteacher.

4. WATER SOURCES

4.1 Use of alternative sources

One of the discouraging results of the Water Master Plan survey was that even in villages with a functioning improved water supply, a large part of the population did not use it, primarily because of a longer distance to the improved source than to a traditional source, which was then preferred. Table 4.1 demonstrates this problem.

TABLE 4.1 : USAGE OF WATER SCHEMES AT THE TIME OF INTERVIEW; RESPONDENTS IN VILLAGES WITH WORKING WATER SCHEMES; IRINGA AND MBEYA WMP SURVEY

Iringa Region	Village Usage % of Respondents	Mbeya Region	Village Usage % of Respondents
Matamba	100	Utengule	36
Mlangali	0	Rujewa	93
Lugarawa	31	Mwanbani	47
Kiponzelo	66	New Mbangala	100
Nyambula	52	Ikama	70
Igula	100	Katela	50
Kihorogoto	100	Lema	67
		Kateela	87
Average	64		69

In comparison with this Tabel 4.2 shows that in the six present study villages with new DANIDA water schemes almost 90% of respondents in the questionnaire survey stated that they use the improved water source, and only in one village is the figure below 80%.

Mbalamasiwa, where 28% of respondents claim not to use the water scheme, is, however, an example of a problem which may become more widespread in the future. Many of these non-users are people who have moved out from the nucleated village since the water supply was designed - and the village policy was liberalised. Kasumulu, with 20% non-users, somewhat similarly was never "villagised", so people live relatively scattered.

Table 4.2 : Distribution of Households by Use of Different Water Sources.

Water Source	% of HH by Village						% of ALL HH
	Kiponzelo	Mbalamasiwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
Tap/pump	100.0	44.0	52.0	86.4	72.0	87.5	73.1
Other source		28.0	20.0	4.5	16.0		11.7
Both#		28.0	28.0	9.1	12.0	12.5	15.2
DP/Pump & Both	100.0	72.0		80.0	84.0	100.0	88.3
N	24	25	25	22	25	24	145

Among those using both sources 92 % indicate that DP/pump is most important.

Table 4.2 also shows that more people than the non-users supplemented the improved source with a traditional source, and Table 4.3 that the principal sources apart from DPs/pumps are rivers/streams, followed by rainwater, which typically is supplementary rather than an alternative.

Among all those stating to supplement DP/pumps with another source 92% did however maintain that their most important source is the DP/pump.

Table 4.3 : Distribution of Households by Water Sources Used Other Than DP/Pump.

Type of Source	% of Households by Village					% of ALL HH
	Kiponzelo	Mbalamazi wa	Kasumulu	Mlangali	Nzivi	Nyeregete
River/Stream	35.7	75.0	66.7	57.1	100.0	59.0
Well	14.3	16.7		28.6		15.4
Rain	35.7	8.3	33.3	14.3		20.5
Other	14.2					5.2
N	14	12	3	7	3	39

4.2 Reasons for preference for an alternative source.

Table 4.4 shows that also in this survey by far the major reason given for using an alternative source is that it is nearer than the DP/pumps.

Table 4.4 : Distribution of Households by Reasons for using Other Source than DP/Pump.

Reasons Given	% Distribution of HH by Village					% of ALL HH
	Kidonzelo	Moalama ziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
Near	50.0	91.7		57.1		56.4
Better for drinking			33.3			2.6
Queuing at DP/Pump				28.6		5.1
Better for washing/ bathing			33.3		66.7	7.7
No water at DP/Pump	7.1				33.3	5.1
Other		8.3	33.3	14.3		7.7
D.k.	42.9					15.4
N	14	12	3	7	3	39

An even larger proportion (73%) of the respondents using a traditional source (only at supplimentary) state that it is actually closer than the DP/pump.

4.3 Distance to DPs/pumps.

Comparing the distances to DPs/pumps in the present survey with those of the Water Master Plan survey, as in Table 4.5, shows that the situation has improved quite a lot in the Iringa region, while the new DANIDA schemes in Mbeya have slightly more people living more than 400 m. from their DP/pump than in old schemes, where the situation was, however, already relatively good.

TABLE 4.5 : DISTANCES TO DP/PUMPS

	% of HH.			
	Iringa		Mbeya	
	WMP	Present	WMP	Present
Households using DP/Pump	64	85	69	92
HHs less than 400 m to DP/Pump	61	91	85	76
HHs more than 400 m to DP/Pump	40	9	15	24

Looking at distances to DPs/pumps in the individual villages, Table 4.6 again shows the characteristic difference between the two main problem villages, Kasumulu, with its scattered population of which almost 2/3 live more than 300 m. from their DP, and Mbalamasiwa, where 2/3 of the respondents living in the village centre have less than 200 m. to their DP, while 20% live more than 800 m. away from any DP.

While this latter group in Mbalamasiwa does not use the water scheme, Table 4.7 indicates that while users are in general satisfied and feel they live nearby a DP/pump, the proportions in the individual villages who think the DP/pump is far away are otherwise closely related to the proportions who actually have larger distances (as seen in Table 4.6).

Table 4.6 : Distance to DP/Pump as Estimated by Interviewer (all HH).

Distance metres	% Distribution of HH by Village						% of ALL HH
	Kiponzelo	Mbalama ziwa	Kasumuiu	Mlangali	Nzivi	Nyeregete	
0 - 49	29.2		4.0		4.0	20.8	9.5
50 - 99	12.5	32.0	12.0	8.3	28.0		15.6
100 - 149	4.2	16.0	4.0	4.2	16.0	29.2	12.2
150 - 199		12.0		12.5	24.0	25.0	12.2
200 - 299	50.0	12.0	20.0	45.8	16.0	8.3	25.2
300 - 399	4.2	8.0	20.0	8.3	4.0	4.2	8.2
400 - 799			16.0	20.8	8.0	12.5	9.5
800 -		20.0	24.0				7.5
N	24	25	25	24	25	24	147

Table 4.7 : Villagers Conception of Distance to DP/Pump (users only).

Conceived Distance	% Distribution of HH by Village						% of ALL HH
	Kiponzelo	Mbalama ziwa	Kasumuiu	Mlangali	Nzivi	Nyeregete	
Near	66.7	77.8	50.0	52.2	76.2	70.8	65.4
Far	33.3	22.2	50.0	43.5	14.3	29.2	32.3
Average				4.3	9.5		2.3
N	24	18	20	23	21	24	130

Table 4.8 : Source of Water in Relation to Distance to DP/Pump.

Distance to DP/ Pump - metres	% of HH by Source of Water	
	DP/Pump	Other or Both
0 - 99	28.3	17.9
100 - 199	28.3	15.4
200 - 399	35.8	25.6
400+	7.5	41.0
N	106	39

Correlation Test: Pearson's R:	Value	Significance
	0.28595	0.0002

Not only do people, as we have seen, give distance as the main reason for using an alternative source, there is also a highly significant correlation between the actual choice of water source and the distance to a DP/pump (Table 4.8).

4.4 Dry season sources

Apart from obtaining information on presently used water sources (i.e. rainy season sources) the interviews also enquired about water sources in the dry season. The answers are presented in table 4.9. Unfortunately this question (because of a not too good composition of the questionnaire) was not posed to the majority of respondents in Mlangali and smaller sections in Mbalamasiwa and Kiponzelo. In spite of these missing answers a comparison of tables 4.9 and 4.2 makes it clear that there is very little difference in water sources between the two seasons, the main one probably being less use of supplementary sources in the dry season.

Table 4.9 : Distribution of Households by Dry Season Water Source.

Water Source	% Distribution of HH by Village						% of ALL HH	TOTAL OF SUBSTANTIAL ANSWERS
	Kiponzelo	Mbalamasiwa	Kasumulu	Mlangali	Nzivi	Nyeregete		
DP/Pump	87.5	48.0	76.0	8.3	84.0	95.8	66.7	86.0
River/Stream		8.0	20.0	4.2	8.0	4.2	7.5	9.7
Well		4.0	4.0		8.0		2.7	3.5
Lake		4.0					0.7	0.9
D.K.	12.5	36.0		87.5			22.4	
N	24	25	25	24	25	24	147	114

4.5 Alternative sources when the waterscheme is out of order.

The sources of water to which people revert when their DP/pump does not yield water are presented in table 4.10. Only users of DPs/pumps have answered, and quite a few answers indicating that people wait the short time lapsing before repairs are made (e.g. in Kiponzelo) have also been omitted in the table. Not surprisingly the most common alternative sources are rivers or streams. However, in the handpump villages, where only one pump breaks down, and not the whole scheme as often in piped water schemes, many people would in that case use another pump. The same is the case in Kiponzelo, where people, because it's an older scheme, may be more used to individual DPs not funcionning.

Table 4.10 : Distribution of Households by Alternative Source when DP/Pump is Out of Order.

Sources	% Distribution of HH by Village						% of ALL HH
	Kiponzelo	Mbalama ziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
River/Stream		63.2	60.0	100.0	38.1	52.6	56.9
Well	69.2	36.8	30.0			5.3	19.8
Other DP/Pump	30.8				57.1	26.3	18.1
Other			10.0		4.8	15.8	5.1
N	13	19	20	24	21	19	116

5. DAILY PER CAPITA WATER CONSUMPTION

5.1 WMP findings and design recommendations.

The major considerations behind the WMP recommendations on per capita consumption and capacity of schemes are recapitulated in Table 5.1.

According to this the proposed design capacity should be 20 litres per capita (of (future) design population), leaving a margin of 15% over the villages with the highest per capita consumption, or 53% over the mean for all villages in the survey, which was estimated at 13.1 litres per capita per day.

Over and above this there must be an allowance for almost inevitable system losses, which was rather arbitrarily fixed at 5 litres/capita/day giving a total design capacity of 25 litres per capita, which has since them been approved for DANIDA funded schemes.

TABLE 5.1 : PROPOSED SCHEME CAPACITY AND PRESENT WATER USE AT THE TIME OF THE WMP

	Estimated Mean Consumption per capita per Day				
	Present at House (litres)	at Tap (litres)	Total Present (litres)	Proposed Capacity (litres)	Increase allowed (%)
Villages with highest collection figures	14.5	2.9	17.4	20	15
Villages with lowest collection figures	6.7	2.9	9.6	20	108
Mean, 8 zones	10.2	2.9	13.1	20	53

Source: WMP, Iringa, Mbeya, Ruvuma Vol. 12 Table 8.8

Table 5.2 presents the results of the WMP survey in more details. It should be noted here, that after the finalisation of the Water Master Plan it has been discovered that the way the means are calculated in the edb programme used has given all mean per capita calculations an upwards bias. The reason is that they were calculated as the mean per household of consumption per capita - calculated first for each household. As there is a very strong negative correlation between per capita consumption and household size, this method, which has a bias towards small households (as they are given equal weight with large households), is therefore also biased a high per capita consumption.

TABLE 5.2 : MEAN WATER COLLECTION (LITRES PER CAPITA) BY SAMPLE HOUSEHOLDS THE DAY BEFORE THE INTERVIEW, IRINGA, MBEYA, RUVUMA WMP SURVEY

	Water Collection		
Region/Zone	Zonal Mean ltrs/cap.	Village with Highest water collection ltrs/cap.	Village with Lowest water collection ltrs/cap.
IRINGA			
High rainlands	9.6	12.4	4.4
Upper Plateau	10.7	14.8	9.2
Medium Dry zone	10.4	14.4	7.4
Dry Northern fringe	9.0	13.2	4.8
MBEYA			
Wet highlands	9.7	12.0	6.3
Lake shore	9.7	12.0	7.0
Dry plain	10.7	23.4	6.4
Dry Northern zone	11.6	13.8	10.3
RUVUMA			
Dry Eastern zone	8.5	9.3	7.4
Wet Western highlands	15.0	15.8	14.3
Intermediate zone	10.6	11.5	9.0

Source: WMP Iringa, Mbeya, Ruvuma - Vol. 12 Table 8.2

In the present study we have corrected the method of calculations, but to have some comparable figures, the last row in Table 5.3 " Mean of lts/cap/HH " has been calculated the same way as the WMP figures.

5.2 Daily wateruse according to household interviews.

5.2.1 Water carried home

The mean daily water collection is shown in table 5.3

Table 5.3 : Mean Daily Water Collection per Household and per Capita.

	Villages						ALL HH
	Kiponzelo	Mbalamaziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
lts/HH/Day	52	48	67	52	38	63	54
lts/Cap/Day	9.8	9.7	14.4	12.8	6.9	12.7	10.9
Mean of lts/Cap/HH	11.3	13.6	14.1	14.4	7.2	17.5	13.1
N	23	18	20	23	21	24	129

The mean for all households of 10.9 lts/cap. at first sight seems very similar to the 10.2 lts/cap. obtained in the WMP survey, but due to calculation bias the figure in our survey, which corresponds with the 10.2 lts in the WMP, is actually 13.1 lts/cap. This, however, is also more in line with the WMP finding, that villages with an improved (functioning) watersupply tend to use more water per capita.

Using the corresponding figures for the individual survey villages we find that apart from Nzivi they are well within the range of those villages in the WMP survey with the highest zonal water collection.

This again is in accordance with the expectations that consumption will increase with the establishment of improved water supply, with shorter distance to the water source, and socio-economic improvements.

5.2.2 Water use in relation to social and distance factors.

As in the WMP survey we have in Tables 5.4 to 5.7 correlated water consumption with a number of social factors as well as the distance the household lives from the DP/pump.

Table 5.4 : Water Collection per Capita in Relation to Household Size.

lts/cap/day	% of HH by Household Size			% of ALL HH
	0 - 3	4 - 6	7+	
0 - 6.9	17.1	34.4	62.5	34.1
7 - 13.9	34.1	35.9	29.2	34.1
14+	48.8	29.7	8.3	31.8
N	41	64	24	129

Correlation Test:

Pearson's R:	Value	Significance
	-0.36154	0.0000

Table 5.5 : Water Collection per Capita in Relation to Type of Roof.

lts/cap/day	% of HH by Roof Type	
	Thatched Roof	Corrugated Iron
0 - 6.9	37.6	21.4
7 - 13.9	35.6	28.6
14+	26.7	50.0
N	101	28

Correlation Test:

Pearson's R:	Value	Significance
	0.20049	0.0114

Table 5.6 : Water Collection per Capita in Relation to School Education.

lts/cap/day	Education	No Education
0 - 6.9	27.3	39.7
7 - 13.9	43.6	26.0
14+	29.1	34.2
N	55	73

Correlation Test:

Pearson's R:	Value	Significance
	-0.11703	0.0933

Table 5.7 : Water Collection per Capita in Relation to Distance to DP/Pump.

lts/cap/day	% of HH by Distance to DP/Pump			
	0 - 99	100 - 199	200 - 399	400+
0 - 6.9	23.5	38.9	41.3	46.2
7 - 13.9	41.2	33.3	28.3	15.4
14+	35.3	27.8	30.4	38.5
N	34	36	46	13

Correlation Test:

Pearson's R:	Value	Significance
	-0.08969	0.1561

Among the social indicators the highest degree of (negative) correlation is found between water collection per capita and household size. Water collection and roof type, used as an indication of social status also shows a significant correlation; whereas the correlation found between school education of the respondent and watercollection is only significant at the 10% level. Finally, our survey reconfirms the very weak and unsignificant negative correlation between water consumption and distance to the water source, found also in the WMP survey.

In general, the tendency is thus the same as in the WMP study: that an increasing water use is to be expected when family size decreases, economic status improves level of education increases and distance to water source gets shorter - but also that no dramatic increase is to be expected until water is led right into the houses.

5.3 Water use as observed at selected DPs and handpumps.

5.3.1 Per capita water use.

In the observations at three different DPs/pumps on three different days in each village we tried to estimate the amount of water each person carried home, and to identify his/her household, with the nomber of household members.

Table 2.1 and 2.2 presented some of the data from these observations, which are here summarized in Table 5.8 in relation to per capita water consumption.

TABLE 5.8: PER CAPITA WATER USE AS OBSERVED AT DPs/PUMPS

Name of Village	Water Collected by Identified hh.	Water Collected by Unidentified hh. or for non-hh. use	Water Used at DP/Pump	Total
	Lts/Cap.	Lts/Cap.*	Lts/Cap.*	Lts/Cap.*
Piped Water:				
Kiponzelo	5.7	1.1	1.4	8.2
Mbalamaziwa	7.4	1.1	4.5	13.0
Kasumulu	7.5	0	2.2	9.8
Mlangali	7.3	0	3.6	10.8
Handpumps:				
Nzivi	4.6	0.1	0.9	5.7
Nyeregeti	6.3	0.1	1.0	7.4
All Villages:				
Piped Water	6.8	0.7	2.9	10.4
Handpumps	5.8	0.1	1.0	6.9
Total	6.3	0.4	1.9	8.7

* Calculated on the basis of the number of people in the identified households

The most striking result is a per capita consumption which is same 40% lower than according to the household interviews. This is probably primarily due to the difficulty in proper identification of watercollectors households, which easily leads to double-counting of a number of households' members. So for calculations of per capita water collection this method seems inappropriate.

5.3.2 Water use by non-household consumers and use at the DP/pump

While the per capita consumption figures are not very reliable, using this method, we believe that the absolute estimates and their distribution between household use, non-household use, and use at the DP/pump are more reliable - and they cannot be obtained through any other method.

In table 5.8 the consumption by unidentified households or non-household use primarily belong to the latter category, i.e. hotels, bars, milling machine, etc. Water used at DP/pump was recorded in lts. for exceptional uses, whereas ordinary laundry has been estimated at an average of 40 lts., personal hygiene at 10 lts., and other use and waste at 5 lts. per person recorded as undertaking any of these "activities". If anything these are very moderate estimates.

Thus calculating the relation between water collection by identified households, by unidentfied households or non-households, and use at the DP/pumps gives a total of 100 : 6 : 30 for all villages or 100 : 10 : 43 for piped water schemes.

There is good reason to believe therefore, that the WMP relation between use at house and at tap, which was 100 : 28 for all villages and 100 : 20 for those with the highest mean consumption, is an underestimation, and that for design purposes it should probably be our 2 : 1 between household and other uses rather than the WMPs 5 : 1.

The above calculation of water use at the DPs/pumps were based on data presented in detail in Table 5.9.

It is clear from the Table that quite a few watercollectors do undertake such activities, although often forbidden. Less people, however, seem to use handpumps for laundry and personal hygiene.

TABLE 5.9 : ACTIVITIES OBSERVED AT DPs/PUMPS

Name of Village	% of Collectors Using Water at DP/Pump for:			
	Laundry	Personal Hygiene	Cleaning Utensils	Other
Piped Water:				
Kiponzelo	2%	7%	24%	0%
Mbalamaziwa	3%	10%	49%	4%
Kasumulu	3%	5%	14%	4%
Mlangali	5%	11%	50%	6%
Handpumps:				
Nzivi	0%	3%	37%	0%
Nyeregeti	0%	2%	37%	1%
All Villages:				
Piped Water	3%	8%	35%	3%
Handpumps	0%	2%	37%	0%
TOTAL	2%	6%	36%	2%

6. PEAK FACTORS

6.1. The WMP findings on consumption over the day and daily peakfactor.

In the WMP the daily peak factor calculation was based on questionnaire interviews only, and it was only possible with any reliability to use a 2 1/2 hour peak factor, depending, as it were, on womens recollection of watercollecting the previous day.

Table 6.1 presents the WMP results on the distribution of water collection over the day, and the 2 1/2 hour peak factor for all households across in the sample. As the survey also showed a somewhat more equal distribution over the day of collections in piped water schemes, the WMP design figure was put at peak factor 3.

TABLE 6.1 : DISTRIBUTION OF WATER COLLECTION OVER THE DAY. WATER MASTER PLAN SURVEY. PIPED WATER ONLY

Time Intervals	Distribution of Water Collections %
Before 9.00 a m	33
9.01 - 11.30 a m	16
11.31 - 2.00 p m	15
2.01 - 4.30 p m	20
After 4.31 p m	16
2½ Hour Peak Factor	3.2

Source: WMP Iringa, Mbeya, Ruvuma - Vol. 12 Table 8.12

6.2 The daily peak factor as derived from interviews in the present survey and from observations at DPs/pumps.

The present survey gave a 2 1/2 hour mean peak factor for all interviewed households in the survey villages of exactly 3.0 or the same as th WMP design figure.

Table 6.2 shows this result and the distribution of watercollections over the day as well as peak factor for the six villages. They vary from 2.1 to 3.4, and interestingly the two hand pump villages have the highest peak factors, being perhaps more similar in this respect to villages with traditional sources.

Table 6.2 : Distribution of Water Collection over the Day. Household Interviews.

	% Distribution of Water Collection by Village						ALL HH
	Kiponzelo	Mbalama ziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
6.00 - 8.29	33.5	35.0	25.8	24.9	35.5	34.1	31.5
8.30 - 10.59	14.5	14.9	11.5	17.8	13.1	8.4	13.1
11.00 - 13.29	8.3	9.3	28.2	28.4	21.1	9.2	17.9
13.30 - 15.59	24.7	16.0	10.2	23.6	2.9	18.4	16.2
16.00 - 18.29	12.1	22.2	19.1	5.3	27.5	19.3	17.4
18.30 - 20.59	6.9	3.6	5.2			10.6	4.6
2.5 Hour Peak Factor	3.2	2.1	2.7	2.7	3.4	3.3	3.0

The peak factors from the DP/pump observations are given in Table 6.3, which shows two different calculations: When a mean of the peak factors for each tap and pump observed are calculated we get exactly the result as through the interviews, 3.0 for all taps and pumps, slightly higher for the pumps alone, and lower for the taps.

If we calculate the peak factor for all observations per village, irrespective of DP/pump and date we get a lower peak factor, as evident from the table, and one which in a way is more realistic, as we are interested in the peak for whole villages, which is bound to be lower than mean for all

DPs/pump in the village. However, as we have observed only few DPs/pumps, a chance deviation from "normal" behaviour at one DP/pump, e.g. because of rain, on one day may lower the peak factor too much as has apparantly been the case in Nziwi.

From the observations we can also estimate a one hour peak, which is of course somewhat higher than the 2 1/2 hour peak i.e. from same 3.5 to 4.5, varying between villages and method of calculation.

Whether to use the 2 1/2 hour peak factor as in the WMP, or the higher 1 hour peak, or an even higher peak for a shorter period, is of course a political decision, where cost has to be weighed against the convenience of never being short of water, even for a short period, because of an eventual concentration of water use.

Similarly the choice of making allowance for possible "peak days" in the scheme capacity, is a political one. In the WMP the likelyhood of weekends being peak water use days was however neglected completely, so whether to make allowance for it or not was not posed as a choice.

Neither the interviews, nor the DP/pump observations, could however in this survey cover that aspect, so it was left to the part of the survey, measuring water flows with meters.

TABLE 6.3 : PEAK FACTORS AS OBSERVED AT DPs/PUMPS

Name of Village	Peak Factor for All Obs.[1]			
Piped Water Supply:	1 Hour	Time	2½ Hours	Time
Kiponzelo	3.0	19 - 20	2.5	17.30 - 20
Mbalamaziwa	3.6	17 - 18	2.7	17 - 19.30
Kasumulu	3.8	18 - 19	2.9	17.30 - 20
Mlangali	3.2	9 - 10	2.4	9 - 11.30
Handpumps:				
Nzivi	2.6	8 - 9	2.2	16 - 18.30
Nyeregeti	4.4	7 - 8	2.9	6.30 - 9

	Mean for All Taps/Pumps[2]	
	1 Hour	2½ Hours
Taps	4.2	2.8
Pumps	4.9	3.4
All taps/pumps	4.5	3.0

Notes:

1) Calculated as peak factor for the sum of all obs. per village.

2) Calculated as mean of the DP/pump peak factors.

7. WATER COLLECTORS

According to Tables 7.1 and 7.2 the overall distribution of water between sex and age groups has not varied much from the WMP survey which included all types of water sources, to the present study of DANIDA funded water schemes, but from Table 7.2 the variation between villages seems very great.

TABLE 7.1 : DISTRIBUTION OF WATER COLLECTION BY SEX AND AGE. WMP SURVEY

Sex and Age	% Distribution of Water Collected
Women	80
Men	0
Children	20

Source: WMP Iringa, Mbeya, Ruvuma - Vol. 12 Table 8.18

Table 7.2 : Distribution of Water Collection by Sex & Age. Household Interviews.

Sex & Age	% Distribution of Water Collection Trips by Village						% of ALL HH
	Kiponzelo	Mbalama ziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
Women	79.4	81.9	100.0	58.1	67.1	91.3	78.8
Men		1.4		16.7		4.4	4.0
Children	20.6	16.7		25.3	32.9	4.4	17.3
N	21	18	15	21	21	23	119

Comparing these results from the interviews with actual observations at the DPs/pumps, presented in Table 7.3, gives a very different picture, however. We would tend to regard these observations as more reliable on this point than the interviews with the women, and it is not really very surprising, that they show that children are shouldering a much greater part of the water collecting workload than the women remember or are aware of.

TABLE 7.3 : WATER COLLECTORS AS OBSERVED AT DPs/PUMPS

Name of Village	% of Litres Collected By:			
	Women	Men	Children	Total
Piped Water:				
Kiponzelo	53%	5%	41%	99%
Mbalamaziwa	40%	9%	51%	100%
Kasumulu	62%	4%	34%	100%
Mlangali	76%	6%	18%	100%
Handpumps:				
Nzivi	65%	5%	30%	100%
Nyeregeti	71%	6%	23%	100%
TOTAL All Villages	62%	6%	32%	100%

	% of Collection Trips Made By:			
	Women	Men	Children	Total
Piped Water:				
Kiponzelo	44%	5%	51%	100%
Mbalamaziwa	30%	7%	63%	100%
Kasumulu	51%	4%	45%	100%
Mlangali	64%	8%	28%	100%
Handpumps:				
Nzivi	49%	5%	46%	100%
Nyeregeti	63%	6%	32%	100%
TOTAL All Villages	52%	6%	42%	100%

There was one village, where children actually collected more than 50% of all the water collected (Mbalamaziwa) and two where they comprise more than 50% of the watercollectors, with another two where children go almost as often as women.

There is a certain tendency it seems, that kids collect water more often in villages with easier access to the DPs/pumps, and it is our general impression, though not corroborated by any hard data, that the same difference exists between villages with improved water supply and those using traditional sources.

Considering the effect the heavy load of often huge watercontainers must have on the backs of the - equally often - very young water collectors, the data, as described, point out a hitherto overlooked problem, which nevertheless merits serious consideration in the project context.

8. WATER USES

The women interviewed - as well in this as in the Water Master Plan survey - were asked about the use of the water collected the day before the interview. The results are registered in Tables 8.1 and 8.2, and the totals are remarkably similar, with about 1/3 used for consumption, slightly more for personal hygiene and laundry, and the rest for cleaning, storing and other uses.

TABLE 8.1 : DISTRIBUTION OF DAILY WATER USE AT HOME BY DIFFERENT PURPOSES. TAP USERS ONLY. WMP SURVEY

Purpose	% of Water Used
Drinking / Cooking	33
Cleaning	14
Bathing / Washing	20
Laundry	16
Other	6
Storing	11
Total	100
Mean Ltrs.	51

Source: WMP Iringa, Mbeya, Ruvuma - Vol. 12 Table 8.19

Table 8.2 : Distribution of Daily Water Use at Home by Different Purposes. Household Interviews.

	% Distribution of Water Use by Village						ALL HH
	Kiponzelo	Mbalama ziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
Drinking/Cooking	26	36	40	27	22	30	30
Cleaning	21	17	14	6	14	20	15
Bathing	30	29	28	33	43	37	34
Laundry	5	4	2	10	9	4	6
Other	1	6	8	4	1	3	4
Storing	17	8	8	20	10	6	11
Total	100	100	100	100	99	100	100
Mean lts	51	48	68	53	34	73	54
N	17	18	20	21	21	19	116

There is one remarkable difference between the two surveys however, that is in the proportions of water used for bathing and laundry respectively, but it is not clear to us what the reason for this difference is (except that it may not be statistically significant because of the small number of households actually doing any laundry at all, 18%).

The Water Master Plan interviews showed a relation of 3 : 1 between those households washing clothes at home, and those doing it at the DP, while in our interviews the relation was 9 : 1, but comparing DP/pump observations on laundry at the source, with the interview data on laundry at home would give a present relation of some 3 1/2 : 1.

11% and 14% stated that they sometimes use water from the DPs/pumps for watering cattle and crops respectively, but this is most unlikely to be during the rainy season.

9. VILLAGE PARTICIPATION IN OPERATION AND MAINTENANCE

9.1 Villagers conceptions of operation and maintenance problems.

The major part of this aspect of the study consisted of discussions with village leaders and other key persons, in which a number of issues were considered at depth - following a prepared check-list. The main points raised during these discussions are referred to in village cases in sections 9.3 to 9.8 and summarized in 9.2.

However, during the questionnaire survey a few questions were also posed to the respondents concerning their views on operation and maintenance, the first one simply with the purpose of finding out whether they had actually experienced that their DP/pump could stop yielding water.

Table 9.1 shows that overall this is the case for almost 2/3 of the respondents.

Table 9.1 : Has DP/Pump Ever Been Out of Order ?

DP/Pump out of order ?	% Distribution of HH by Village						% of ALL HH
	Kiponzelo	Mbalamaziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
Yes	70.8	52.6	85.0	95.8	50.0	20.8	62.4
No	25.0	42.1	15.0	4.2	50.0	75.0	35.3
Don't Remember	4.2					4.2	1.5
D.K.		5.3					0.8
N	24	19	20	24	22	24	133

In the most recently finished piped scheme, Mbalamaziwa, and in both pumped schemes only about 50% or less have, however, had this problem, and in Mbalamaziwa the respondents are actually here thinking about the period the water supply was closed in order to get people back to trenchdigging.

The scheme attendants have acquired a strong position in people's minds, when it comes to questions, about who is concerned with problems in the water supply.

According to Table 9.2 most people would go to the scheme attendant when the DP/pump is out of order (the 43% in Nyeregete answering pump attendant actually mistook the pump attendant for the scheme attendant), closely followed however by the more traditional authority figure, the barozi. The division between the two varies a lot between the villages, probably depending a lot on the personal reputation of the scheme attendant.

Table 9.2 : Distribution of Indications of Whom Complaints are Directed to, if DP/Pump is Out of Order.

Complaints directed to	% Distribution of HH by Village						% of ALL HH
	Kiponzelo	Mbalamaziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
Husband	12.5				4.5		3.1
Barozi	62.5	26.3	5.0	8.3	50.0	38.1	32.3
Tap/Pump Att.		15.8			9.1	42.9	10.8
Scheme Att.	12.5	5.3	75.0	70.8	9.1		29.2
VWC	4.2	5.3		12.5	18.2		6.9
Village Leaders		31.6	5.0	4.2	4.5	4.8	7.7
Other		5.3	5.0			4.8	2.3
D.K.	8.3	10.5	10.0	4.2	4.5	9.5	7.7
N	24	19	20	24	22	21	130

Among those who have experienced problems at their DPs the scheme attendants have an even stronger standing as the repairer, as seen in Table 9.3, except in Mbalamaziwa, where the only problem experienced was the deliberate closure of the supply, which was of course subsequently redressed again by the DANIDA/MAJI staff.

Table 9.3 : Distribution of Indications of Repairer of Pump/water Scheme.

Repairer Indicated	% Distribution of HH by Village						% of ALL HH
	Kiponzelo	Mbalama ziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
Scheme Attendant	89.5		82.4	78.3			57.6
MAJI/DANIDA Fundi		80.0	5.9	4.3	100.0	20.0	25.9
Villagers							1.2
D.K.	10.5	20.0	11.8	13.0		80.0	15.3
N	19	10	17	23	11	5	85

In the handpumped schemes, on the other hand, only repairs by the project staff have been experienced.

Table 9.4 demonstrates that large proportions of the villagers claim to have participated in same O & M activity, but for the great majority this has only taken the form of helping to clean the area around the DP/pump. In the recently opened scheme in Mbalamaziwa only a minority have participated so far.

Table 9.4 : Households' Participation in Various Operation & Maintenance Activities.

Participation in O & M Activities	% Distribution of HH by Village						% of ALL HH
	Kiponzelo	Mbalama ziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
Meetings	45.8		30.0	12.5		33.3	21.1
Cleaning DP/Pump	37.5	21.1	85.0	66.7	86.4	87.5	64.7
Collections	58.3			20.8		12.5	16.5
Other	8.3	31.6	10.0		13.6	4.2	10.5
Any Activity	95.8	40.0	76.0	75.0	88.0	95.8	78.2

Finally respondents actually using the water scheme were asked about their satisfaction with it and whether they have any suggestions for improvements. As Table 9.5 shows, the overwhelming majority declared their satisfaction, and just as many suggested that there should be more DPs/pumps added to the scheme.

Table 9.5 : Distribution of Households by Suggested Improvements to & Satisfacti with Water Scheme.

Suggested Improvements	% Distribution of HH by Village						% of ALL HH
	Kiponzelo	Mbalama ziwa	Kasumulu	Mlangali	Nzivi	Nyeregete	
More DPs/Pumps	81.3	66.7	77.8	91.3	88.9	93.8	84.0
Other	18.8	33.3	22.2	8.7	11.1	6.3	16.0
N	16	15	18	23	18	16	106
Satisfied ?							
Yes	95.8	94.4	70.0	95.8	81.8	66.7	84.1
No	4.2	5.6	30.0	4.2	18.2	33.3	15.9
N	24	18	20	24	22	24	132

Dissatisfaction is highest in Kasumulu, where distances to DPs are long, and Nyeregete, where the waterquality is low, and there are few pumps, resulting in queuing most of the time, as shown in Table 9.6, which records actual queuing at the DPs/pumps observed during the study.

TABLE 9.6 : QUEUING AT DPs/PUMPS

Name of Village	% of Water Collectors Queuing	
	Total	Max. for any DP
Piped Water:		
Kiponzelo	21%	27%
Mbalamaziwa	13%	20%
Kasumulu	8%	10%
Mlangali	5%	9%
Handpumps:		
Nzivi	9%	18%
Nyeregeti	63%	73%

9.2 Summary of case studies

Because of the need to select villages where the water scheme has been in operation for some time, it was not possible also to ensure that planning and construction had followed the presently used village participation guidelines as established with the approval of the WMPs.

As most were started in phase 1 or the intermediate phase of the project more rudimentary and experimental village participation procedures were carried out, but in spite of this, the general impression from the case studies is a much higher degree of awareness of village responsibility for the schemes, and a higher level of village activity, than was experienced in villages with an improved watersupply at the time of the WMP survey.

All the villages have functionning Village Water Committees and shceme attendants, and most have tap attendants. In all villages operation and maintenance activities take place, under the supervision of VWC and scheme attendants, but with participation of the ordinary villagers - so far especially concerned with cleanlyness around the DPs/pumps. The village leaders as well as most villagers are aware that they will be

responsible for their water scheme - although they often do not know when and what it actually implies.

In all villages the central role in relation to the water scheme is played by the scheme attendants, who seem technically reasonably capable and confident, and feel a high degree of responsibility. It seems to be the scheme attendants, who take the initiative in maintenance, such as cleaning the intake and DP/pump surroundings, and to whom people turn if there are any problems in the water scheme.

In the three piped water schemes that have not yet been handed over, the scheme attendants are still paid a salary by DANIDA (or MAJI in Kiponzelo), although their participation in the construction work ended quite a long time ago (except in Mbalamaziwa). In Mlangali the scheme attendant was paid by the village last time in the middle of 1986, whereas in Nzivi and Nyeregete they have not been paid anything since DANIDA stopped paying after construction was finished.

In most cases village leaders declared their intention to remunerate the scheme attendants once the scheme is handed over, but no agreements had been made nor did they have any ideas of how and how much.

Some scheme attendants seemed satisfied to have their work counted as ujamaa work, which is actually done in some cases.

Considering the central role of the scheme attendants there is some concern about what to do when the attendants trained during construction for some reason leave their jobs, as the waterproject has not introduced any procedures for replacement of scheme attendants.

In comparison with the technical role of the scheme attendant, which is reasonably well defined, there is a lot of confusion about the supposedly more organisational role of the VWC.

Apparently VWC members have quite a strong sense of responsibility for the schemes, but they have very little idea of how to exercise it after the finalization of the construction.

Most people among the village leaderships also feel that the Village Water Committee has an important role to play - without being able to define what role, except as a forum where waterproblems are discussed.

It is clearly understood, that within the village structure the scheme attendant as a village "servant" has the technical responsibility for repairs and maintenance, while barozis and village chairman and secretary have the authority to mobilise people for "voluntary" work, and the village government is in charge of money and materials, i.e. how to get and how to use them. As long as the project or other authorities outside the village has not helped with outlining the proper procedures and providing materials such as ledgers, diaries, receipt

books etc., which involves the VWC in a clearly defined line of " O & M steps ", the organisation of O & M, which is perhaps more important than its technical side, will remain haphazard and the role of the VWC obscure.

The problems, summarized above, around primarily the organisation of O & M, have clearly been aggravated by the uncertainty regarding village versus DANIDA/MAJI responsibilities, created by the extremely long periods which have been allowed to elapse from finalisation (or "almost finalisation") of construction until schemes are handed over to the villages.

But in any case the organisational side of O & M will become even more important after handover, and as time passes, and more spareparts, and thus money, begin to be needed, involving the village government in collecting money and approving their use.

Our survey revealed, that the villages are already involved in a whole range of communal income generating activities ranging from the ujamaa shamba, village shops and milling machines, to beer bars, collection of fees for beerbrewing, markets and cropmarketing, and imposing fines for contraveening village regulations or non-participation in communal work. Not all of these give a surplus, in fact the surplus from some is often used to cover the deficit on others, but they do mean that the villages have sources of funds which might be used to finance maintenance of the scheme, and that at least some of them are used to handle quite large sums in the range of several hundred thousand shillings per year.

In relation to all these activities, organisation (or rather lack of it) is, however, the main problem and the principal reason why so many, often even after an initial succes, eventually fail.

Of course the waterproject cannot solve this basic weakness in the Tanzanian village structure, but it might be expected to try to introduce organisational procedures in relation to the waterschemes, that would give their operation and maintenance a chance to avoid being automatically left at the mercy of the general disorganisation of village level economics.

The only step towards organising O & M, taken by the project, the Regional Maintenance Unit, has only been noticed in one of the villages, Mlangali, which is located only 15 kms from the regional centre. The RMU is anyway a technical measure, which may be needed, but cannot replace the more urgent organisational/institutional solutions.

9.3 Kiponzelo case study

9.3.1 History of participation in Kiponzelo waterscheme

Kiponzelo waterscheme is a single village gravity scheme,

constructed through rehabiliation of a former dieselpump scheme, including expansion from 10 to the 15 present taps.

The prevailing village participation guidelines for construction of water supply schemes were not followed in Kiponzelo. During the construction phase there was no village water committee (VWC) in operation: instead it was the barozi's who mobilized villagers for trenchdigging etc. The waterscheme was completed and opened in September 1984, but is not yet handed over to the village.

9.3.2 Village Water Committee (VWC)

The chairman of the Village Water Committee in Kiponzelo is a woman. According to her the present VWC was elected on the day of the official opening of the water scheme: the 24th of September 1984.

12 people had been suggested by the barozis and through voting, which took place in the village assembly, 3 men and 3 women were elected according to the DANIDA guidelines. Today, however, the VWC in reality consists of only 4 members: two men and two women. One member had died recently, another does never attend the meetings.

The principal function of the VWC in Kiponzelo seems to be to ensure that there is a forum where waterproblems are discussed and subsequently to make recommendations to the acting bodies: The Village Government and barozis.

Major problems so far: 1) to prevent children from playing around the DP's; 2) to organize the cleaning around the DP's.

Mobilizing people to do the cleaning is the responsibility of the barozis. In case the barozi fails to get his (or her) people to clean around the DP the barozi complains either to the village government or to VWC, which may decide to fine the negligent person(s). Is fining decided the village government has authority to execute this.

It is not seen as the responsibility of the VWC to collect money or to pay either fundi or spareparts. This is thought to be tasks solely for the village government.

The VWC does not have a regular meeting schedule, but the chairman calls a meeting whenever problems occur. The latest two meetings were held in September '86 and February '87. The topic of the last meeting was problems related to the expected handover of the waterscheme, i.e. how to raise funds for spareparts.

Whether villagers' complaints are addressed to the VWC members, seem to depend on the distance to the members, especially the VWC chairman. Anyone living nearby would complain to her, while others would bring their problem to barozi or scheme attendant. In spite of this, in discussions with village chairman, village secretary and divisional secretary, any of these stressed the importance of the VWC to ensure that problems relating to watersupply were raised and

discussed. And to the constitution of the VWC (3 men, 3 women) similar answers are given: "Women are the waterusers and therefore more engaged in water problems whereas men have more experience within committee work and are therefore needed to assist the women".

9.3.3 Scheme attendants, repairs and maintenance

Today there are still, as before the rehabilitation of the scheme, two scheme attendants, employed by MAJI at a monthly salary of 1,030 shs. In addition to these, the village has had a village scheme attendant employed on the recommendation of DANIDA. Every household had to contribute 2 shs. each per month. However, because the fundi did not receive his salary he decided to leave Kiponzelo in 1986. The village chairman claims that it was the villagers, who did not pay; villagers and the new village secretary on the other hand maintain that money disappeared from village government.

One of the MAJI employed scheme attendants explained, that as the waterscheme is not yet handed over to the village, the scheme attendants have recieved neither tools nor spareparts.

Of the repairs which until now have been conducted by the scheme attendants, few have involved any expenditures. Therefore the scheme attendants have been working rather independently from the village government, VWC and the ten cell leaders. If a problem does require spareparts not available in the village, the scheme attendant at least formally, informs the VWC in order to get permission to go to DANIDA/Iringa to obtain the needed spareparts.

The scheme attendant did not have any clear ideas on how to get spareparts when the water scheme is handed over.

For the most frequently occuring repairs - leakages in the pipe system - the scheme attendant is supposed to be assisted by villagers in digging. It is the job of the village secretary and the barozis to make people participate in this. During the study period, however, this participation seemed to raise problems. For the repair of a broken pipe 20 people were told to do the digging. Of these only eight participated, the rest ran away or produced "bad excuses", according to the village secretary. According to the scheme attendant cleaning of the intake is done once a week, inspection of the taps every day. He also checks the pipes frequently. Although the scheme attendant claimed to inspect the taps every day, it seemed generally agreed that the barozi act as tap attendants, having the authority to order people to clean around the DP, and prevent washing of clothes, playing etc. round them.

9.3.4 Villagers' attitudes

During the household interviews all the women expressed satisfaction with the watersupply. During the lifetime of the rehabiltated water scheme there has hardly been any major breakdown. Only minor breakdowns were mentioned and people either then chose to wait for tap to be repaired or go to another tap. A minority had decided to go to another source. Although people generally stressed the need for more DPs several people stated that the work needed for collection of water has been reduced, that health conditions have improved and that it has become easier to build brick houses.

This seems to be the background for many respondants' willingness to contribute money to the O & M of the waterscheme. Most people interviewed had previously contributed money for the village scheme attendant and some also for purchase of spareparts.

9.4 Mbalamaziwa

9.4.1 Construction of the waterscheme.

According to the village chairman, the first application for a waterscheme in Mbalamaziwa was sent to MAJI in 1982. Meetings with DANIDA/MAJI were held during 1984 and in 1985 the construction was started. The works lasted for 1 year and 7 months, and as a genaral rule villagers were working on 2 days a week on the scheme, mobilized by the VWC, the village chairman and the barozi's.

Mbalamaziwa was the first village in the scheme to have water running from the new taps. This created some problems with the mobilization of the villagers for the trenchdigging onwards to the village of Nyanyembe. As result the MAJI/DANIDA staff cut off the watersupply to Mbalamziwa for some days until the villagers had taken up the trench-digging again.

The scheme has not yet been handed over to the village. Maintenance, including two minor repairs already carried out, has so far been done by MAJI/DANIDA construction staff assisted by the 2 scheme attendants, appointed by the village and presently employed by MAJI/DANIDA.

9.4.2 Organisation of the Village Water Committee (VWC)

The Village Water Committee was elected in 1984 by the Village Assembly, ensuring that different geographical areas of the village became represented. The village chairman was also appointed chairman of the new committee. As recommended by DANIDA 2 out of 5 members are women. According, to the chairman and one of the female committee members, with whom the VWC was discussed it has been important with the female representation, because water is mainly the concern of women - and women are better to persuade other women to contribute to spareparts etc. in the future!

Participation of men in the committee is considered to be a necessity, as they have the power and respect needed to mobilize the villagers to participate in th work and to sanction misuses.

The VWC is not directly integrated with the other activities of the village government and is only requested to attend the Village Assembly if special waterrelated problems are being discussed. The relation with the village government is mainly through the chairman.

During the planning and construction period the tasks of the VWC have primarily been to decide location of the DPs and to take care of the mobilization of the villagers through the barozisystem. Meetings are held once a week together with the DANIDA employed SEC assistants.

9.4.3 Scheme attendants, tap attendants, and repairs and maintenance.

The VWC has also been responsible for the selection of the scheme attendants and the tap attendants. As no fundi's were available for the task, the 2 scheme attendants have been appointed because of their formal education (standard 7 and form 4), and because one of them had some knowledge about plumbing and the other had been chairman af the youthcommittee of the village. They are presently employed by MAJI/DANIDA, receiving around 1000 shs. pr. month. Their possible payment after the handover of the scheme has not yet been decided, and the villagers have different opinions on the possibilities of the villagers to contribute to their salaries. The proposals varied from 1000 shs. per month to nothing.

Nevertheless the scheme attendants indicated that they would be willing to look after the scheme, even without remuneration that they felt obliged to stay in the village to perform the tasks they had been apppointed to. In case they had to leave the village they would train a substitute.

As the scheme is not yet handed over they have neither received their toolboxes nor any extra training courses. They have not yet tried to clean the watertank, but had assisted to clean the strainers of the intake 4 times. Apart from this they control that people treat the taps and the area around them properly.

The tap attendants were appointed among the households living near the DPs in Oct. 86 when the DPs were ready for use. There seems to be some confusion about who are actually tap attendants, and both members of the VWCs the scheme attendants and the users of the taps indicated wrong names, if any at all.

The 2 tap attendants interviewed described their jobs as being to ensure that the area around the DP is clean, that children don't play there, and that washing of clothes and personal hygiene is not performed within a 20 meter radius of the DP. They indicated to have some problems with the enforcement of these rules and one indicated to have to call the village chairman because of lacking authority to sanction misuses.

The cleaning around the DPs is done by the women using the tap. At some DPs there are time schedules distributing this duty among the users, while at other DPs the cleaning is done

whenever there is a need for it. At one DP the tap attendant complained about the grass not being cut. The problem had been discused among the women, but none of them had spare time for this task at present, because of the heavy agricultural workload.

Besides this also the washing of clothes near the DPs seems to be a problem. Only 2 DPs have a stone serving as washingslab, and few villagers seem to approve the rules established by the VWC about not washing within a distance of 20 m. from the DP, and the ban is not enforced.

There has only been 2 minor breakdowns in the waterscheme, which have been repaired by the scheme attendants assisted by the DANIDA/MAJI personel.

According to both scheme attendants, village chairman and secretary, the former are in charge of getting spareparts in case of breakdown in the village watersupply. If the spareparts are not available in the village store, the scheme attendants would have to go to Iringa to get them either from the MAJI office or from the shops. According to the village's accountance-system the financecommittee is in principle supposed to have a meeting about use of village money for buying spares. They would then give notice to the bank in Mafinga, that money was to be drawn from the bankaccount and by whom it would be effectuated. The scheme attendant will get the money, and has to come back with a receipt for the purchase, to be used for bookkeeping by the village secretary.

Asked about the feasibility of making a fund for purchase of spareparts, the respondents were af varying opinions. Scheme attendants and village chairman found it reasonable to have a fund, administered by the VWC and some villagers also agreed on a payment in advance of 50 - 100 shillings per household. The majority of villagers with whom it was discussed preferred to wait with a collection until spares were needed. A small majority favoured solutions where it was the users of the particular tap, who should contribute to the repairs, whereas a minority felt that this ought to be the responsibility of the whole village.

9.4.4 Peoples attitudes towards the watersupply

Apart from the cattleherders, who are very angry about having to dig trenches without receiving any DPs at the place where they had settled, the rest of the villagers claimed to be satisfied with the watersupply. It has, in their opinion, diminished the number of diseases, and eased the work of women, who therefore can prepare the meals quicker for the men! One of the interviewed persons indicated furthermore that water is now or such quality that boiling is no longer necessary.

Among the most frequent suggestions given by the villagers, was the installation of more DPs, allthough none of the households interviewed (apart from the cattleherders) had

more than 400 m to the tap.

The VWC has sent a request for more DPs to MAJI/DANIDA, but this has not yet given any result. Complaints made during the construction phase over the number of DPs in the village resulted in an additional DP in its northern part.

The villagers were not aware about when the handover of the scheme is to take place, but members of the VWC supposed that it would be effectuated after the finalization of the supply in Nyanyembe.

As the scheme attendants seem very responsible in their work and the tasks or cleaning etc. are performed regularly although in a somewhat spontaneous manner, there seems to be no major obstacle to a handover. The functions of the Village Water Committee are for most people difficult to identify as the majority of the tasks are performed by the village chairman, and people are used to this rather authoritarian system.

9.5 Kasumulu

9.5.1 History of the water scheme.

According to the village chairman the village had applied for a water supply many years back. DANIDA started surveying the area in 1982, amd Kasumulu was informed that they were to be included in the Ngana group water supply. The village agreed to participate in the construction which started in the beginning of 1984. For 1 1/2 year the villagers went once a week to participate in the construction work which was organized by the VWC.

The location of the DPs was decided by the VWC together with DANIDA. However, the people from some of the subvillages in Kasumulu, which were not supplied with DPs refused to continue to work when they realized that no DPs would be placed in their part of the village. Presently 14 DPs supply the village but due to its scattered character many people are not supplied with water. The village has applied for more DPs but so far without result.

9.5.2 The organization of the VWC.

In Kasumulu the members of the VWC were appointed by the village government without any village assembly. The committee is composed of: village chairman, village secretary, scheme attendant and 4 other members, two men and two women. (6 of the 7 members were interviewed). The women had been appointed because DANIDA suggested selection of at least two women. One of them is the secretary of the UWT and as such experienced in organizing people. Both of them emphasized the importance of having women in the VWC, since mainly women are concerned with water collection and water usage. The male members, however, did not see any importance of having women in the VWC, and they complained that the women often did not attend the meetings because "they were

busy with other problems in their houses".

During constrution the VWC met once per week to organize the work and to report to DANIDA how the construction was progressing. Last meeting was held just after construction was finished in 1985 to inform the villagers on the day to day maintenance of the taps. Since 1985 there had been no activities in the VWC. The VWC members considered their tasks to be completed and future problems with the water scheme would either be the responsibility of the scheme attendant or the village chairman. However, the scheme attendant did not agree with the other VWC members. According to him the VWC still ought to be responsible for the water scheme, i.e. the day to day cleaning as well as other operation and maintenance problems, which were now left to him alone.

9.5.3 Scheme attendant and tap attendants.

A former bicycle mechanic in the village had been appointed by the village government to be trained as a scheme attendant. During construction he was taught how to repair breakdowns, burst pipes etc., and how to fix the taps.

Ever since construction started the scheme attendant has been paid by DANIDA and still he is paid 810 shs. (the minimum salary) per month.

The scheme attendant has got almost daily contact with the foreman in the DANIDA camp in the neighbouring village. Here he is informed about duties and he reports problems, if any. During the rainy season he has to go and clean the intake tree times per week because of problems with dirt and mud in the screens. Several times since construction was completed, the scheme attendant has repaired burst pipes. The only tools he is provided with are two spanners, but if other tools are required he can obtain them from the DANIDA camp.

Apart from repairs and cleaning of the intake, the scheme attendant also considers it to be his job to supervise the tap attendants in day to day maintenance. Regularly he checks the taps and visits the tap attendants to discuss problems, if any. Before the handing over the scheme attendant is supposed to go to Mbeya for further training, but he has not yet been informed when the handing over will take place. No agreement has been made on the payment of the scheme attendant after the handing over. He is not sure if he will get paid, but otherwise he is ready to continue his work as voluntary work for the benefit of the village.

At each DP in the village the barozis have appointed 3 people to be tap attendants (both men and women). (Five of these have been interviewed). The main tasks of the tap attendants are to organize the cleaning of the surroundings of the DPs and to make sure that people operate the tap properly. Most of the tap attendants agreed that it was rather easy to mobilize people for this. In case of failure to do the cleaning the users will be fined 50 shs., but none of the tap attendants interviewed had yet fined anybody.

In case of problems with the water supply or other technical problems with the taps, the tap attendants report to the scheme attendant, who is known by all of them. Other problems (cleaning etc.) are reported to barozis.

9.5.4 Peoples attitudes.

The villagers who have been supplied with DPs are very satisfied with the scheme. Most of them are willing to contribute to spareparts in case of breakdown at their tap and consider it to be the responsibility of the users - not the whole village. Regarding the payment of the scheme attendant after the handing over it was considered to be a matter for the village government, but all the interviewed were willing to contribute if necessary. The scheme attendant is known by almost all the villagers who are very satisfied with his work. He is a very popular person in the village who "listens to problems and go to repair even in the night or on Sundays if necessary" (according to one of the tap attendants).

The health impact of the water scheme was stressed by most of the interviewed. Even people living quite far from the taps (1-11/2 km) go there to collect water for drinking and cooking. As one of the respondents recalled, she used to cook ugali with water from the river, and "it looked like mud".

Both men and women also emphasized how much the water scheme has relieved womens work, especially during the dry season when they earlier had to go very far to collect water.

Just before the construction was finished the main pipe at the tank had burst due to sabotage made by some of the villagers, who had not been supplied with DPs. This incident is still remembered by the villagers who fear new attempts to sabotage the water scheme after the handing over has taken place. It was significant that most of the villagers, when questioned about needed improvements, suggested that people living far from the DPs should be supplied with water rather than asking for additional DPs closer to their own houses.

9.6. Mlangali

9.6.1 History of the waterproject.

According to the village secretary, the village never sent a formal application for an improved watersupply, but at an official visit by people from the party, the CCM, the question of the waterquality was discussed. In 1982 there were discussions with MAJI/DANIDA and the works on the Songwe Waterscheme to which Mlangali belongs were started in 1983, and completed after 1 year of work.

Neither village secretary nor VWC members remember to have had any problem with the mobilisation of the villagers for trench excavation etc. and the fining system (10 shs. pr. person not attending the work) was hardly put into effect. Unfortunately a number of technical problems were discovered

(bad location of the intake and wrong dimensioning of certain pipes) and the scheme was not officially handed over to the village until nov. 1986. Nevertheless most of the operation and maintenance has been handled by the villagers since 1984.

9.6.2 The Village Water Committee.

The Village Water Committee, which has been appointed by the Village Assembly, was elected according to the DANIDA/MAJI guidelines to ensure a reasonable sexual and geograhpical distribution among the members.

The VWC has meetings approximately 3 times a year according to the needs. According to the members of the VWC, the work of the committee mainly consists of taking care of the proper use of the DPs and their cleaning, as well as the mobilization of the villagers to help the scheme attendant to perform his tasks. In reality these functions are performed by barozis and tap attendant (cleaning etc.) and by the village secretary and chairman (mobilization of workforce). Nevertheless the VWC has an important function as "backing group" for the scheme attendant in case of major problems.

APPENDIX

Terms of reference for the study

TERMS OF REFERENCE FOR A STUDY OF VILLAGE PARTICIPATION IN OPERATION AND MAINTENANCE AND OF WATER CONSUMPTION IN SELECTED VILLAGES WITH AN IMPROVED WATER SUPPLY INSTALLED UNDER THE DANIDA WATER PROJECT IN IRINGA, MBEYA AND RUVUMA REGIONS, TANZANIA

1. Objectives of the Study

The objectives of the study are to provide data on

(a) water consumption, especially in terms of water sources, distance to water, who collects water, quantities consumed and purposes for which water is used.

(b) village participation in operation and maintenance, with particular reference to the functioning of the Village Water Committees and scheme attendants.

The data must be presented and analysed in such a way that they are as far as possible comparable with data collected for the Water Master Plans.

The data are required for the subsequent evaluation of the whole DANIDA Project, and must consequently be presented and analysed in a form that provides an input for the evaluation team.

2. Scope of the Study

2.1 Water Consumption

The study will collect data on water consumption in the study villages for a sample of households at least including:

- Water consumption/capita/day;
- Purposes of water consumption and amounts used;
- Sources of water: permanent, seasonal or temporary sources; relations between sources and use purpose; distances to water sources; reasons for choice of water source;
- Collectors of water;
- Time of water collection;

- Problems with water scheme; breakdowns; water shortage;
- Queuing; quarrels; uncleanliness; water quality, distance etc.;
- Handling of water.

In the study villages with piped schemes, meters will be installed furthermore and gaugings made in order to establish the size of losses between the source and the distribution points, as well as the peak factor in the main distribution network.

2.2 Village Participation in Operation and Maintenance

The study will collect information of relevance to village participation in operation and maintenance. This shall comprise but not necessarily be limited to

- The Village Water Committees; their election and composition; meetings held and matters attended to; Village Water Committee relationship with village government, with MAJI and other Government personnel and with scheme and tap attendants.

- Scheme Attendants; their selection, training and "contract" with the villages; their presence and actual activities; records kept; supervision of their work; actual remuneration from the village; relationships with tap attendants and with MAJI personnel.

- Tap Attendants; selection, training and "job description"; activities and performance; supervision; relationship with VWC, scheme attendant, and neighbours/users.

- Operation and maintenance; what operation and maintenance activities have actually been carried out by whom? and at whose initiative?; reporting system.

- Spareparts; does the village have a store of spareparts? Acquisition of spareparts - who, how, wherefrom; responsibility for spares and their use, reporting system; payments.

material (and some very basic Kiswahili for the Danes), one jointly in Dar preparing for the field work, 6 weeks of field work, including transport and introduction in the region(s), districts and villages, and 2 weeks of data processing and compilation in Dar es Salaam. Finalising of the report will take another week in Copenhagen.

During the field work the research assistants will be divided into three teams, each of one Danish and one Tanzanian student. Each team will carry out field work in two villages, spending at least two weeks in each village.

5. Timetable for the Study

The study will start no later than 9th February 1987 and be finalised no later than 24th April 1987 (see diagram).

Time Schedule for Participation and Water Consumption Study; DANIDA Water Project Iringa, Mbeya, Ruvuma

	Week Number										
Activities:	7	8	9	10	11	12	13	14	15	16	17
Preparations	**********										
Field Work				**********	**********	**********					
Processing Report									**********	**********	**********

6. The Report

The result of the study will be presented to DANIDA in a report containing a relatively high degree of data description, data analyses and comments, but with little emphasis on conclusion to be drawn, since this will be the responsibility of the subsequent evaluation team.

The raw data will further be made accessible if necessary.