UNITED REPUBLIC OF TANZANIA

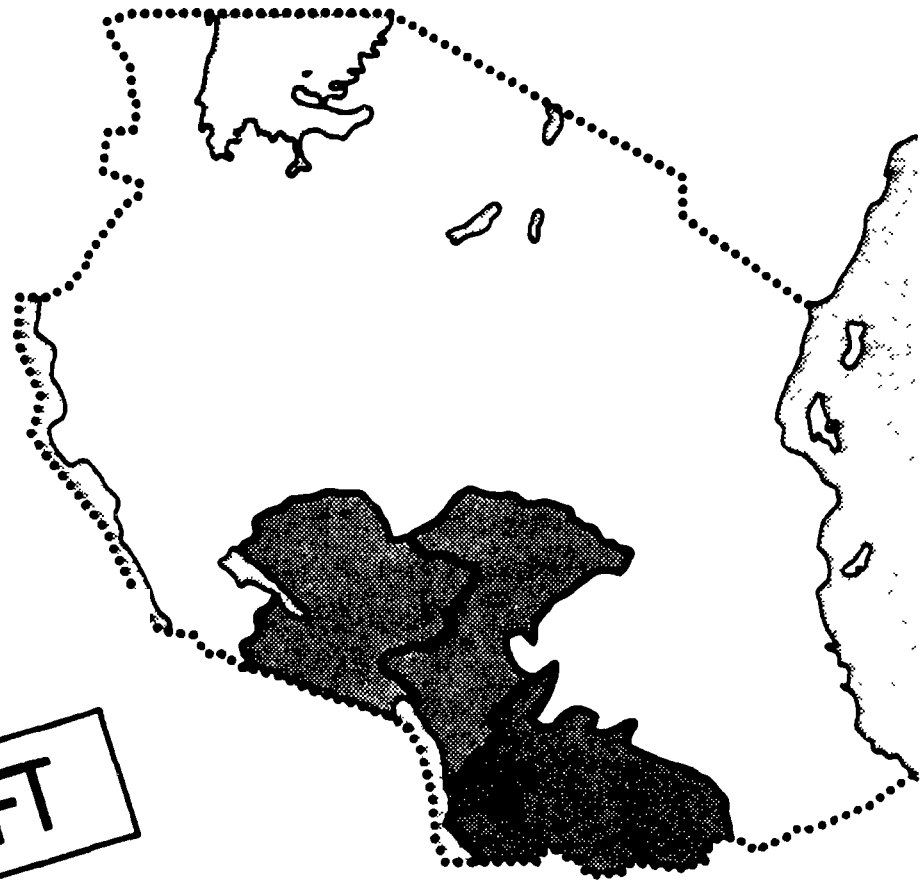
DANISH INTERNATIONAL DEVELOPMENT AGENCY • DANIDA

WATER MASTER PLANS FOR IRINGA, RUVUMA AND MBEYA REGIONS

SOCIO-ECONOMIC STUDIES

VILLAGE PARTICIPATION ON WATER AND HEALTH

VOLUME 13



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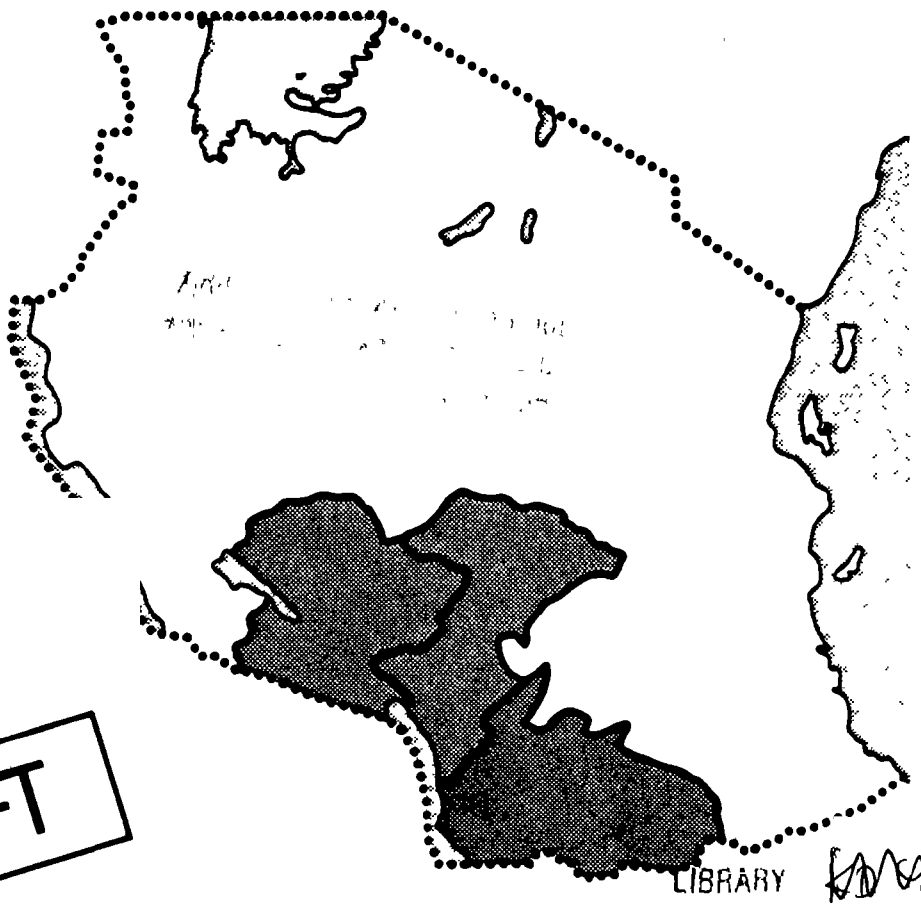

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CONTENTS

		Page
1.	INTRODUCTION	
1.1	Socio-economic Water Master Plan study, Iringa, Mbeya, Ruvuma regions	1.1
1.2	Socio-economic studies reported on in this volume	1.1
1.3	The organization of volume 13	1.2
1.4	The continuous character of Water Master Planning	1.2
PART I		
Policies on village participation in water related activities		
2.	OBJECTIVES OF VILLAGE PARTICIPATION	2.1
2.1	Village participation for self-reliance	2.1
2.2	Village participation for increased benefits	2.1
3.	POLICIES FOR VILLAGE PARTICIPATION	3.1
3.1	Introduction	3.1
3.2	Operation and maintenance	3.1
3.2.1	Vital importance of O&M	
3.2.2	Objectives	
3.2.3	Policies	
3.2.4	Reasons	
3.3	Selection of villages	3.7
3.3.1	Objectives	
3.3.2	Policies	
3.3.3	Reasons	
3.4	Planning	3.10
3.4.1	Objectives	
3.4.2	Policies	
3.4.3	Reasons	
3.5	Construction	3.11
3.5.1	Objectives	
3.5.2	Policies	
3.5.3	Reasons	
3.6	Rehabilitation	3.12
3.6.1	Objectives	
3.6.2	Policies	
3.6.3	Reasons	

3.7	Health education	3.13
3.7.1	Objectives	
3.7.2	Policies	
3.7.3	Reasons	
3.8	Sanitation	3.14
3.8.1	Objectives	
3.8.2	Policies	
3.8.3	Reasons	
4.	ORGANIZATION FOR VILLAGE PARTICIPATION	4.1
4.1	Village level organization	4.1
4.1.1	Objectives	
4.1.2	Policies	
4.1.3	Reasons	
4.2	Government agencies involved in water related activities and their coordination	4.7
4.2.1	Objectives	
4.2.2	Policies	
4.2.3	Reasons	
4.3	The MAJI organization	4.11
4.3.1	Objectives	
4.3.2	Policies	
4.3.3	Reasons	
4.4	The AFYA organization	4.14
4.4.1	Objectives	
4.4.2	Policies	
4.4.3	Reasons	
4.5	The MAENDELEO organization	4.15
4.5.1	Objectives	
4.5.2	Policies	
4.5.3	Reasons	
4.6	The need for temporary external assistance in organizing for village participation	4.20
5.	PROCEDURES FOR VILLAGE PARTICIPATION	5.1
5.1	The handbooks: "Village Participation on Water Schemes" and "Village Participation in Health Education"	5.1
5.2	The use of the handbooks	5.3
5.3	Improvements and adaptability of the handbooks	5.7
Appendix I :	Handbook on Water Schemes	5.8
Appendix II :	Handbook for implementation of village health education projects in combination with rural water schemes	5.83

PART II

Studies

		Page
6.	EXPERIENCES WITH VILLAGE PARTICIPATION ON PIPED WATER SCHEMES	6.1
6.1	Introduction	6.1
6.2	Experiences with selection of projects	6.1
6.3	Experiences with planning	6.2
6.4	Experiences with construction	6.2
6.4.1	Development of procedures	
6.4.2	Special surveys of self-help construction work	
6.5	Experiences with operation and maintenance	6.9
6.5.1	General	
6.5.2	Scheme attendants	
6.5.3	The attendants	
6.6	The roles of MAJI and DANIDA	6.12
6.7	Conclusions	6.12
7.	WOMEN PARTICIPATION ON WATER PROJECTS	7.1
7.1	Introduction	7.1
7.2	Implementation programme, phase 1	7.2
7.2.1	Organizing village participation	
7.2.2	Village water committee	
7.2.3	Attendance	
7.2.4	Scheme attendants	
7.3	Is women's involvement needed ?	7.4
7.4	Phase 2	7.5
7.4.1	Women on the village water committee	
7.4.2	Attendance	
7.4.3	Scheme attendants	
7.5	Summary and recommendations	7.9
7.6	Closing remarks	7.10
8.	PROBLEMS OF EXISTING WATER SUPPLY SCHEMES	8.1
8.1	Introduction	8.1
8.2	Study design and methodology	8.1
8.3	Description of water schemes	8.2
8.4	Technical problems	8.6
8.4.1	General	
8.4.2	Breakage of pipes	
8.4.3	Lack of spare parts	

8,4,4	Transportation problems	
8.5	Non-technical problems	8.8
8.5.1	General	
8.5.2	Conflicting water use at the source	
8.5.3	Lack of proper operation and maintenance procedures within MAJI	
8.5.4	Lack of MAJI supervision of scheme operation	
8.5.5	Lack of political interest in and support for operation and maintenance of existing schemes	
8.5.6	How an amateurish advice, a village meeting and one bag of cement brought water back to five villages	
8.6	Remedial measures	8.18
9.	EXPERIMENTS WITH HEALTH EDUCATION	9.1
9.1	Introduction	9.1
9.1.1	Main problem	
9.1.2	National health policy	
9.2	Shortcomings of previous and present health education programmes	9.3
9.3	The experimental health education projects in Mbeya and Ruvuma	9.4
9.3.1	Background	
9.3.2	Objectives	
9.4	Experiment with health education in Mbeya	9.6
9.4.1	Baseline study	
9.4.2	The design of the Utengule Health Education Project	
9.4.3	Village health educators in Utengule	
9.4.4	The discussion groups	
9.4.5	The pilot project and schoolchildren	
9.4.6	Findings of the Mbeya health education experiment	
9.5	Experiments with health education in Ruvuma	9.25
9.5.1	Study area	
9.5.2	Objectives of the experimental health education project	
9.5.3	Project organization	
9.5.4	Identification of health and sanitation problems	
9.5.5	Baseline survey and individual health education objectives	
9.5.6	Findings of the baseline study	
9.5.7	Health education during home visits	
9.5.8	Group health education	
9.6	Comparison of the Mbeya and Ruvuma experimental health education project	9.35
9.7	Recommendations	9.36

		Page
10.	CONTAMINATION BETWEEN WATER COLLECTION AND USE (SECOND STUDY)	10.1
10.1	Introduction	10.1
10.2	Methods applied	10.1
10.2.1	Sampling	
10.2.2	Testing	
10.3	Description of the data	10.2
10.4	Discussion of findings	10.5
11.	DOMESTIC WATER SUPPLY AND CHILD HEALTH: RUVUMA REGION, TANZANIA	11.1
11.1	Introduction	11.1
11.2	Survey methodology	11.2
11.2.1	Organization	
11.2.2	Child examination	
11.2.3	Anthropometric techniques	
11.2.4	Laboratory tests	
11.3	Description of the areas surveyd	11.9
11.3.1	Introduction	
11.3	Geography, demography, economy	
11.3.3	Health services in the survey villages	
11.4	Water use, hygiene, and sanitation	11.14
11.4.1	Water supply	
11.4.2	Water sources used	
11.4.3	Contamination of water sources	
11.4.4	Hygiene and sanitation	
11.5	Child health	11.19
11.5.1	Growth and disease in the six villages	
11.5.2	"Under-five" mortality rates	
11.5.3	Diarrhoea	
11.5.4	Widal test (typhoid fever)	
11.5.5	Malaria and anemia	
11.5.6	Intestinal worm load	
11.5.7	Growth and health	
11.6	Domestic water sources and child health - conclusions	11.35
12.	WOMEN'S TIME USE	12.1
12.1	Introduction	12.1
12.2	Survey methodology	12.1
12.3	Women's time use	12.3
12.4	Comparison between villages and seasons	12.6
12.5	Conclusions	12.8

PART III

Monitoring and evaluation

13.	PROPOSAL FOR MONITORING AND EVALUATION OF IMPLEMENTATION OF WATER MASTER PLANS FOR MBEYA, IRINGA, AND RUVUMA REGIONS	13.1
13.1	The monitoring and evaluation system	13.1
13.2	Monitoring and ongoing evaluation of implementation processes and outputs	13.1
13.2.1	Purpose	
13.2.2	Objects for monitoring and ongoing evaluation	
13.2.3	The organization of monitoring/ongoing evaluation	
13.3	Impact evaluation	13.4
13.3.1	Purpose	
13.3.2	Impacts to be evaluated	
13.3.3	Organization and methods of impact evaluation	
13.4	Evaluation of water sector objectives in the regions	13.6

TABLES

		Page
Table 3.1 -	Order of magnitude of yearly operation and maintenance costs in an average village	3.4
Table 3.2 -	Village cash incomes from different studies	3.4
Table 4.1 -	Village Water Committee: Standard membership and terms of reference	4.2
Table 4.2 -	Project Committee: Standard membership and terms of reference	4.3
Table 4.3 -	Duties of scheme attendants	4.6
Table 4.4 -	Duties of tap attendants	4.6
Table 4.5 -	Duties of site assistants	4.13
Table 4.6 -	MAENDELEO: present duties	4.18
Table 4.7 -	MAENDELEO: duties on water related activities	4.18
Table 4.8 -	MAENDELEO staff (CDO, ACDO, CDA) in districts in Iringa, Mbeya and Ruvuma (February 1983)	4.19
Table 5.1 -	Standard format for each step in the procedure	5.1
Table 5.2 -	Twentyfive steps for village participation on water schemes	5.2
Table 5.3 -	Twentytwo steps for village participation in health education	5.3
Table 6.1 -	Reason for absentism	6.8
Table 7.1 -	Men's and women's attendance percentages in two villages in Mbeya	7.7
Table 8.1 -	Some selected water schemes for rehabilitation in Iringa rural district	8.3
Table 9.1 -	Sanitary conditions among Utengule households before pilot health education project	9.8
Table 9.2 -	Description of village health educators	9.16
Table 9.3 -	Attendance during the pilot health education project	9.20
Table 9.4 -	Sanitary conditions among Utengule households before and after the pilot health education project	9.23
Table 9.5 -	Diseases diagnosed at Mkongo dispensary January, 1981 - September, 1981	9.29
Table 9.6 -	Diseases diagnosed from Mkongo health centre July-September, 1982 (three months)	9.29
Table 9.7 -	Environmental hygiene and sanitation characteristics of households visited	9.32
Table 9.8 -	Comparative characteristics of experimental health education in Mbeya and Ruvuma	9.35
Table 10.1-	Contamination of water samples taken from sources, collection containers, and storage vessels. Utengule and Mporo villages	10.30
Table 11.1-	Socio-economic indicators for health survey villages	11.12
Table 11.2-	Health services indicators for health survey villages	11.14

		Page
Table 11.3	- Details of water schemes in health survey villages	11.15
Table 11.4	- Percentages of mothers using different water sources for collection of water for household use	11.16
Table 11.5	- Percentages of mothers showing the different places where they do their personal bathing	11.16
Table 11.6	- Contamination of water sources in health survey villages, measured as number of fecal coli from 100 ml of water in one Millipore test per source	11.17
Table 11.7	- Frequencies of housework washing procedures in which mothers habitually use soap if at hand	11.18
Table 11.8	- Percentage of children using latrine, by age group	11.19
Table 11.9	- Infant growth and morbidity in children 12-47 months old (in percentages of children examined)	11.20
Table 11.10	- Calculation of "present under-fives" mortality rates in the survey villages	11.21
Table 11.11	- Expected mortality between birth and five years of age	11.22
Table 11.12	- Causes of death by zero to five years age groups and in percentage of all children born in last five years	11.23
Table 11.13	- Relation in percentage between the most common causes of death in the present under-five population in districts and in villages with and without piped water supply	11.23
Table 11.14	- Prevalences of diarrhoea and supplementary breast feeding in age groups	11.24
Table 11.15	- Children with history of diarrhoea in the week before the survey as percentage of all children using each drinking water source in each village	11.27
Table 11.16	- Children with history of diarrhoea in the week before the survey as percentage of all children using tap water and of those using other sources	11.26
Table 11.17	- Correlation between diarrhoea and malaria parasitemia	11.27
Table 11.18	- Prevalence rates of positive Widal tests in age groups	11.28
Table 11.19	- Children with positive Widal test in percentage of all children using tap water and of those using other sources	11.28
Table 11.20	- Children with positive Widal (S.typhi H.antigen) tests in percentage of all children using each drinking water source in each village	11.29
Table 11.21	- Helminths found in stools of 1027 children examined (percentages in brackets)	11.32
Table 11.22	- Relations between child growth and village location, incidence of diarrhoea, malaria parasitemia and use of piped drinking water	11.34

Page

Table 12.1 - Mean time used per woman day for different tasks 12.5

Table 12.2 - Days when different tasks are actually performed as percentage of all registered woman days, and mean time used for different tasks on those days when they are actually performed 12.6

Table 12.3 - Mean labour hours per woman day for different tasks, distance to water and family composition 12.7

MAPS

Map 8.1 - Ismani water supply project 8.4

Map 8.2 - Mazombe - Ilula water supply project 8.5

Map 11.1 - Location of child health survey villages in Ruvuma region 11.10

Map 11.2 - Cases of typhoid fever diagnosed in hospitals, Jan. 79 to Oct. 82, by residence of patients. Lake shore area, Ruvuma region 11.30

FIGURES

Figure 5.1 - Combination of activities on piped water scheme 5.5

Figure 5.2 - Coordination of activities on wells scheme 5.6

Figure 6.1 - Attendance and output by work round in three villages in Iringa region 6.7

Figure 11.1 - Operations performed by child health survey staff 11.5

Figure 11.2 - Child registration card 11.6

1. INTRODUCTION

1.1 Socio-economic Water Master Plan study, Iringa, Mbeya, Ruvuma regions

This is the second volume of socio-economic studies in the Water Master Plans for Iringa, Mbeya, and Ruvuma regions. The studies were carried out by a socio-economic research group formed jointly by the Institute of Resource Assessment (formerly Bureau of Resource Assessment and Land Use Planning), University of Dar es Salaam, and the Centre for Development Research, Copenhagen, working under the MAJI/DANIDA Water Master Plan project.

The detailed project organization, terms of reference, and cooperation with other institutions were outlined in the first socio-economic volume, vol. 12 of the Water Master Plan.

Throughout the whole project period the socio-economic group has consisted of three regional researchers, Mr. Ole Therkildsen (Iringa), Dr. Kristian Laubjerg (Mbeya), and Mr. Benedict S. Kapinga (Ruvuma), supported by two senior researchers, Dr. Mark Mujwahuzi (IRA) and Mr. Jannik Boesen (CDR). Two short-term consultants, Dr. Knud Balslev and Dr. Jørgen Prag, participated in the child health study (chapter 11).

1.2 Socio-economic studies reported on in this volume

Volume 12 provided the general results, broken down to regional and sub-regional levels, of surveys on existing water supplies and sources, water collection and consumption, villagers' attitudes to water problems, population projections and priority criteria, etc. This volume, vol. 13, concentrates particularly on two main problem areas, village participation and health, on which only preliminary chapters were included in vol. 12.

Throughout the project period the socio-economic researchers have been involved in the ongoing implementation of DANIDA funded water supply projects in the three regions, initiating new forms of village participation in the planning, construction and future operation and maintenance of these projects, as well as carrying out experimental health education projects.

This volume is primarily the result of the experiences gained over three years as these processes progressed, the results were carefully recorded, and changes were made to achieve further improvements. In addition separate studies on some specific water related problems are also presented.

The whole volume is thus first and foremost concerned not just with water supply, but with water, health and sanitation, which closely interrelated as they are, throughout this volume are referred to as water related activities.

1.3 The organization of volume 13

The volume is divided into three parts.

Part one, chapters 2 - 5, include chapters on village participation in planning, construction, operation and maintenance, and health education, presented in the form of policies for village participation in water related activities, which can immediately be adopted as parts of the approved Water Master Plans. It also includes, as appendices to chapter 5, proposed detailed handbooks for project personnel on village participation in water schemes and health education.

Part two, chapters 6 - 12, presents those studies carried out by the socio-economic group, which were not or only preliminarily reported on in vol. 12. Some of these include certain recommendations, but mostly they have formed the basis of the policies outlined in part one.

Finally, part three briefly proposes monitoring and evaluation system for Water Master Plan evaluation.

1.4 The continuous character of Water Master Planning

As a final introductory note the importance of continuously revising the Water Master Plans must be strongly emphasized.

As project personnel gain experience and villagers become more involved, possible improvements in policies, organization and procedures are bound to show up, and no plans should be so inflexibly adhered to that such improvements cannot be adopted. On the other hand this should not happen on an ad hoc basis, but be systematically incorporated in the plans in a written and generally approved form.

2. OBJECTIVES OF VILLAGE PARTICIPATION

2.1 Village Participation for self-reliance

Why should village participation be a key factor in the development of the rural water sector ? In the improvement of sanitary conditions ? And in a rural health education programme ?

Questions like these were never explicitly answered in volume 12. However, as a guideline for the formulation (and future reformulation) of policies, principles of organization, and procedures for village participation, explicit objectives are needed. Furthermore, it is impossible to monitor and evaluate the village participation component of a programme on water-related activities without specifying its objectives (see chapter 13).

In the rural water sector the main objective of village participation is to enable each village to plan, build, operate, and maintain a water supply improvement with a minimum of assistance. Ideally the village is building and managing its own scheme assisted by the government. Not the other way around.

Health education and sanitary improvements should similarly be promoted with a minimum of outside assistance, using village participation to ensure villagers' sustained interest and efforts in improvements of health conditions in their own community.

The political foundation for these objectives for village participation is self-reliance, a cornerstone in Tanzania's ruling ideology, which aims at improving the living conditions for the rural people.

2.2 Village participation for increased benefits

More specifically the objective of village participation in water related activities is also to increase the benefits and cost efficiency derived from them.

Village participation in water supply improvement thus aims at ensuring, that:-

- The water scheme and its service level is in accordance with the expressed needs of the community
- The need is so strongly felt, that the community is willing to contribute significantly from its own resources to construction, operation and maintenance of the scheme
- The resources are used in the most efficient way to satisfy the needs.

Village participation in health education and sanitation aims at:-

- Health and sanitation measures that are directed towards problems recognized as such by the villagers
- Health and sanitation measures which are affordable and acceptable to the community
- Mutually supportive and sustained efforts that are understood to increase the combined benefits from water, health education and sanitation, at a higher cost efficiency.

3. POLICIES FOR VILLAGE PARTICIPATION

3.1 Introduction

There is an urgent need for explicit and operational policy guidelines on a number of key issues, crucial to the development of a coherent programme for water-related activities. Such policies are stated below.

The policies are related to the different aspects of the programme for water-related activities. Some of them only require changes in current administrative practices in the regions. Others necessitate administrative reforms or policy changes at the national level. Such issues can only be decided upon by the relevant Tanzanian authorities, which must also evaluate the importance of all the political, social and economic consequences of the policies set forward below. Their opinions are therefore urgently needed before the policies below (or modifications of them) can be implemented.

3.2 Operation and maintenance

3.2.1 Vital importance of O&M

The key element in a programme for water-related activities is the water supply sector. And within this sector clear and consistent policies for operation and maintenance (O&M) are of vital importance to the success or failure of the whole programme - even assuming that each water scheme is well constructed.

At present, operation and maintenance policies are unclear. Moreover, what is followed in a given village depends very much on where it is (the region); who finances the scheme (the donor); and when the scheme was completed (the approach changes over time). Table 6.15 in volume 12 just gave a small taste of the diversity of policies that are being implemented. This confusion, and the apparent lack of political will to invest the necessary resources (money, man power, and transport), are the main reasons for the discouraging operation and maintenance records of most rural water supplies (see f.ex. vol. 4A, chapter 6.3.8).

To indicate the vital importance of the policies for operation and maintenance, they are described before policies for the other phases of the water scheme project cycle.

3.2.2 Objectives

The long-term objective should be that:-

- The village is fully responsible for the operation and maintenance of its scheme both with respect to financing and management.

However, the economic and managerial conditions in the villages for meeting this objective at present do not exist. Thus, for the next decade or so, reasonable and realistic objectives for operation and maintenance should be the following:-

- The village is fully responsible for operating its scheme
- The village and the government divide the responsibility for maintaining the scheme between them.

3.2.3 Policies

Only policies for the next decade or so will be put forward. These medium-term policies do not, however, foreclose a gradual change in policies to meet the long-term objective stated above. The medium-term policies are:-

- Policy 1.
  The village is the owner of that part of the scheme which is located within the village boundaries
- Policy 2.
  The village pays the full cost of operating its part of the scheme (attendants, fuel, etc.)
- Policy 3.
  The village pays the full cost of maintenaining the distribution system within its boundaries. On piped water supplies this includes all installations from tank to tap. On wells this includes all hand-pumps and aprons
- Policy 4.
  MAJI assists the village on the rest of the scheme by executing and paying the full cost of maintaining intake, borehole, pump and engine, main lines, all storage and break pressure tanks, all wells
- Policy 5.
  Spare parts for the distribution system, hand pumps are stocked by MAJI at district level, from where they can be bought by the village at full cost price.

- Policy 6.
  MAJI will undertake regular inspections of all schemes (including also the distribution systems for which maintenance needs should be reported to the villages).

3.2.4 Reasons

Discussions on operation and maintenance policies ought to be guided by the following statement recently made by chairman J.K. Nyerere, CCM:

> "Whatever the technique used (for building water supplies) it must be adopted in consultation with the local people, and from the beginning the responsibility for looking after the facilities must clearly be theirs. Government cannot finance the maintenance and repair work of basic village equipment if new developments are to go ahead." (Second Ordinary Party Conference, October 20th, 1982).[1)]

Following this statement, the basic principle of operation and maintenance policies should no longer be in doubt. Villages must contribute money and other resources to the maintenance of their own schemes !

What remains to be decided is the question of "how much". The statement quoted above could be read to mean that the full operation and maintenance costs should be covered by the village. This is the desired long-term objective as stated above in 3.2.2. If operation and maintenance policies are geared to this objective already now, the majority of villages will be excluded from participating in a rural water supply programme for a long time to come.

Operation and maintenance costs versus village incomes

This assumption is based on the data presented in tables 3.1 and 3.2 below.

Two factors are important when evaluating these tables. All O&M cost figures are averages. Substantial variations between villages will occur. Everything else being equal, sparsely populated villages with a scattered settlement pattern will face the highest operation and maintenance cost per inhabitant for a given scheme technology.

There are also wide variations in household and village incomes.

Scheme type	Total costs shs/person	Long-term goal		Medium-term goal	
		MAJI shs	Village shs	MAJI shs	Village shs
Gravity	14	0	21000	13900	7100
Borehole, pumped	34	0	51000	16300	34700
Shallow wells	18	0	27000	18600	8400

Table 3.1 - Order of magnitude of yearly operation and maintenance costs in an average village (1981 prices - 1500 persons) 2)

Type of income	Shs.
Gross cash income per family (80/81)	
(Range of village means)	
Iringa region (21 villages)	1880 - 2120
Mbeya region (21 villages)	1120 - 4100
Ruvuma region (11 villages)	1360 - 5750
Net cash income per family (80/81)	
(Range of village means)	2070 - 3790
Iringa district (3 villages)	980 - 4370
Njombe district (4 villages)	
Net village income from crop levy and communal farming (78/79)	
(Mean)	
Iringa district (9 villages)	17320
Njombe district (9 villages)	29480

Table 3.2 - Village cash incomes from different studies (vol. 12, tables 6.10, 6.12, and 6.14).

A large proportion of households in the average village is poor. In a recent study in Iringa region it was concluded that "for the fifty percent of the households in the lowest income groups the possibilities of expenditure were very small."[3)]

Secondly, the cost figures relate to a pre-participation situation. When villagers maintain a scheme (or parts of it) costs will decrease. Partly,

because some MAJI transport and labour costs will disappear or decrease, and partly, because villagers are probably more efficient at operating and maintaining schemes than MAJI is.

Nevertheless, table 3.1 shows that the long-term goal results in rather high yearly expenses for the village, in relation to the personal and/or communal incomes in villages (shown in table 3.2). The medium-term goal (full operation cost and maintenance cost of distribution system and pumps paid by the village) will be within economic reach of most villages, that can be supplied by shallow wells or a gravity scheme. Schemes requiring pumping have high operation costs, which will be beyond the economic means of almost all villages. Such schemes do, however, also have low implementation priority in the Water Master Plan (see vol. 12, chapter 12).

The conclusion is that it will take considerable time before the economics of average villages have improved so much that a rural water supply programme can attain the long-term goal for participation in operation and maintenance. For the immediate future (the next decade or more) the programme should be geared towards the medium-term goal. Policies 1 to 6 spell out the implications of this conclusion.

Implications of the local government acts

Six acts concerning different aspects of local government were passed by parliament in 1982.[4] They will be effectuated by July 1983.

At the time of writing (February 1983) the only major source of information remained the acts themselves. Very little additional information has yet been made available to the government staff at regional and district levels, although they will shortly be at the hub of the local government machinery.

Which implications do these acts have for the policies on operation and maintenance outlined above ? Two key issues are involved:-

- Do the acts provide for a situation in which district and village councils share responsibilities for operating and maintaining water schemes ?
- And do they allow district and village councils to collect revenues for this purpose ?

No specific answers to these questions can be found in the acts. Water schemes, operation and maintenance are not dealt with explicitly. The following may, however, be relevant:-[5)]

- A district and a village council can cooperate to execute their functions
- Both district and village councils are responsible for the furtherance of health education of the inhabitants
- District councils shall formulate, coordinate and supervise the implementation of all plans for economic, commercial, industrial, and social development.

Revenues for executing the duties of district and village councils may come from several sources as stated in the local government Finances Act, 1982. The major sources of revenue for district councils are:-[6)]

- Fees, fines, rents, etc.
- Surplus from economic activities undertaken by the council
- Transfers from central government
- Annual tax on every resident above eighteen years of age

Villages may have the same sources of revenue, except the annual personal taxes. It may be inferred from these extracts that the medium-term objective of the operation and maintenance policies put forward above can be implemented under the new local Government Acts. District and village councils can share the responsibilities involved, and the village revenues may in most cases suffice to pay for its share of the costs as argued above. The long-term objective is, however, that villages should be fully financially responsible for operation and maintenance (see 3.2.2).

With the district councils solely responsible for collecting personal taxes, the revenue base of village councils may not be sufficient to shoulder this burden. The simplest solution is to transfer funds from the district to the village as the local Finances Act makes possible. But whether this is in line with government policies is impossible to say at present.

More information on the actual implementation of the local Government Acts are needed before a full assessment of their implications can be made.

3.3 Selection of villages

3.3.1 Objectives

Implementation of the policies outlined in 3.2 will of course not - at a stroke - assure that schemes are well maintained. Villages will still depend on MAJI to do some (crucial) repairs. MAJI inability to do its share of maintenance will destroy any attempt at reviving the rural water sector.

Neither do the proposals guarantee that villages will execute their share. Much will depend on their motivation for getting easier access to better quality water. Only if the construction of a new water scheme meets a real and felt need does the necessary (but not sufficient) condition for such motivation exist. Thus policies for the selection of villages, in which water schemes are to be constructed, are extremely important in determining the willingness and capability of villages to operate and maintain their schemes.

Selection procedures therefore should ensure that:-

- The village can opt to say no to a proposed water scheme
- The government reduces the risk of investing money in villages that place low priority on a new water scheme and which consequently are reluctant to maintain it.

3.3.2 Policies

Policies towards these objectives are:-

- Policy 7.
  Government resources for a new water scheme should only be committed for those villages which prior to construction have made a cash down-payment to MAJI equivalent to one year's cost of operating and maintaining the distribution system, hand pumps in that village
- Policy 8.
  In a proposed group scheme all villages must fulfil this condition before construction is initiated
- Policy 9.
  In villages with insufficient economic capabilities to meet the above conditions, the proposed project should be postponed. Supplementary programmes to increase village income and leadership skills could be initiated.

3.3.3 Reasons

Present policies on selection of villages to receive water supply are as unclear as those for operation and maintenance. Undoubtedly they vary as much across regions, donors and time as do the present operation and maintenance policies. Moreover, the two sets of policies are not linked. The extent to which villages are actively involved in the selection process is rather unclear too. At most they might be asked to confirm what has already been decided elsewhere.

The link between policies for operation and maintenance and selection of villages

In the selection phase the important task is to identify those villages that feel a real need for improving their water situation and which are willing to contribute labour and money to its improvement.

Extensive household surveys showed that felt need for an improved water supply strongly depends on the actual quality and access to water. Also expressed willingness to pay for such improvements correlate well with these two factors (see vol. 12, chapters 5 and 6.5).

The identification of villages with a likelihood of having a highly felt need is therefore accomplished by using these two factors as the main selection criteria. This has been done in the Water Master Plan (see vol. 12, chapter 12).

The difficulty, however, arises when a village is left with a completed scheme and then asked to contribute to operation and maintenance costs. Many villages on DANIDA funded schemes failed even to compensate their own scheme attendants despite previous promises (see chapter 6.3). Policy 3 (above, 3.2.3) even implies much higher financial contributions than compensation to scheme attendants.

Villages should therefore be asked to pay one year's expected operation and maintenance cost to MAJI before any construction is started (Policy 7). While such a down-payment will certainly increase the likelihood of a better village maintenance record, it does not guarantee it.

Investing in average one million shillings per village in a new water scheme is still a gamble, both for the government and donor agency, which may

see the scheme deteriorate and this money wasted and for the village, which invested considerable labour.

Size of the down payment and consequences of non-payment

What amount of down payment to demand is a difficult but important question. If it is too small, villages will be faced with a distorted choice and some villages with a low "real" priority for a water scheme may therefore tend to opt for it anyway, while it does not ensure later payment of real maintenance costs. Is the demanded down payment too high, villages for which a water scheme is a high "real" priority may feel they cannot afford it. As a first approximation policy 7 should be tried out and then adjusted depending on the experiences gained. Policies 8 and 9 are rather restrictive but the alternatives are next to impossible to administrate.

If one village in a group scheme refuses to accept a scheme, the whole scheme should temporarily be dropped (policy 9). The alternative would be to build the scheme anyway, but the mainline through the refusing village would then have to be dug by paid labour. Not a very easy situation to administrate.

According to policy 4, villages get a maintenance subsidy from MAJI. It is approximately the same for each village, and it is easily defined on basis of the physical layout of each scheme. Policy 9 is aimed at those villages which are not presently economically able to shoulder the burden of maintaining the distribution system, but which have a high priority in the Water Master Plan.

Here income generating activities should be encouraged (most likely by KILIMO) to improve the economic basis of the village. This may take time and may not be easy.

However, the alternative would be to adjust the village contribution to operation and maintenance (and the down payment) to the economic capability of each particular village. The implications of this approach are spelled out in volume 12, chapter 6.5.4. Here it suffices to say that a system of differential subsidies is extremely difficult to administrate and open to corruption. It can therefore not be recommended.

3.4 Planning

3.4.1 Objectives

Village participation in planning should ensure that:-

- The source of water is acceptable to the users
- The distribution system is adapted to local conditions and settlement patterns, subject to technical and economic constraints.

3.4.2 Policies

Policies on village participation in planning of the scheme:-

- **Policy 10.**
  The village has veto over a proposed water source
- Policy 11.
  MAJI plans the overall service level for a given village in accordance with the WMP design criteria (number of domestic points, hand pumps, washing slabs, cattle troughs etc.). The village locates these, but subject to technical approval and economic considerations.

3.4.3 Reasons

Villagers have fairly precise criteria for deciding whether a given source produces acceptable water or not (Vol. 12, chapter 5). It would be hazardous to disregard village opinion on a given source - even in cases where the water quality is acceptable according to the Tanzanian standards. Had policy 10 been in effect previously, several schemes that are only used to a limited extent or not at all would probably have been built with a different source.

Policy 11 is quite feasible. Experience has shown that domestic points located by villagers match the settlement pattern well. Furthermore the increase in the number of users resulting from this match is a cost-effective way of improving the service level of a scheme - despite the increase in the length of the distribution system that will often be a result of involving villagers in planning (vol. 12, pg. 6.50-51). However, since villagers do not pay anything (except labour) for the number of domestic points, hand pumps, etc. that are built, it is necessary that the number of such facilities be fixed a priori based on the population size and settlement pattern.

3.5 Construction

3.5.1 Objectives

Participation in construction aims at:-

- Increasing villagers' motivation for operating and maintaining the completed scheme
- Increasing villagers' technical skills, so that as many maintenance tasks as possible can be carried out by the maximum number of villagers
- Increasing villagers' skills in self-management so that they are capable of organizing maintenance work
- Reducing construction costs.

3.5.2 Policies

Policies for village participation in construction are:-

- Policy 12.
  Villagers should carry out all unskilled work connected with trench clearing and digging, laying of pipes, backfilling, construction of domestic points, hand pumps, wells, washing slabs, and soak-aways
- Policy 13.
  Through participation in construction of domestic points, wells, soak-aways and washing slabs, selected villagers should gain skills that will enable them to maintain the structures
- Policy 14.
  Villages that fail to carry out previously agreed construction activities should under no circumstances be bailed out by hiring unskilled labourers to do the work. Construction work will consequently stop until villagers do their part of the work.

3.5.3 Reasons

Although difficult to prove, experiences on the DANIDA funded water projects indicate (see chapter 6) that motivation for operating and maintaining a scheme is positively influenced by village involvement in the planning and construction phase. This is one argument for making this involvement as wide and deep as possible (policy 12 and 13).

A second argument is that if village participation is properly organized, and the MAJI employees who work in the field are properly trained, then technical skills - although limited in kind - could be spread to a large number of people.

Finally, participation in construction work typically involves 500 - 1,000 people per village. Organizing this huge labour force requires considerable skills in self-management. Such skills are very scarce at present. Self-management skills are, however, badly needed at village level. Not only to carry out the construction tasks, but also to organize the much more demanding task of maintaining the scheme.

Policy 14 drives home, once more, the important point that the village is building its own scheme assisted by the government, not the other way around. And experience has shown that a sure way of confusing everybody is to let the same type of activity be carried out by both paid and unpaid labour - even if it takes place in different villages: News travel fast.

3.6 Rehabilitation

3.6.1 Objectives

The objective of village participation in rehabilitation is:-

- To rehabilitate existing schemes using exactly the same policies as for new schemes.

By rehabilitation is meant scheme repairs that are so extensive that a camp must be established to carry out the work.

3.6.2 Policies

- Policy 15.
  Operation and maintenance should be carried out in accordance with the policies in 3.2, policy 1-6
- Policy 16.
  Selection of schemes for rehabilitation should follow the policies spelt out in 3.3, policy 7-9
- Policy 17.
  Planning should follow policies laid out in 3.4, policy 10-11

- Policy 18.
  Construction policies in 3.5 should be followed, policy 12-14.

3.6.3 Reasons

Almost all existing schemes are in need of rehabilitation (volume 4A, chapter 6.5). The causes of this dismal state of affairs have been traced to present insufficient resources for maintenance; an ineffective MAJI maintenance organization; and the lack of village participation (volume 12, chapter 6.2 and this volume chapter 8).

Were existing schemes to be rehabilitated and then operated and maintained after the present system (or systems) then they would most likely run into problems soon after the rehabilitation team had left. Rehabilitation should therefore not be just a technical renovation of a scheme. It should also involve a process in which villagers participate in all phases of the project cycle and which allows all new and rehabilitated schemes to be run according to one operation and maintenance system. Policies 15 to 18 spells out the implications of this.

3.7 Health education

3.7.1 Objectives

The objectives of health education given in combination with a water project are:-

- To increase awareness among the target group of all diseases which may be related to water, poor hygiene or poor sanitation
- To encourage and support individuals and groups to improve or change their environment in such a way that it will reinforce behaviour which is in agreement with principles for proper health, hygiene and sanitation.

3.7.2 Policies

- Policy 19.
  The villagers should carry out their own health education project with a minimum of outside assistance
- Policy 20.
  Women should be trained by health staff as village health educators in such a way that they will be able to conduct discussion groups among other women

- Policy 21.
  The water project and health staff should support the villagers in implementing any works which result from the health education project
- Policy 22.
  Health education activities should be initiated during the construction phase of any water scheme.

3.7.3 Reasons

The history of health education in Tanzania shows that preventive health care leaves much to be desired. The regional health staff is undermanned and there is a general lack of funds. Experiments carried out by the socio-economic group in Mbeya and Ruvuma Regions showed that women who have passed a rudimentary training programme were able to conduct discussion groups of women under supervision from health staff. When health education thus given were followed up by house visits, the impact of the project was satisfactory. The behaviour of the villagers changed and it was assumed that this behaviour reflected - or eventually would reflect - genuine attitude modifications.

3.8 Sanitation

3.8.1 Objectives

The key objective of sanitary activities should be:-

- To promote latrines that are hygienic, maintainable, affordable and acceptable to the users with a minimum of outside assistance.

3.8.2 Policies

- Policy 23.
  Villagers should be fully involved in selecting latrine types and in their construction
- Policy 24.
  Upgrading of existing latrine types in accordance with proven health criteria should be given priority over the introduction of new types
- Policy 25.
  Subsidies to latrine construction might be given, but they should not discriminate between different latrine types

- Policy 26.
  Sanitary activities should be initiated during the construction phase of the water scheme.

3.8.3 Reasons

The results of the socio-economic group's surveys of sanitary conditions in the three regions in general and in the Wanging'ombe area in particular are presented in volume 12, chapter 11.

The policies stated above are based on these results. They are, however, only tentative. For a number of reasons it has not been possible to experiment with implementation of them. Sanitation was not included in the Terms of Reference of the socio-economic study (volume 12, chapter 1.1.3), and work pressure did not allow time for experiments.

Unfortunately existing literature on rural low cost sanitation is not very helpful.[7] The proposed technologies may be cheaper than what is presently used in urban areas in developing countries. But they are certainly not low-cost compared to the latrines built by the majority of people in the rural areas of Tanzania.

DANIDA has now invited the Technology Advisory Group (TAG) from the World Bank to advise on sanitation in the three regions. Its terms of reference are very similar to the policies stated above. If they are followed, they should make it possible to implement a sanitation programme with a high degree of village participation at a cost to the sponsor and the individual household which makes the programme replicable.

It should be noted however, that introduction of a subsidy for latrine construction, which is kept as a possibility in policy 21, would run counter to all present trends towards giving villagers more - not less - financial responsibility for village facilities (not to speak of household facilities).

Notes:

1. Daily News, October 21, 1982.

2. Bo, P., and T. Rasmussen, (1982). "Peasant Economy and Rural Credit - A Study of Maize Production in Iringa Region, Tanzania". CDR Project Papers, A.82.11. Centre for Development Research, Copenhagen, p. 110.

3. The basic information on operation and maintenance is given in the table below:

Scheme type	Cost per person per year[a]				Cost composition[f] (%)			
	IBRD[b] 1976	WHO[c] 1977	RWE[d] 76/77	CCKK[e] 1981	Fuel	Spares	MAJI staff & transp.	Attendants
Gravity	10	8	5	14	0	39	36	26
Borehole, pumped	10	17	13	34	50	28	9	13
Shallow well	6	6	3	18	0	47	31	22

a) Cost per person actually served (i.e. total costs increase with population)

b) World Bank Special Mission (1976) "Fiscal Implications of Universal Primary Education and Universal Rural Water Supply". Unpublished paper table 7.

c) WHO (1977) "Rural Water Supply Sector Study". World Health Organization/World Bank Cooperational Programme. Appendix 9.

d) Ibid. Appendix 9.

e) WMP, volume 4B, table 9.27.

f) Our estimates based on WHO (1977) op.cit., Appendix 9, table 5, adjusted for fuel and labour cost increases.

In table 3.1 the medium-term goal implies that the village pays all fuel costs, all spares for the distribution system (estimated at 20 % of all spares) and attendants fees.

4. See "Special Supplement", The Gazette of the United Republic of Tanzania, no. 13, vol. LXIII, dated 26th March 1982.

5. Ibid., Local Government (Districts Authorities) Act, 1982. Part V. Functions and Duties of Local Government Authorities.

6. Ibid. Local Government Finances Act, 1982. Part II. Funds and Resources of Local government authorities; and Part III. Making and Collection of Rates.

7. See f.ex. World Bank, (1980).
Appropriate Technology for Water Supply and Sanitation. A Planner's Guide. World Bank, December 1980.

4. ORGANIZATION FOR VILLAGE PARTICIPATION

4.1 Village level organization

4.1.1 Objectives

With respect to water related activities the village level organization must be able to:-

- Define village interests
- Mobilize own resources to achieve them
- Cooperate with government agencies whose help in achieving them is necessary.

4.1.2 Policies

- Policy 1.
  A village water committee (VWC)[1)] must be established in each village that is going to receive government assistance for water supply. A standard composition and terms of reference of the committee are presented in table 4.1
- Policy 2.
  Project committee (PC) is established for all group schemes to be established or rehabilitated. Its standard membership and terms of reference are listed in table 4.2
- Policy 3.
  Two scheme attendants (preferably a man and a woman) are chosen by the VWC among villagers and are trained by MAJI in their village to do repairs and preventive maintenance on the distribution system and domestic points/hand pumps. They should be paid by the village - also during training. Their duties are listed in table 4.3
- Policy 4.
  One tap attendant (preferably a woman) is chosen by the balozis among households close to each domestic point/hand pump. Her duties will be to look after the upkeep of these installations and their surroundings as shown in table 4.4.

Membership

The committee consists of:-

- The village chairman
- The chairman of the committee for education, culture and social welfare
- One member from the Construction Committee
- Three women elected by the village assembly.

The committee elects its own chairman. Tenure of the appointed committee members follows their tenure on the village council. Tenure of the elected female members expires at the date of elections for the village council, at which date the village assembly elects or re-elects female members.

Terms of reference

a. To define and represent village interest vis-avis government agencies on the issues below.

b. To inform fellow villagers on all aspects of the planning, construction, operation and maintenance of the water scheme, and on health education and sanitation efforts.

c. To decide on the location of all domestic points/hand pumps/washing slabs/cattle troughs (subject to technical and economic limitations).

d. To organize and supervise self-help labour for construction, operation and maintenance.

e. To manage village responsibilities for operation and maintenance of the water scheme.

f. To supervise and support improvements in sanitary conditions and health education efforts.

g. To establish by-laws for the use of the water scheme and protection of environmental hygiene.

Table 4.1 - Village Water Committee: Standard membership and terms of reference.

Membership
The committee consists of:- • The Chairman of each village water committee in the project. The project committee selects its own chairman. Tenure on the Project Committee follows tenure on the Village Water Committees.
Terms of reference
a. To represent the interests of the villages as a group vis-a-vis government agencies including negotiations with MAJI on operation maintenance. b. To inform respective villages on all general aspects of the group scheme and health education and sanitation efforts.

Table 4.2 - Project Committee: Standard membership and terms of reference.

4.1.3 Reasons

The Village Water Committee

During extensive field work in the three regions the socio-economic group has not come across any voluntary groups or associations working actively on water related activities at village level. Thus the official village government structure must be relied upon. The new Local Government Act, 1982, Section 142, vests all executive power in the village council which can "initiate and undertake any task, venture or enterprise designed to ensure the welfare and well-being of the residents of the village".

Issues related to water, health and sanitation do not fit neatly into any one of the standing committees. However the village council may establish any permanent committee it deems necessary, and it may delegate any of its functions and powers to such committees. (Local Government Act, 1982, Section 107 and 108). Thus the establishment of a special village water committee (policy 1) with appointed members from the standing committees is in line with the intentions of the Act. So is the inclusion of three specially elected women. The arguments in favour of their membership are presented in Vol. 12, chapter 6.6.1 and in the present volume, chapter 7.

Experiences with village water committees are described in volume 12, chapter 6 and in chapter 6 of this volume. The main thrust of these experiences has not changed, but the proposed procedures (chapter 5) in this volume reflects the need for government agencies not exclusively to deal with the VWC in matters related to water related activities. In other words, the establishment of VWC is a necessary but not sufficient condition for successful village participation.

The project committee

The creation of this committee (policy 2) is an attempt to strengthen village interest vis-a-vis government agencies on the one hand, and to ease government agencies in their communication with the villages on the other.

There has been, in the past, some reluctance on the part of government to encourage intervillage cooperation. The only viable links are vertical ones from the village to the government. Integration is supposedly done at the upper layer of administration well above the individual village.[2)]

In the context of water supplies this means that each village is left on its own vis-a-vis MAJI. To change this, it is strongly recommended that project committees are established. Especially during the operation and maintenance phase strong committees with some clout are needed to prompt MAJI to fulfil its operation and maintenance responsibilities.

Experiences with project committees on projects in Iringa Region are not very good, however. A main reason is that little effort has been spent on establishing and supporting such committees. Consequently it has never been clear to the committee members what they were responsible for. Establishment of and support for project committees should receive much more attention in the future.

Scheme and tap attendants

In the present set-up scheme attendants are appointed and paid by MAJI. Only one male attendant is employed in each village. Sometimes one attendant is supposed to work in two or more villages. This system does not

work well. The scheme attendants belong to the "forgotten staff" in MAJI. They get no support, no spares and no tools from this department. They are not properly (or ever) supervised. The villages they are supposed to serve have no real influence on how and when they work. As a result they don't do much for the full salary they get (see volume 12, chapter 6.3).

Policy 3 should improve the situation. Scheme attendants selected and paid by and coming from the village are more likely to respond to village needs for immediate repairs. Secondly, by employing two attendants, the village decreases the risk that both attendants will be sick, on safari, or move away. Finally the employment of a woman may make it easier for female villagers to get breakdown attended to quickly (see chapter 7, below).

Training and payment of scheme attendants have caused many problems (see chapter 6). Policy 3 is based on these experiences. MAJI should also be more systematic in its training of scheme attendants (see chapter 4.3.3).

The introduction of the tap attendants (policy 4) is new in Tanzania. The system works well in Malawi. A similar need to make somebody responsible for each individual domestic point or hand pump obviously exists here as well. Experiences from Mbeya, where tap attendants have been appointed in a few villages, are good (see chapter 6).

a. To make every effort to keep the scheme working.

b. To inspect the following parts of the scheme every .....day: intake/gate valves/air valves/tanks/break pressure tank/main lines/ distribution lines/domestic points/washing slabs/drainage trenches/ soak-aways/hand pumps.

c. To report to MAJI and the VWC major problems and defects on these installations that cannot be repaired by the scheme attendant.

d. To repair any defects that occur from the tank to the tap as soon as they occur.

e. To advise the tap attendants on the proper upkeep of the surroundings of the domestic points/hand pumps.

f. To take care of and protect all tools and spares that the village may decide to hand over to the scheme attendants.

g. To advise the Village Water Committee on the need for spare parts.

h. To assist the Village Water Committee in purchase of spare parts and tools.

i. To participate in all meetings of the Village Water Committee.

j. To carry out all work that the Village Water Committee might decide.

Table 4.3 - Duties of scheme attendants.

a. To ensure that the surroundings of the domestic point/well are kept clean and free of excess water.

b. To cut grass around domestic point/well.

c. To ensure that drainage around the domestic point/well works and is kept clean.

d. To ensure that users of the domestic point/well:-
   - open and close the tap gently/operate the hand pump gently
   - do not bath on apron
   - only wash clothes on slab
   - do not water cattle at water point
   - do not play around water point.

e. To report any breakages and vandalism on domestic point/hand pump to scheme attendants or Village Water Committee or balozi.

Table 4.4 - Duties of tap attendants.

4.2 Government agencies involved in water related activities and their coordination

4.2.1 Objectives

Complex problems are involved in this issue. There is no "best" solution - only a number of alternatives for which pros and cons are difficult to evaluate and compare.

The time perspective is probably the most important factor to consider, for appropriate short and long-term solutions look quite different. The policies below are based on a long-term perspective.

The socio-economic group is well aware that the implementation of these policies will create difficulties in the short run and that other organizational models would provide greater short-term benefits. We believe, however, that the long-term advantages of the policies below will outweigh the short-term disadvantages. Unfortunately only limited experiences exist on which to base this judgement. In view of this uncertainty it is proposed that the policies below are followed for a period of three years, after which they should be critically evaluated and adjusted if necessary.

The government agencies involved in water related activities should be organized in such a way that:

- Health, participatory, and technical expertise and considerations are each given appropriate weight
- Their respective tasks at the project level are fully coordinated and clearly defined
- No new bureaucratic structure is established either within or between them.

4.2.2 Policies

- Policy 5.
  AFYA, MAENDELEO, and MAJI should be responsible respectively for health, participatory, and technical aspects of water related activities in the regions
- Policy 6.
  At the project level MAJI should coordinate the water related activities of AFYA, MAENDELEO and MAJI.

4.2.3 Reasons

In Tanzania government agencies that may carry out water related activities are already established: MAJI constructs and maintains water schemes; AFYA does health education and promotes improved pit latrines; and MAENDELEO is involved in community development work. However, at the project level there is presently no or very little cooperation on water related activities. And no policies exist to make coordination possible. Such policies should clearly outline the division of labour on water related activities between government agencies (new or existing); and should specify how these activities should be coordinated.

Present division of labour between agencies should be kept

During the last three years three different models have been discussed in connection with the Water Master Plan:-

- All water related activities should be carried out by one agency
- Activities related to technical matters and community work on water schemes should be carried out by MAJI. Health education activities should be carried out by AFYA. MAENDELEO should not be involved
- The water related activities should be divided between the existing government agencies: MAJI, MAENDELEO and AFYA.

The first and the last models represent extremes. The former implies full organizational integration of activities, while no such integration exists in the latter model. Between the two extremes there are, of course, a host of possible combinations of activities and agencies of which the second model has been most actively discussed.

Model one is used by the highly successful Rural Piped Water Supply Programme in Malawi. Construction, maintenance, health education and community development work is carried out by the same organization. Even more, all these functions are mainly carried out by the same person at the project level, namely the so-called project assistant. Obviously this makes coordination of activities easy and efficient. A detailed description of the Malawi model in a modified form has recently been published.[3] It is, however, the particular circumstances under which the Malawian programme developed over 15 years that made this unique model possible.[4]

In a Tanzanian setting the model could be implemented by creating an "implementation unit" for water related activities with its own staff, transport and budget. It could in principle be completely independent of existing government agencies. In practice it would most likely be attached to MAJI - although the linkage might not be strong.

This type of set-up has proved rather tempting to many donors operating in the water sector and elsewhere.[5] Certain short-term advantages are gained in this way. It makes it possible to by-pass the many bureaucratic constraints within the Tanzanian government agencies. It gives the donor greater control over staff and resources and their use. And consequently donors may stand a better chance of avoiding one of their recurrent nightmares: not to be able to spend enough money within the allocated period.

The problems faced by these rather autonomous projects are, however, many. They have recently been extensively reviewed. One of the conclusions were:

> "Realizing the full potential of donor aided programmes must mean not only short term production increases but also development of effective rural administration ....."[6]

It is precisely the long-term difficulties of integrating autonomous or semi-autonomous projects with the regular government administration without jeopardizing the performance of the project which makes model one so problematic.

Model two implies that a new bureaucratic layer must be built up within MAJI to carry out community development work, while health education remains under AFYA. One of the attractions of this model is undoubtedly that it has proved to work, at least in the short run, with the socio-economic group and its assistants forming the new layer while acting as the "extension unit" on DANIDA funded projects. Furthermore, in this model, control over community development work would remain with the donor, or rather with MAJI, with which the donor cooperates closely.

Apart from necessitating creation of a new community development bureaucracy within MAJI, parallel to MAENDELEO, perhaps an even more important disadvantage of this model is that the participatory aspects very easily become subject to technical expediency within a basically technocratic organization such as MAJI.

Policy 5 as stated above is a consequence of model three and of the objectives to ensure that health, participatory, and technical aspects are all given appropriate consideration; and not to establish new bureaucratic structures either within or between existing government agencies.

The policy implies that water related activities at the project level shall be carried out by MAJI, MAENDELEO and AFYA in cooperation. In this way MAENDELEO would be given a role on water related activities for which it has clearly been intended (see table 4.6). By and large the division of labour between these agencies should be kept, with the exception that follows from policy 10, chapter 4.3.2 below.

The external assistance needed to implement this policy is specified in chapter 4.6.

MAJI should coordinate project level activities

Coordination at project level becomes a crucial factor when implementing Policy 5. MAJI is in the best position to perform this function. Firstly because the lead activity in a programme on water related activities is the water supply improvement. It is the precondition for the introduction of improved latrines and is the basis for the health education effort. Such activities should therefore be planned and implemented to fit the water improvement activities. Secondly, MAJI staff has experience in project planning and execution that neither AFYA or MAENDELEO staff has. And finally, MAJI mobilizes considerable resources (labour, transport, etc) to implement projects, and some of these could be used to carrry out the coordinating functions without much additional cost.

In this set-up MAENDELEO and AFYA have the role of service organizations to MAJI and the villages on water related activities. The handbooks, discussed in chapter 5 and shown as its appendix I and II will be important tools for coordinating project level activities.

In the three regions under study, coordination of water related activities at the regional level is presently done through the Regional Steering Committee meetings, where representatives for the Regional Development Director, MAJI and the donor are members. Where AFYA and MAENDELEO are not already represented they should be in the future.

4.3 The MAJI organization

4.3.1 Objectives

An efficient and well managed MAJI organization is a sine qua non for successful village participation as explained in vol. 12, chapter 6. The proposals put forward in volume 4B, chapter 11 will hopefully contribute to such efficiency increase. This chapter will therefore only deal with those organizational aspects that are directly related to village participation.

In a village participation perspective the MAJI organization should be geared to:-

- Allow a maximum degree of village participation in all project phases
- Assist and train villagers in improving their own water and sanitation situation.

4.3.2 Policies

- Policy 7.
  Relevant MAJI personnel should be trained in community work approaches
- Policy 8.
  A new category of MAJI field level staff - site assistants - should be established. Their functions are listed in table 4.5
- Policy 9.
  MAJI should develop a systematic training programme for scheme attendants
- Policy 10.
  MAJI should construct demonstration latrines and teach villagers how to build similar ones in project villages.

4.3.3 Reasons

A positive attitude among MAJI staff to villagers and their involvement in water improvements is a necessary condition for successful participation. Training in community work (policy 7) cannot in itself change peoples' attitudes, but it may help positively disposed MAJI personnel (of whom there are many) to a better understanding of villagers and their reactions. And it may equip such staff with better skills in communicating with villagers.

In principle all MAJI staff that is in regular contact with the villagers should get such training. The need is especially high for field staff engaged in surveys, construction, rehabilitation and maintenance. The aim is that MAJI as an organization (and not just some individuals within it) should be responsive to village needs.

The training should be carried out in the field as on-the-job-training. The socio-economic group has, to a limited extent, been involved in such training during the past two years. It should, however, be expanded in the future. Short-term arrangements for this kind of training are described in chapter 4.6.

Policy 8 concerns site assistants, a new category of MAJI field level staff, engaged in activities requiring substantial inputs of self-help labour: trench digging, backfilling, construction of domestic points etc. During these activities the contact between MAJI and the villagers should be close and cooperative. In many cases it is not: MAJI asks the village to do a certain work; the village agrees and is then left to carry on without much support or supervision from MAJI. As a result, self-help work has often been of poor quality and very slow. Site assistants provide this much needed contact between MAJI and the village during self-help activities.

This idea has been adopted from the Rural Piped Water Supply Programme in Malawi.[7] Experiences from construction work at Tanangozi, phase I where two site assistants worked in each village, have been very good. Trenches of sufficient depth, width and straightness have been dug on almost all sections. The self-help work also progressed well with some exceptions as explained in chapter 6.4. The assistants (ex standard 7 or less) must be given much of the credit for this (together with the site engineer whose attitude to village participation is very positive). Some on-the-job training by the site engineer and the socio-economic group was all that the assistants got.

To carry out the functions listed in table 4.5 they need more and more systematic training - also in community work approaches.

a. To demonstrate activities done by self-help work
b. To assist balozis and the village water committee in mobilizing villagers for self-help work
c. To assist and supervise villagers during self-help work

Table 4.5 - Duties of site assistants.

Policy 9 concerns training of scheme attendants. Presently MAJI conducts the training during construction of the schemes. Some of the social conflicts created by this are explained in chapter 6.5. The training provided varies much from village to village depending on who among the MAJI staff happens to do the training.

However, the training of attendants is so essential that MAJI should develop a more systematic training programme for this purpose. A training manual for scheme attendants should also be made.

The final policy (10) concerns improvements of latrines. It is suggested that MAJI gets involved in this activity which is presently done by AFYA. Construction of demonstration latrines and teaching villagers how to build improved ones are activities for which site assistants should be very suitable. Moreover, if latrine improvement activities are started while the site assistants are still on site and construction of the water scheme is going on, there will be much easier access to building materials, transport, etc.

MAJI involvement in the technical side of latrine improvements should complement the promotional and educational work which is done by AFYA (see 4.4). AFYA does not appear to have sufficient staff with the needed technical skills at the subdistrict level to actually <u>build</u> improved latrines. Mostly they only <u>talk</u> about them. This is the final reason for dividing the hardware and software components of a sanitation project between MAJI and AFYA as implied by policy 10.

More detailed plans for this and precisely which latrine technologies should be promoted in the three regions must, however, await the results of the TAG-mission (see chapter 3.8.3) and subsequent decisions.

4.4 The AFYA organization

4.4.1 Objectives

The organizational objectives for AFYA on water related activities should be:-

- To initiate and support health education and sanitation activities based on a participatory and self-help approach as a component of all water schemes (incl. rehabilitation projects)
- To work in a service function to villages, MAJI and MAENDELEO on all health matters related to water projects.

4.4.2 Policies

- Policy 11.
  As part of their normal duties AFYA staff at ward/divisional level should carry out the health education field work on water related activities. If no such staff is available it should be seconded to the project area for at least the full water project implementation period
- Policy 12.
  If a sanitation component is included in a water scheme, this should be carried out by AFYA with MAJI as the constructor of demonstration latrines
- Policy 13.
  If health education results in village health projects, AFYA should give support, with MAJI as constructor.
- Policy 14.
  AFYA staff at district/regional level should supervise and support lower level AFYA staff involved in water related activities, including training of lower level AFYA staff in water related, community based, health education (mainly on the job training).

4.4.3 Reasons

AFYA staff is specialized in health education and preventive health. As health education and sanitation are supposed to be integrated parts of any water scheme, with emphasis on community participation and self-help, it is important that AFYA staff is involved throughout the duration of the establishment of a water scheme - and even after the finalization of construction.

In order to achieve this continuity, and to build on a thorough knowledge of local conditions it is preferable that local AFYA staff to the greatest extent possible is involved in the water related activities.

Any water scheme is of such magnitude that it should be possible for AFYA to relieve its local personnel of most other duties during the establishment period - and if no local personnel is available, then to second someone from the district or regional staff to the scheme.

Usually AFYA neither has the personnel nor tools or materials to undertake construction works, e.g. of demonstration latrines. This should therefore be done by MAJI personnel from the water project, in cooperation with AFYA.

Lower level AFYA staff, including also dispensary personnel, will need training in water related activities and the participatory approach to these, which should be given on the job by district/regional level AFYA, if possible in cooperation with MAENDELEO. The handbook on health education, appendix II below, which gives details on the procedures may also be used as a training tool for lower level AFYA personnel.

4.5 The MAENDELEO organization

4.5.1 Objectives

With the re-establishment of MAENDELEO, community development work has now regained the importance it previously enjoyed.

As can be seen in table 4.6 below the overall duties of MAENDELEO have been formulated in rather general terms. The underlying philosophy is undoubtedly that community work should form an integral part of all village development activities. What remains is to specify policies on water related activities. These are outlined below.

The organizational objectives for MAENDELEO on water related activities should be:-

- To promote the participatory approach in all such activities
- To work in a service function for villages, MAJI, and AFYA on these projects.

4.5.2 Policies

- Policy 15.
  As part of their normal duties, MAENDELEO staff at ward/divisional level should carry out the community participation field work on water related activities from the planning to the operation and maintenance phase
- Policy 16.
  MAENDELEO staff at the district/regional level should supervise and support lower level MAENDELEO staff involved in such activities, including training of lower level MAENDELEO staff in the participatory approach to water related activities (mainly on the job training).

4.5.3 Reasons

Almost two years ago the socio-economic group proposed that community work on water related activities should be carried out by MAENDELEO.[8] A seminar on village water supply and community participation made the same recommendation.[9] The arguments in favour of this recommendation are stated in vol. 12, chapter 6, and shall not be repeated here. MAENDELEO is now involved in water related activities on an experimental basis.

On the DANIDA funded Tanangozi water project in Iringa Region the community development assistant in Kalenga division in the project area carries out this work in 7 villages.

In Ileje district in Mbeya region MAENDELEO is involved in the DANIDA funded Mlale and Ndola projects. In both cases preliminary versions of the handbook in village participation (see chapter 5, appendix I) is the basis of work. MAENDELEO has been through almost half of the procedures specified in the handbook (to step 10). Based on this limited experience it does not seem to require very much training to enable existing MAENDELEO staff to carrry out community work on water related activities. However, the whole procedure should be completed in all three regions using MAENDELEO staff before a full evaluation of MAENDELEO staff performance can be made.

Another experimental project, called "A project for the development of a community participation component in the Tanzanian rural water supply

programme" was initiated in 1981 under the Community Development Department (MAENDELEO) in the Prime Minister's Office (PMO), in cooperation with the International Reference Centre for Community Water Supply and Sanitation (IRC).[10] Here existing MAENDELEO staff from the district level in Morogoro Region (4 districts) and Shinyanga Region (1 district) are carrying out community work on activities related to water, health education and sanitation. As on the DANIDA funded projects the performance of existing MAENDELEO staff has not yet been evaluated.

Policy 15 specifies that the community development field work on water related activities should be carried out by the existing MAENDELEO staff at the ward or divisional level. The intension is that the MAENDELEO staff already residing in the project area must be fully involved in the planning and construction phases in order to be able to carry out the equally important functions during the later and continuous operation and maintenance phases.

Through this intensive involvement, MAENDELEO staff who have assisted a village to build its own scheme will be in a good position to support and sustain village interest in the much more critical phase when the village is left with the responsibility for running and repairing the scheme (or parts of it).

It follows from this line of argument that project level work on water related activities should not be carried out by specialized MAENDELEO personnel with no other duties. No "extension unit" within this department should be created. Such personnel would not be able to carry out the crucial continuous operation and maintenance functions specified in the handbook. Especially not at a future date when most (if not all) villages supposedly have a water scheme. This policy is in line with proposals by PMO/IRC.[11]

It should be noted that policy 15 will require a considerable effort to implement. First of all, MAENDELEO staff at the ward/divisional level must be increased. At present staff is only placed in some wards/divisions, as shown in table 4.2. Secondly, ward/divisional level MAENDELEO staff engaged in water related activities will have a heavy work load, especially during the planning and construction period on gravity schemes and on schemes to be rehabilitated.

As this staff has many other duties, as shown in table 4.6, temporary but systematic arrangements must be made in order to implement policy 15. These are discussed in chapter 4.6.

---

a. To train villagers in management skills

b. Help villagers prepare their development plans, calendar of work and action plans (both economic and social)

c. To initiate and set up village building brigades in order to make villagers self-sufficient in appropriate village technology

d. To organize villagers, train them and help them towards better housing programmes

e. To educate villagers and leaders towards self-reliance so that they can participate fully and effectively in self-help projects

f. Organize and train women in home economics and give particular emphasis on nutrition, child care and cookery (homecraft and mothercraft skills).

Table 4.6 - MAENDELEO: present duties.[12)]

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a. To support and sustain village activities to improve water, health and sanitary conditions

b. To establish credible communication links between village communities and MAJI and AFYA concerning such activities

c. To assist villages in defining their priorities for water, health and sanitary improvements

d. To assist villages to mobilize their members for self-help work on water related activities

e. To increase self-management skills in project villages

f. To promote village interests vis-a-vis MAJI and AFYA

g. To assist relevant personnel from MAJI in participatory methods

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Table 4.7 - MAENDELEO: duties on water related activities.

Districts	Number of		Number of MAENDELEO staff		
	Divisions	Wards	District	Divisions	Wards
Iringa Region					
Iringa rural	9	26	3	6	5
Mufindi	6	14	4	6	
Njombe	7	25	4	8	
Ludewa	4	20	3	4	
Makete	5	15	2	6	
Mbeya Region					
Mbeya rural	5	25	3	4	10
Chunya	4	34	3	0	3
Mbozi	6	21	3	9	1
Rungwe	4	27	3	0	8
Kyela	2	14	3	3	3
Ileje	2	9	3	0	4
Ruvuma Region					
Songea rural	7	21	4	10	
Mbinga	5	31	3	10	
Tunduru	7	17	3	11	

Table 4.8 - MAENDELEO staff (CDO, ACDO, CDA) in districts in Iringa, Mbeya and Ruvuma (February 1983).

Policy 16 establishes the role of the district and regional level MAENDELEO staff on water related activities. Their function should be to train, supervise and support lower level MAENDELEO staff.

The key feature of this training should be that it should be specific (geared to water related activities) and job oriented (training in the field and not in the classroom). The handbook, chapter 5, appendix I, or similar material should form an important part of the instruction material. The socio-economic group has had some experience with cooperation with MAENDELEO staff which indicates that the handbook is well suited for this kind of training.

Table 4.7 summarizes the duties of MAENDELEO under policies 15 and 16.

4.6 The need for temporary external assistance in organizing for village participation

The organizational policies put forward above relate to a future situation in which MAJI coordinates the water related activities with AFYA and MAENDELEO acting as service agencies. Constraints with respect to manpower, funds and transport prevent this future state from being reached without temporary assistance.

MAJI has already for the last three years received substantial assistance from DANIDA to carry out its tasks. The form and content of this support is mostly outside the scope of this volume and will not be dealt with here.

MAENDELEO faces the biggest challenge as responsible for the participatory aspects. Being a young department it has limited staff from the regional level and downwards and, while being trained in community development, the staff has no specific experience with involvement in water related activities.

Two types of training needs therefore exist. First the training of trainers (regional and district MAENDELEO staff). PMO/IRC has suggested a crash course for which financial support is needed. "It is therefore proposed to make the preparation and implementation of this course a joint project of PMO and all bilateral donor agencies involved".[13] This seems both reasonable and necessary.

Secondly, there is a need for training of field level MAENDELEO staff. As mentioned earlier this should be carried out as on-the-job training with the handbook (chapter 5, appendix I) as the key educational tool.

These training needs are, however, not likely to be met in the near future. In the meanwhile DANIDA will continue to fund the construction of water schemes. Also rehabilitation of existing schemes are scheduled to start soon. External manpower assistance to MAENDELEO is therefore needed during the coming years. for what? (task disruption)

It is proposed that one suitably qualified Tanzanian or expatriate be placed as an advisor/coordinator of village participation in water related activities for the regional community development officer in each of the

three DANIDA funded regions for a period of three years. The advisor/coordinator should assist MAENDELEO in carrying out the duties listed in table 4.7 and should be actively involved in the training and support of MAENDELEO staff. He/she should also act as a link to MAJI and AFYA on water related activities. Finally the advisors/coordinators should evaluate and improve the procedures specified in the handbooks (see chapter 5) as more experience with their use is gained.

Given the shortage of MAENDELEO staff (as shown in table 4.8) funds for temporary hiring of assistants to carry out water related activities under MAENDELEO may also be needed. Transport needs should also be carefully assessed in light of implementation plans and the substantial support already given to MAJI in this respect.

At present it is not envisaged that AFYA needs much external assistance to carry out health education on the water projects. A substantial number of AFYA staff is already placed at village, ward and divisional level, and health education has been an AFYA responsibility for years. However, the use of participatory methods as specified in the health education handbook (see chapter 5) is probably new to most AFYA staff. The MAENDELEO advisor might therefore have to cooperate closely with field level AFYA staff in the project villages to make them familiar with this approach.

The need for advisors/coordinators for the regional community development officers should be reassessed after three years. It should be done in conjunction with the suggested evaluation (see chapter 4.2) of the organizational model for carrying out water related activities.

Notes to chapter 4

1) It has been suggested that the committee should be called the Village Water and Sanitation Committee. Translating this to Swahili is, however, very cumbersome. For that reason the term Village Water Committee will be used. It is responsible for all water related activities (water, sanitation, health education).

2) Fortmann, L. "Peasants, officials and participation in rural Tanzania: Experience with villagization and decentralization". Special series on rural local organization, RLO nr. 1, Cornell University 1980, p. 105.

3) Glennie, C. (1982) "A model for the development of a self-help water supply programme". World Bank technical paper number 2.

4) Sørensen, H. and O. Therkildsen (1982 "Rural water supply in Malawi". Report on a visit 12/3, 1982 to 19/3 1982. Unpublished.

5) Kleemeier, L. "Decentralized planning in Tanzania: A history and evaluation of the role of foreign assistance 1971-82". Unpublished seminar paper. Political science department, university of Dar es Salaam, 1982, 33 pp.

6) Lele, U. The design of rural development: lessons from Africa Baltimore: The John Hopkins University Press 1975, p. 141.

7) Sørensen, H. and O. Therkildsen, op.cit.

8) Laubjerg, K. and O. Therkildsen (1982) "Considerations on practical arrangements for village involvement in piped water supplies". In Bureau of Resource Assessment and Land Use Planning and International Reference Centre for Community Water Supply and Sanitation. Village Water Supply and Community Participation in Tanzania; report of a national workshop held in Dar es Salaam, Tanzania, July 14-16, 1981 p. 103-113.

9) Ibid. p. 132, recommendation 3.1.

10) Kirimbai, M. and C. van Wijk "Project for development of a community participation component in the Tanzanian rural water supply programme: profile for field-testing and application of results". Office of the prime minister; international reference centre for community water supply and sanitation. July 1982.

11) Ibid. chapter 5.

12) Source: Speech by the prime minister at the opening of the parliamentary session 1981.

13) Kirimbai and van Wijk, op.cit. p. 15-18.

5. PROCEDURES FOR VILLAGE PARTICIPATION

5.1 The handbooks: "Village Participation on Water Schemes" and "Village Participation in Health Education"

Chapters 2.3 and 4 provide the framework for introducing village participation on water related activities. But they do not in detail explain how to implement the many policies which have been put forward.

This purpose is served by the two handbooks shown in appendices I and II. They explain - step by step - how village participation is introduced in each phase of the water scheme and in health education.

At each step in the procedure specific instructions are given about the implementation of it. In both handbooks these instructions have been standardized and follow with a few exceptions the format shown in table 5.1.

Valid for (scheme type)
Preconditions (for initiating the step)
Purpose
Participants
Preparations (before arriving in the village)
Tasks in the village
Duration (approximate time spent in the village)
Documentation (for completion of the step)
Practical hints
Forms (to be used by project personnel or the village)

Table 5.1 - Standard format for each step in the procedure.

The handbook on water schemes (appendix I) contains 25 steps, while that on health education (appendix II) contains 22. The steps are listed in tables 5.2 and 5.3 respectively.

1.	Meeting to prepare the project
2.	Starting the procedure in village
3.	Collect information in village
4.	Inform village on project
5.	Discuss project with village
6.	Sign agreement with village
7.	Select village water committee members (and project committee members)
8.	Prepare for location of domestic points/wells/cattle troughs (and burning of bricks)
9.	Locate domestic points/wells/cattle troughs
10.	Select scheme attendants
11.	Wells: demonstrate construction of well, apron, washing slab and drainage
12.	Wells: make work plan for construction tasks
13.	Piped supply: demonstrate trench digging, pipe laying and backfilling
14.	Piped supply: make work plan for construction tasks
15.	Start construction tasks
16.	Repeat follow-up on construction tasks
17.	Piped supply: demonstrate construction of domestic points and washing slabs
18.	Piped supply: make work plan for construction of domestic points
19.	Piped supply: start construction of domestic points
20.	Select tap attendants
21.	Train village water committee; tap and scheme attendants in operation and maintenance tasks
22.	Make village by-laws for the use of the water scheme
23.	Explain operation and maintenance procedures to users
24.	Hand over scheme to village
25.	Repeat follow-up on operation and maintenance

Table 5.2 - Twentyfive steps for village participation on water schemes

1.	Preparatory visit to village
2.	Planning the health education project in the village
3.	Visit each ten-cell leader
4.	Meeting with all women in the village
5.	Meeting with health prompters
6.	Training of village health educators: first session: water use at home
7.	Meeting with all primary school teachers
8.	Training of village health educators: second session: water use at tap
9.	Training of village health educators: third session: water use at traditional source
10.	Training of village health educators: fourth session: sanitation and personal hygiene
11.	Training of village health educators: fifth session: a health problem related to water, sanitation and hygiene, specific to the village
12.	Summary of training programme
13.	Planning of discussion groups
14.	Village health educators conduct discussions in groups for all women in the village
15.	Do
16.	Do
17.	Do
18.	Do
19.	Planning practical projects proposed by the health education discussion groups
20.	Evaluation of the health education discussion groups
21.	Inspection of health/sanitation projects
22.	Household visits

Table 5.3 - Twentytwo steps for village participation in health education.

5.2 The use of the handbooks

The handbooks are written with three main uses in mind. Their most important use is as field manuals for the project personnel engaged in village participation in water related activities at the village level. The handbooks can also be helpful aids for training project personnel in participatory methods on water related activities. Finally, the handbooks should

prove useful as tools for those who plan, manage and supervise the village participation procedures and who coordinate activities between MAJI, MA-ENDELEO and AFYA.

Figures 5.1 and 5.2 illustrate the sequence of activities in these procedures. Figure 5.1 shows the coordination of activities on piped supplies. It has two important features. Village participation in selection of schemes (resulting in signing of an agreement) and planning of the locations of domestic points, etc. takes place before MAJI proceeds with the final design. This allows MAJI to include the village choice of locations of domestic points in the final design and to order all materials for a scheme once and for all. So far village planning of domestic points has been carried out at a much later stage, when DANIDA had already ordered some of the materials for a scheme, and several designs of the distribution system were made.

Secondly, health education (and sanitation) are introduced when villagers have been involved in trench digging for some time. Lasting for about 2 - 3 months this health education leads, among other things, to decisions on washing slabs and bathing units. Villagers must make such decisions (step 19 in the handbook on health education) before construction of domestic points and washing slabs can start (see step 17 in the handbook on water schemes).

The sequence of activities on wells is different. Construction time is much shorter. And construction consists in building the water point itself. Thus villagers must make decisions on washing slabs etc. before construction of the wells starts. Consequently health education must be initiated as soon as the agreement on the scheme has been signed and the down payment made (see figure 5.2).

Activities relating to sanitation have also been indicated in the two figures. It is suggested that they are carried out simultaneously with health education activities during the construction period. The reasons for this are given in chapter 3.7. However, more specific decisions must await the recommendations of the special consultant on sanitation (see chapter 3.7).

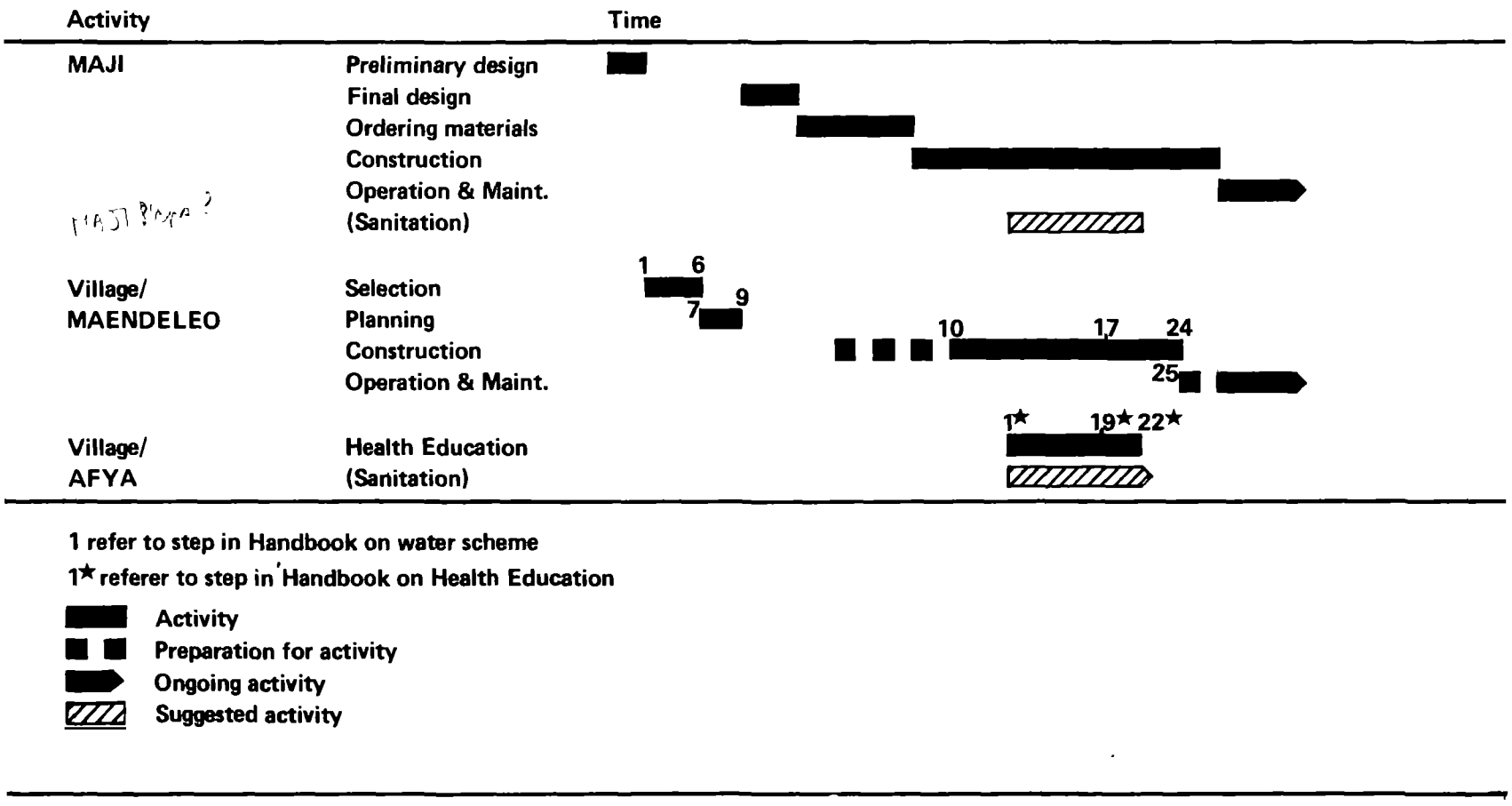


Figure 5.1 - Combination of activities on piped water scheme.

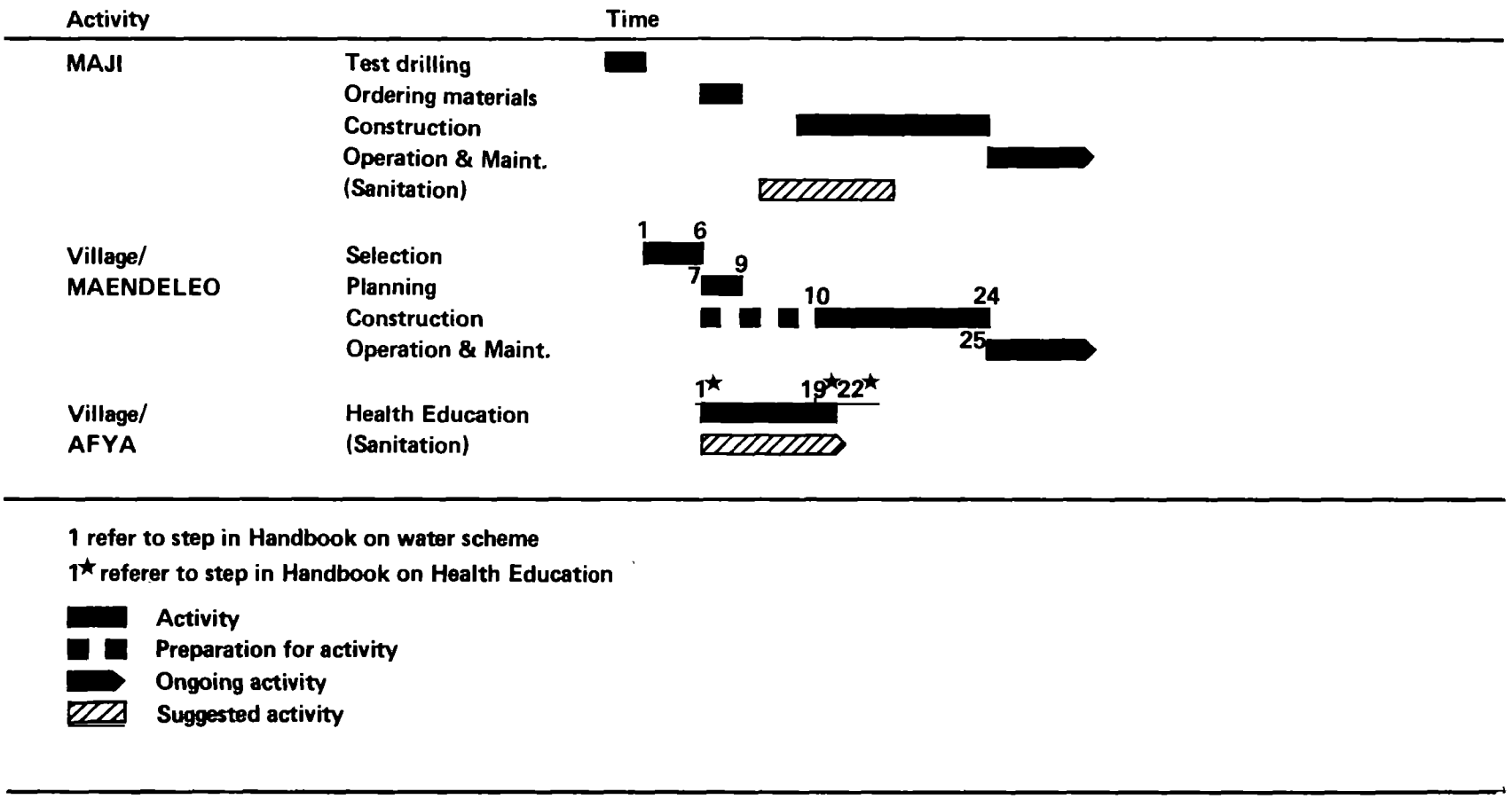


Figure 5.2 - Coordination of activities on wells scheme.

5.3 Improvements and adaptability of the handbooks

The handbook on water schemes has been developed, changed and tested by the SEC group in all three regions for more than a year. Presently it is tested by MAENDELEO staff in Iringa and Mbeya regions (see chapter 4.5). The impression from these testings is that the handbooks is a useful and appropriate tool for carrying out the tasks involved.

However, there are still room for improvements, especially for the steps dealing exclusively with wells. These have not yet been tried out. With appropriate adaptions the handbook can also be used for introducing village participation on rehabilitation projects, but no experiences with this type of project have so far been gained. The handbook on Water Schemes is therefore not a final product.

This applies to an even greater extent to the handbook on health education. Work on this handbook was started less than half a year ago in Mbeya and Ruvuma regions. And it has mainly been used by the socio-economic group itself.

For all these reasons the handbooks should be produced in loose-leaf form, so that each page can easily be amended and changed as more experience with their use is gained. And obviously the handbooks should be translated into Swahili.

Appendix I : Handbook on water schemes

Step 1: Meeting between MAJI, MAENDELEO and AFYA to prepare project

Valid for:

All scheme types.

Preconditions:

Village(s) included in implementation plan.

Piped supply: preliminary design ready.

Wells: hydrogeologist has assessed well potential (test drilling may have started).

Purpose:

To coordinate work of MAJI, MAENDELEO and AFYA on project.

Participants:

MAJI, MAENDELEO and AFYA staff to be in charge of project.

Preparations:

MAJI has information to fill in form 1, part I & II (all forms are presented at the end of the handbook, p.5.59, numbered according to the step they belong to).
MAENDELEO and AFYA have identified field level staff (form 1, part III).

Tasks:

1) Discuss project (the scheme, village participation, health education).
2) Draw up a work plan for the involvement of MAJI, MAENDELEO and AFYA.
3) Arrange for coordination of transport needs.

Duration:

Less than half a day.

Documentation:

Fill in form 1.

Step 2: Starting the procedure in village

Valid for:

All scheme types.

Purpose:

To inform village leaders about the procedure about the start.

Participants:

MAENDELEO.

Village leaders who are present on the day of visit.

Preparations:

Tentative schedule (dates) for future visits to be made.

Tasks in village:

1) Be introduced to village leaders present on the day of visit (and ward/divisional secretaries if appropriate).
2) Briefly explain leaders about the proposed project (water, health, sanitation).
3) Get permission to collect information (step 3).
4) Arrange date for this collection.

Duration in village:

One to two hours.

Documentation:

None.

Step 3: Collect information on village

Valid for:

All scheme types.

Purpose:

To collect information on:-

- Settlement pattern in relation to traditional source
- Size and organization of village labour force
- Village administration
- Possible conflict between proposed scheme and irrigation and livestock watering
- Population movements
- Village economy
- Building materials available in village.

Participants:

MAENDELEO.

Village chairman/secretary or other leaders.

Preparations:

Bring form 3.

Tasks in village:

1) Fill in form 3.
2) Arrange date for next meeting (step 4).

Duration in village:

One to two days.

Documentation:

Form 3 completed.

Practical hints:

Maps: do not copy maps made by MAJI. Draw your own by walking around to each and every subvillage. The village may have its own map (ask the chairman, head teacher, priest, etc.). When back in office check with MAJI that all subvillages can be supplied.

Step 4: Inform village on project

Valid for:

All scheme types.

Preconditions:

Wells: the number and locations of successful test drilling sites should be known.

Purpose:

To inform the village about all key features of the proposed scheme and the procedure to be followed. To encourage the village to weigh the benefits of an improved water supply against the costs of it.

Participants:

All members of the village government.
All balozis.
All UWT leaders and other leaders of women's group.
All leaders of Party Organizations (CCM, VIJANA, etc.).
All government employees in the village.
MAENDELEO.
AFYA (see Health Education Handbook, step 1).
MAJI.

Preparations:

MAJI and MAENDELEO clear up the issues arising from form 3, that is:-

- Can all subvillages listed in form 3 be supplied ?
- Is village population stable or should project be cancelled ?
- Should intake be relocated due to conflicts with irrigation and livestock watering ?
- Should other source be selected because of village reservations against proposed source ?
- Which building materials for DPs/wells should be supplied by the village ?

MAJI and MAENDELEO prepares form 4 by filling in the appropriate blanks.
Make 10 copies of this proposed agreement.
AFYA prepares how to introduce health education programme.

Tasks in village:

1) MAENDELEO informs village meeting on content of form 4.
2) AFYA introduces health education programme.
3) Discuss project proposals.
4) When discussion is over give one copy of form 4 to:
   - Village chairman
   - Committee for finance and planning
   - Committee for education, culture and social welfare
   - Construction committee
   - Village secretary.
5) Urge participants to call one or more new meetings in which villagers discuss proposal among themselves.
6) Arrange for new meeting (step 5). Allow at least 14 days for internal discussions in the village.

Duration in village:

One day.

Documentation:

Note down how many village participants of each category mentioned above were present at the meeting.

Practical hints:

1) If village attendance is low, then cancel meeting and call a new one.
2) The most important point to get across at the meeting is this: it is the village itself which is responsible for constructing a new water supply and for maintaining it afterwards. The government can and will only assist the village in doing these tasks.
3) The purpose of the meeting is to inform the village about the proposed project. Do not push the participants to say YES or NO to the proposal at this stage.
4) During the discussion make sure that you ask the following questions:-
   - Mention all the subvillages that can be supplied by water. Ask: are there any subvillages which has not been mentioned ?
   - Is the water you now use so dirty or so far away that you are willing to spend a lot of effort and money to get cleaner water closer to your houses ?
   - You will get water from .....river. Is the taste of this water good ? Is this water dirty ? Does the river sometimes dry up ?

- How much was the village income last year ?
- It costs Shs. ..... to operate and maintain the scheme each year. Where will you get that money from in the future ?
- Which other projects would your village like to start ?
- If you get a new water supply do you then think that you will have time for and can afford any other new project ?

5) Encourage the village to read the draft agreement carefully and to discuss it in the village council and assembly. Encourage the village to propose changes to the draft agreement if it finds parts of the agreement unacceptable. Such changes will be discussed during the next meeting (see step 5). However, you must stress that the size of the down payment <u>cannot</u> be changed.

Step 5: Discuss project with village

Valid for:

All scheme types.

Purpose:

To repeat key points in the draft agreement (form 4).
To answer villagers' questions about proposed project.
To identify issues on which village wants changes in draft agreement.
To proceed to step 6 if possible.

Participants:

All members of village council.
All government employees in village.
All balozis.
Leaders of all local party organizations (UWT, Vijana etc.).
MAJI.
MAENDELEO.

Preparations:

The first time step 5 is done in a village no special preparations are needed.
(If this is the second (or third/fourth) time step 5 is done then the village objections to the draft agreement must be discussed between MAJI and MAENDELEO. At this discussion a common stand on the village objections must be arrived at. Revisions of the draft agreement may have to be made before step 5 can be repeated).

Tasks in villages:

1) MAENDELEO reads key points of the draft agreement.
2) Discuss these key points with village.
3) Discuss any other problem that villagers may bring up.
4) If village accepts the draft agreement without changes then proceed to step 6.
5) If village wants minor changes in the draft agreement then make these on the spot and proceed to step 6.
6) If village wants major changes in the draft agreement then arrange for a new meeting and repeat step 5 (see preparation).

Duration in village:

Half to one day.

Documentation:

If the draft agreement is acceptable then proceed to step 6 and sign agreement.

If major changes in agreement are needed then make minutes of meeting indicating:-

- Number and type of participants
- Issues in draft agreement on which village disagrees.

If village refuses to sign then make detailed report on the reasons, and present it to the regional steering committee meeting/district development committee/regional development committee (whichever is appropriate).

Practical hints:

1) Step 5 and 6 may be completed during the same meeting if village accepts draft agreement.
2) If the village continues to disagree on issues in the draft agreement and no compromise is reached despite repeated meetings then report to higher authorities (see above).
3) In group schemes the whole project will be cancelled if just one village refuses to sign the agreement unless the refusing village(s) are at the end of the main or branch line.
4) When agreement is about to be reached then ask village participants how they are going to get the money for the down payment.

Step 6: Sign agreement with village

Valid for:

All scheme types.

Preconditions:

An agreement, acceptable to the village and MAJI, has been prepared during step 5.

Purpose:

To sign agreement between Village Council and the government.

Participants:

All members of the Village Council.
MAJI.
(MAENDELEO).

Preparations:

Prepare the agreement to be signed in 3 copies.

Tasks in village:

1) Sign agreement.
2) Arrange date for selection of committees (step 7).

Duration in village:

One to two hours (or carried out together with step 5).

Documentation:

Signed agreement (one for village; one for MAJI and one for MAENDELEO).

Practical hints:

1) Before signing make sure that a majority of Village Council members are in favour of the agreement.
   (More than half (normally at least 13) of all members of the Council must say yes).
2) Only village chairman needs to sign (on behalf of the Village Council).

3) MAENDELEO needs not be present at step 6 (unless step 5 and 6 are done together).

4) Ask village secretary to open a file for the water project.

5) Leave on signed copy of the agreement with the village secretary.

6) Remind village participants that they now have only one month to get money for the down payment.

7) Arrange how village is going to make the down payment.

Step 7: Select village water committee (and project committee members)

Valid for:

All scheme types.

Preconditions:

Village has made cash down payment to MAJI.

Purpose:

To select villagers who are capable of providing leadership during planning, construction, operation and maintenance of the new water supply; and who can promote sanitary improvements and health education.

Participants:

All adult villagers (village assembly).
MAENDELEO.

Preparations:

Bring 10 copies of form 7A (village water committee duties).
For group schemes, bring 10 copies of form 7B (project committee duties).

Tasks in village:

1) MAENDELEO explains why the committee is needed; what it should do; and the composition of its membership.
2) Village assembly suggest female candidates.
3) Village assembly elects village water committee members.
4) Arrange for next meeting (step 8).

Duration in village:

Half a day.

Documentation:

List of village water committee members (village should also keep this list in its water project file).

Practical hints:

1) The village chairman, the chairman of the committee for education, culture and social welfare, and one member from the construction committee are automatically members of the VWC.

2) On group schemes the chairman of the village water committee is automatically member of the project committee (see form 7B).

3) Give each member of the VWC a copy of form 7A. (On group schemes these members should also have a copy of form 7B).

Step 8: Prepare for the location of domestic points/wells (cattle troughs and burning of bricks)

Valid for:

All scheme types.

Purpose:

To discuss how to locate domestic points/wells (and cattle troughs if applicable).

To prepare burning of bricks (if applicable; see agreement, step 6).

Participants:

All village water committee members.

MAENDELEO.

(MAJI may be needed in case of wells).

Preparations:

Piped supply: check the signed agreement (step 6) for the number of domestic points (and cattle troughs).

Wells: MAJI must make sure that all successful test drilling sites can be found in the village. Otherwise a member of the wells team from MAJI who knows the locations must participate in this step.

Bricks: Check the signed agreement (step 6) for number of bricks to be made.

Tasks in village:

1) Discuss how to locate domestic points/wells.
2) Demonstrate this by walking around in village while discussing which factors to consider.
3) Explain procedure for locating domestic points/wells.
4) Wells only: if there are only few successful test drilling sites, it may be possible to proceed to step 9 straight away (see practical hint No. 2).
5) Ask village to make the required number of bricks before specified date (if applicable).
6) Arrange next meeting (step 9).

Duration in village:

Half a day.

Documentation:

None.

Practical hints:

1) The best way to explain the factors to consider when locating domestic points/wells (see below) is to walk around in the village with all the participants. Allow one hour approximately for this explanation.

2) Wells only: if the number of successful test drilling sites are the same or only slightly higher than the number of pumps allocated to the village there is little point in going through point 3 and 4 below. Instead you may proceed straight away to step 9. However, if there are many possible choices you must go through points 3 and 4 below.

3) Encourage the village water committee to involve other villagers in the location of domestic points (i.e. village assembly and/or balozis should be consulted before the village water committee makes the final decisions on locations).

4) There may be many factors to consider when locating domestic points/wells. As you go around in the village together with the committee discuss those factors which are relevant for the particular village you are working in.

   Drainage possibilities:-

   - Avoid location in depressions
   - Avoid locations where water from domestic point/wells can run down on roads or paths.

   Crossing dangerous roads with many vehicles passing:-

   - Avoid locations right next to the road
   - Select locations behind the first row of houses, or further back from the road if possible
   - Locate domestic points/wells along road exactly opposite each other if possible.

   Sharing between maximum number of people:-

   - Consider the 400 meter criterion in thinly populated subvillages
   - Consider the 250 person criterion in densely populated subvillage (piped supply)
   - At least 150 people should start a domestic point - and no more than 250 people
   - Wells are designed to supply 175 people
   - Rich and powerful people do not have more rights to get a domestic point/well near their house than poor people

   Keep away from pollution activities:-

   - Avoid locations next to cattle bomas/slaughter houses/vilabu/pit latrines.

   Locate along existing paths and walk-ways:-

   - Such locations bring "traffic" to the domestic point/well and do not disturb land use pattern.

Intercept presently used traditional sources:-

- Select locations which are nearer to the houses than the traditional sources if possible
- It is normally the wet season sources which are important to intercept.

Future expansion of village:-

- Prefer domestic point/well locations at places where settlement pattern is scattered. This allows for "filling-in" of new houses (everything else equal)
- Consider most likely areas of expansion given village plans for future plot allocation and topography.

Length of connecting pipe (piped supply only):-

- Locations far away from distribution line are very expensive.

Sufficient water pressure (piped supply only):-

- Long connecting pipes and uphill locations reduce pressure
- It might be impossible to supply the highest points in the village with water.

Primary school/dispensary/hospital/butcher/etc.:-

- Domestic points/wells serving such institutions (existing or planned) should be located so that they can serve surrounding houses as well (if possible)
- Village/ward/divisional offices do not need a domestic point.

5) Cattle troughs (if provided) attract a lot of livestock traffic to the area where a trough is placed. Discuss with the committee how this may:-

- Be a nuisance to people living around the trough (and their gardens and fields)
- Lead to soil erosion.

Encourage location at the outskirt of the village. Urge committee to discuss location with cattle owners. If there are both much cattle and goats/sheep, two types of troughs may have to be provided.

6) Bricks (if applicable): if wells are to be built there is very little time available for the burning of bricks. The urgency should be stressed. If a piped supply is to be built there is more time available before bricks are needed.
In both cases the date fixed in the agreement (see step 6) should, however, be taken seriously.

Step 9: Locate domestic points/wells and cattle troughs

Valid for:

All scheme types.

Purpose:

To agree with village on locations of domestic points/wells.

Participants:

All village water committee members.

MAJI.

MAENDELEO.

Preparations:

Bring sketch of village (see form 3).

Tasks in village:

1) Walk around to each chosen location and reach agreement with village water committee if possible.
2) Make sure that the agreed locations can be identified later (see below).
3) Check that work on brickmaking has started (if applicable).
4) Arrange date for step 10.

Duration in village:

Half a day.

Documentation:

Sketch (from step 3) showing agreed locations.

Description of each location (see below).

Practical hints:

1) The V.W.C., MAJI and MAENDELEO should agree on each particular location.
2) Piped supply: MAJI should consider water pressure and length of pipe when approving the locations chosen by villagers.
3) Consider if locations are distributed fairly (considering 400 m criteria and the population served by each location) and if traditional sources will be intercepted.

4) Also check locations with respect to drainage; dangerous roads; polluting activities; etc.

5) You should be careful when overruling a decision made by the village water committee. Only when a location is clearly technically or economically infeasible should you overrule the committee. Use persuation if you think that a proposed location is wrong. But be prepared to accept locations that you would not yourself have chosen.

6) If village and MAJI disagree on locations (or MAJI needs to do more surveys/calculations then step 9 (or parts of it) should be repeated.

7) The relevant locations should be clearly marked so they can be located later.
MAJI/MAENDELEO should mark each location on their maps. Furthermore the following should be noted:-

- Subvillage
- Balozi
- Name of family/families nearest location.

Step 10: Select scheme attendants

Valid for:

All scheme types.

Preconditions:

Wells: digging/drilling of first well about to start.

Piped supply: trench digging about to start.

Purpose:

To select two capable and reliable villagers as scheme attendants.

Participants:

All village water committee members.

MAENDELEO.

Preparations:

Bring form 10.

Check form 3 for information on village economy and posho for people already employed by village.

Arrange dates for start of training of scheme attendants with MAJI.

Tasks in village:

1) Give each member a copy of form 10.
2) Explain duties of scheme attendants (see form 10).
3) Discuss what type of person would be suitable.
4) Ask village water committee to select two suitable candidates before next meeting (step 11 or 13).
5) Explain the need for compensating scheme attendants.
6) Ask VWC to negotiate posho (compensation) with scheme attendants, and to get the size of the posho approved by the village council before step 11 or 13.
7) Wells: check that village has started brickmaking (if applicable).
8) Arrange for next meeting (step 11 or 13) - especially that materials for demonstration will be on site.

Duration in village:

Less than half a day.

Practical hints:

1) Go through form 10 point by point and explain each one.

2) Stress that the scheme attendants will be responsible for operating and maintaining the scheme. If they fail to do so, the scheme will soon break down. It is therefore important to select the right people as scheme attendants.

3) Discuss which of the following is important to be a good scheme attendant:-

- Respected by fellow villagers ?
- Hard working ?
- Married ?
- Resident of village with no business outside village ?
- Young or old ?
- Male or female ? (argue for females, but don't force the point)
- Able to read and write ?
- Technically minded ?
- Able to do work at short notice every time scheme breaks down ?

4) Leave it to the village water committee to select two candidates before step 11 (wells) or 13 (piped supply).

5) Explain that scheme attendants must do some operation and maintenance work every day when the scheme is completed. (Maybe a total of two days per week - sometimes more, sometimes less. On wells there may only be a total of one full day's work for each of the two attendants).

6) Discuss what other people employed by the village are paid for their work (shop manager, etc., see form 3). Then start a discussion of the size of the posho for scheme attendants. Remind the VWC that exemption from communal work (in shamba etc.) is also a kind of payment. Do not suggest any specific amount of money. Leave that to the VWC.

7) Urge the VWC to get approval from the Village Council for the posho to be paid to the scheme attendants before the VWC signs the agreement (form 10) with the selected scheme attendants.

8) Remind the VWC that the scheme attendants should be paid the posho from the date agreed upon in form 10. On well schemes the scheme attendant must start work as soon as the digging/drilling of the first well starts (see step 11).
On piped schemes the attendants may start work when MAJI construction team starts work in the village (approximately at the start of step 13).

9) The exact start of the employment should be agreed with MAJI before the meeting, so that MAJI can prepare the training programme from that date and onwards.

Step 11: Wells - demonstrate construction of well, apron, washing slab and drainage

Valid for:

Wells (dug or drilled) only.

Preconditions:

One well must be completed (drilled or dug).
Agreement between village and scheme attendants must be signed (see step 10).

Purpose:

To give village leaders a clear picture of the work to be done by self-help labour on the construction of wells, etc.

Participants:

All VWC members.
All balozis.
Selected scheme attendants.
Well fundis (MAJI).
Site assistant.

Preparations:

Site assistant has agreed with VWC on the borehole to use for the demonstration (must be centrally located).
MAJI brings all necessary tools and materials to the site.
Village water committee has arranged collection of stones, bricks, etc. plus water for concrete work (as applicable).

Tasks in village:

1) Site assistant explains importance of good workmanship.
2) Construct apron, drainage, slab, soak-away.
3) Site assistant explains village responsibilities during this work (see practical hints).
4) Arrange date for making work plan (step 12). Stress that all balozis must be present.

Duration:

One day.

Documentation:

None.

Practical hints:

1) Read to the participants the appropriate part of the agreement (step 6) which specified exactly what materials the village should carry and supply for the construction of wells.
2) Explain what this means.
3) Villagers should also do the following at each well:-

- Clear bush around well
- Excavate for apron, trench, soak-away, etc.
- Carry water for concrete work
- Assist in casting concrete, etc.
- Keep casted concrete wet for seven days.

Step 12: Wells - make work plan for construction tasks

Valid for:

Wells only.

Purpose:

To make work plan for self-help labour.

Participants:

All village water committee members.

Scheme attendants.

All balozis.

Site assistants.

MAENDELEO.

Preparations:

Bring form 3.

Tasks in village:

1) Repeat what village should supply for each well.
2) Discuss where village should get this material from.
3) Let balozis around each well select a small group of people (say 10 per well) who shall work on construction of wells.
4) Make work plan.
5) Arrange for step 15.

Duration in village:

One day.

Documentation:

Detailed work plan.

Practical hints:

1) Do not start meeting unless most (3/4) of balozis are present.
2) Urge balozis to select people who stay close to the wells - and who can work without supervision (say 10 persons per well). Make sure that women are included - 5 if possible.

3) Explain that construction of a well takes a week. (Excavation, collection of material, casting, etc.).

4) Suggest that one group works every day for a week when their well is being constructed. The people in the group should therefore be exempted from other communal work.

5) Make the work plan. For each well it should contain the following:-

- Date for start of collection of material
- Amount, type and place where material is to be collected
- Names of the people appointed by the balozis
- Name of village water committee member assigned to construction of the well in question
- Assign scheme attendant to work on construction of wells (maximum of two days a week each).

Step 13: Piped supply - demonstrate trench digging, pipe laying and backfilling

Valid for:

Piped water supply only.

Preconditions:

Materials at site or expected soon. Agreement with scheme attendants must be signed (see step 10).

Purpose:

To give village government, balozis and village water committee members clear picture of the work to be done by self-help labour.

Participants:

All members of the village government.
All balozis.
Selected scheme attendants.
All village water committee members.
MAJI site assistants assigned to the village.
All MAJI foremen that will work in the village.
Ward/divisional secretaries (if appropriate).
MAENDELEO.

Preparation:

MAJI marks line and brings all necessary tools, pipes, fittings, etc. to demonstration site which has been agreed upon with the VWC. The site should be centrally located.

Tasks in village:

1) Introduce project staff to villagers.
2) Site assistant explains importance of good workmanship.
3) Site assistant explains importance of digging, laying, backfilling.
4) Digging, pipe laying, backfilling by all participants.
5) MAENDELEO explaing need for mobilizing all villagers, for work plans, etc.
6) MAENDELEO calls for new meeting (step 14). Stress that all balozis must be present.

Duration in village:

One day.

Documentation:

None.

Practical hints:

1) Make sure that all outsiders present during the demonstration (politicians, government staff, etc.) participate in the digging. Those who do not want to touch a showel should not show up.
2) Scheme attendants from nearby villages may participate in demonstration to show joining of pipes.
3) Sometimes during demonstration MAENDELEO should call forward all members of the VWC so that they become known to the villagers. A short explanation of the duties of the VWC should also be given.
4) All balozis present should also be called forward, and MAENDELEO should emphasize the importance of their duties during construction.
5) Also introduce selected scheme attendants. Briefly explain their duties in the future.

Step 14: Piped supply - make work plan for digging, etc.

Valid for:

Piped supply only.

Preconditions:

Main trench lines surveyed.
Tools (spades, hoes, etc.) available.

Purpose:

To make work plan for self-help labour.

Participants:

All village water committee members.
Scheme attendants.
All balozis.
Site assistant(s) assigned to the village.
MAENDELEO.

Preparations:

Bring form 14 (two copies for each balozi).
Write name and subvillage of each balozi on form 14A (two copies).

Tasks in village:

1) Discuss who should participate in digging.
2) Let each balozi fill in form 14.
3) Discuss how to divide villagers into groups.
4) Make work plan.
5) Attach one member of village water committee to each group.
6) Agree on where,when and who should start digging.
7) Discuss sanctions against absentees.
8) Arrange for next step (15).

Duration in village:

Half a day.

Documentation:

Detailed work plan.

Practical hints:

1) It is very important that ~~most~~ balozis are present. Don't start meeting before at least 3/4 of them have shown up.

2) Repeat the tasks to be done by village. Refer to the demonstration digging (step 13).

3) Explain that digging cannot be done in two or three weeks. It is likely to take three to six months or more. It all depends on villagers' efforts. Good planning of the work is therefore necessary.

4) Who should participate ? (task 1). Of course the sick and the old should not dig. And among the able-bodied the meeting should decide on the participation of the following:-

   - Should all men and women in a household participate ?
   - Should people working for a salary participate (Vibarua) ?
   - Should government employees dig (teachers, village managers, Bwana shamba, etc.) ?
   - Should private businessmen ?
     Write down the decisions.

5) Distribute form 14 to each balozi and let them fill it in according to the decisions reached under task 1. If balozis claim that they don't remember all names, then agree on a date when the forms have to be returned to the CCM Office. (You don't need to know the exact number of able-bodied persons to make the work plan).

6) How to make the work plan (tasks 3 and 4).

   Groups:

   Groups should not be smaller than 50 people and not larger than 250 people. If the latter size is used two site assistants are needed to supervise work. Neighbouring balozis should be grouped together. If possible "weak" balozis should be put in groups with "strong" ones, so that the latter can help the former mobilizing people. Take the subvillage structure into consideration when groups are formed.

   Metres to be dug:

   In average a person should be able to dig 2 metres every time he/she turns up. To calculate how many times a person should show up, take the total length of trenches (say 16000 metres) and the total number of able-bodied (say 800). Each person should then dig 20 metres (16,000/800). Since each person digs 2 metres every time, he/she must turn up 10 times (20/2).

   Organizing the groups:

   This can be done in several ways:-

- A group works for a whole week (say 5 days) at a time while all other groups rest.
  The group is given a certain section to dig and it must itself complete this section. If attendance is low, others in the group must work harder.

  Example: 800 people divided into say 5 groups (160 people/group).
  Each group digs 1,600 metres a week (160 x 5 x 2).
  It will take 10 weeks to complete the digging (16,000/1,600) - provided attendance is 100 % (which is unlikely)

- People should work once a week only and digging should take place (say) from Monday to Thursday (4 days).

  Example: Each group will have 200 persons (200 x 2 x 4).
  It will take 10 weeks to complete the digging provided attendance is 100 % (which it is never)

- People should only work once every two weeks and digging should take place say Monday, Wednesday, Friday (3 days).

  Example: Each group will have 133 people (800/2 x 3).
  In a week 800 metres will be dug (133 x 3 x 2).
  It will take 20 weeks to complete the digging provided everybody shows up (very unlikely).

Which model to choose would depend on:-

- The time schedule for the project (check this with MAJI)
- The villagers preference (discuss the models with the villagers).

Note that the third model may not be possible in villages with few people and long trenches. It may take too long to complete digging. Also note that the second model may not be possible in villages with many people, because it may result in groups that are too large.

7) Making the work plan (task 4). The following should be decided on at the meeting:-

- Which model to choose
- Number of groups
- Names of balozis in each group
- Number of people in each group
- Working days
- Name of village water committee member who should be attached to each group
- Time, date and place for start of digging
- Arrange for regular meetings between committee balozis and site assistants.

Write down the decisions.

8) Sanctions (task 7). Discuss what whould be done to absentees and who should be responsible for taking the measures.
Measures could include: fines in cash/fines in kind/extra trench digging/warnings/etc.

Step 15: Start construction tasks

Valid for:

All scheme types.

Preconditions:

Piped supply: all balozis have filled in form 14. Form has been approved by village chairman.
Wells: bricks supplied by village must be available (if applicable).
Wells: health education discussions have identified need for washing slabs.

Purpose:

To carry out self-help work on construction tasks as agreed in work plans.

Participants:

Villagers (as planned).
Balozis (as planned).
Village water committee members (as planned).
Scheme attendants (as planned).
Site assistants/well fundis.

Preparations:

Trench lines must be marked and cleared (piped supply).
Tools and materials supplied by MAJI must be available.
Building materials supplied by village must be available (wells).
Wells: ask AFYA people about number and location of washing slabs.

Tasks in village:

1) To assist the villagers to carry out the construction work agreed upon.
2) To assist the village leaders (water committee members and balozis) to encourage attendance.
3) To hold regular meetings with village water committee and balozis.

Duration in village:

Continuous.

Documentation:

None.

Practical hints:

1) It is important that site assistants have everything properly arranged for work every day (trenches marked, bush cleared, tools/ materials ready). If the start of work is badly prepared attendance will be low and people will loose enthusiasm very fast.

2) If attendance is low the first couple of days immediate action must be taken. Call meeting with VWC to discuss what to do.

3) Trenches should never be left half done. Urge people to complete their section. It is very difficult to get people to return to an unfinished section.

4) Site assistants should show people how a particular work is done. And they should help the water committee member/balozi to keep records of who is not participating.

5) Site assistants should always work through water committee members and balozis when attendance needs boosting.

6) Site assistants may approach absentees at home - but always accompanied by a balozi or a water committee member.

7) Site assistants may call meeting with a group if attendance is low. Meeting could be held at house of a balozi. Water committee member should always be present.

8) Regular meetings between water committee, balozis and site assistants should be held during construction. The following may be discussed:-

   - Progress in work since last meeting
   - Problems encountered
   - Measures against absentees.

9) If MAJI supplied tools disappear, site assistants should take immediate action through VWC.

10) If attendance is low or falling it may be necessary for site assistant to call site engineer and/or MAENDELEO.

11) During health education the need for and location of washing slabs will be identified.

Step 16: Follow-up on construction work

Valid for:

All scheme types.

Purpose:

To follow progress of work.
To adjust work plans or procedures if needed.
To assist water committees to increase attendance.

Participants:

Village water committee/project committee.
Balozis.
Scheme attendants.
Site assistants.
MAENDELEO.
(MAJI).

Preparations:

Keep informed about regular meetings between village and site assistants. Show up at these at regular intervals (say once a month) or when need arises.

Tasks in village:

1) To discuss with village water committee/project committee (whoever is appropriate) and balozis and site assistants:-
   - Progress of work
   - Changes in procedures and plan (if necessary)
   - Attendance.
2) Check that scheme attendants are satisfied with work and is getting paid by village (check also with MAJI fundis that attendants show up for training and that they are suitable for the job).
3) Check that brickmaking is progressing (if applicable).
4) Arrange for next meeting of step 16.
5) Arrange for step 17 when appropriate.

Duration in village:

Half a day (several times).

Documentation:

None.

Practical hints:

1) Low attendance is likely to be the main problem. Changes in procedures may be needed. Talks with individual balozis/households may also help. Try always to get the villagers themselves to build up social pressure against absentees.

2) When appropriate ask VWC and site assistant to arrange for step 16.

3) If bricks are to be used then regular follow up on the brick-burning activity should be made so that bricks are ready when needed.

4) Also follow up on payment of scheme attendants. Are they paid according to the agreement ?

Step 17: Piped supply - demonstrate construction of domestic points and washing slabs

Valid for:

Piped water supply only.

Preconditions:

MAJI ready for domestic point construction. Village has produced bricks (if applicable).
Health education discussions have identified need for washing slabs.

Purpose:

To give village leaders a clear picture of the work to be done by self-help labour on the construction of domestic points, washing slabs and soak-away.

Participants:

All village water committee members.
Scheme attendants.
All balozis.
Site assistants.
Domestic points fundis.

Preparations:

Site assistant has agreed with VWC on location of demonstration domestic point (must be centrally located).
MAJI brings all necessary tools and materials to site.
Village water committee has arranged for collection of sand, stones, bricks, etc. plus water for concrete work (check agreement, step 6, to see what village should supply).

Tasks in village:

1) Domestic points - site assistant explains importance of good workmanship; construction of domestic point, trench, soak-away and washing slab.
2) Site assistant explains what work should be done by villagers and MAJI respectively (see below).
3) Arrange date for step 18. Stress that all balozis must be present.

Documentation:

None.

Practical hints:

1) Read the appropriate part of the agreement (step 6) to the participants which specified exactly what materials the village should carry and supply for the construction of domestic points.
2) Explain what this means.
3) Villagers should also do the following at each location:-

- Clear the bush
- Excavate for domestic point, trench, washing slab and soak-away
- Carry water for concrete work
- Assist in casting concrete
- Keep casted concrete wet for 7 days.

Step 18: Piped supply - make work plan for construction of domestic points

Valid for:

Piped supply only.

Purpose:

To make work plan for self-help labour.

Participants:

All village water committee members.

Scheme attendants.

All balozis.

Site assistants.

MAENDELEO.

Tasks in village:

1) Repeat what village should supply for each DP.
2) Discuss from where village should get this material.
3) Let balozis from each group name a small group of people (say 10 per DP) who shall work on construction of domestic points.
4) Make work plan.
5) Arrange for step 19.

Duration in village:

One day.

Documentation:

Detailed work plan.

Practical hints:

1) Do not start meeting unless most (3/4) of balozis are present.
2) Urge balozis to select people who stay close to domestic points - and who can work without supervision (say 10 people per domestic point). Make sure that there are women included.
3) Explain that construction of one domestic point takes a week (excavation, collection of material, casting, etc.).
4) Suggest that the group (10 people) work every day for a week when their domestic point is to be constructed. And suggest that these people no longer will have to dig trenches.

5) Make the work plan. It should for each domestic point contain the following:-

- Date for start of collection of material
- Amount type and place where material is to be collected
- Names of the people appointed by the balozis
- Name of village water committee member to participate in construction of the domestic point in question
- Assign scheme attendant to work on construction of domestic point (maximum two days a week for each).

Step 19: Piped supply - start construction of domestic points, washing slabs etc.

Valid for:

Piped supply only.

Preconditions:

Bricks supplied by village must be available (if possible).

Purpose:

To carry out self-help work on construction tasks as agreed in work plan.

Participants:

Villagers (as planned).
Balozis (as planned).
Village water committee members (as planned).
Scheme attendants (as planned).
Site assistants/domestic point fundis.

Preparations:

Tools and materials supplied by MAJI must be available.
Building materials supplied by village must be available (if applicable).
Ask AFYA people involved in health education about the number and location of washing slabs.

Tasks in village:

1) To assist villagers to carry out the construction work agreed upon.
2) To assist village leaders (VWC and balozis) to encourage attendance.
3) To hold regular meetings with VWC and balozis.

Duration in village:

Continuous.

Documentation:

None.

Practical hints:

1) It is important that MAJI has everything properly arranged from the very first day of work. If MAJI is not ready, it is better to postpone the start of work.

2) If all the people do not show up, immediate action must be taken. Call meeting with VWC to discuss what to do.

3) Do not start on a new domestic point before the previous one is completely finished. It is very difficult to get people to go back.

4) Domestic point fundi and site assistant should show people how work is to be done. But villagers should be left to do as much work as possible - also concrete work, etc.

5) Regular meetings should be held. They should be combined with the meetings held for discussions of trench digging (see step 15).

6) See also step 15 on other "practical hints".

Step 20: Select tap attendants

Valid for:

All scheme types.

Preconditions:

Construction of all domestic points/wells completed.

Purpose:

To select tap attendant for each domestic point/well.

Participants:

Village water committee.

All balozis.

Scheme attendants.

Site assistant.

MAENDELEO.

Preparation:

Bring form 20 (at least one for each DP/well).

Task in village:

1) For each domestic point/well find out what balozis are living nearest. Let these balozis select one house near the domestic point/hand pump. The woman in this house should be tap attendant.
2) Let VWC make a list of all names.
3) Arrange for step 21.

Duration in village:

Half a day.

Documentation:

List of names.

Practical hints:

1) Urge balozis to select women who participated in the construction of the domestic point/well (see step 12 or 18).

2) Distribute form 20 to the respective balozis and ask them to give the form to each of the selected tap attendants.

3) Ask the balozis to call the tap attendants for the next meeting (step 21).

Step 21: Train village water committee, tap and scheme attendants in operation and maintenance tasks

Valid for:

All scheme types.

Preconditions:

Water is flowing to domestic points/hand pumps.

Purpose:

To establish village procedures for operation and maintenance.

Participants:

All village water committee members.

Tap and scheme attendants.

All village health educators.

MAJI.

Preparation:

Bring jammed tap.

Tasks in village:

1) Discuss importance of operation and maintenance.
2) Reiterate village responsibilities.
3) Discuss village procedures for operation and maintenance. Exemplify by case-stories (see practical hints).
4) Arrange for step 22.

Duration in village:

One day.

Documentation:

None.

Practical hints:

Go through the relevant cases below one by one.

1) Tap must be opened and closed gently:
Go to domestic point. Show how to open and close tap gently.
Explain what happens when this is not done.
Explain that a new tap costs Shillings .....
and that the village must pay this amount to get a new one.

2) Tap cannot be opened:
Bring jammed tap. Explain that it should not be opened by force, then it will not be possible to repair it. Instead the tap attendant should do the following:-

- Tie a piece of string around tap so that nobody will use it
- Report the case to the scheme attendant
- Find out who jammed the tap. Go and talk with this person. If it is vandalism then report to the village water committee.

3) Tap cannot be closed:
Bring jammed tap. Explain that it should not be closed by force, then it will not be possible to repair it. Instead the tap attendant should do the following:-

- Stop water from flowing with a piece of wood
- Report the case to the scheme attendant
- Find out who jammed the tap. Go and talk with this person and show how to operate tap properly. If it is vandalism then report to village water committee.

4) Children playing around domestic point:
Tap/scheme attendant should tell children to stop.
If that does not help, then parents should be informed.
It might also be necessary to report to village water committee/ balozi.

5) Bathing done at domestic point:
Tap/scheme attendant should tell person to stop.
Explain that bathing should be done at home. Bathing at the domestic point could spread diseases to other people.
It might also be necessary to report persons to the village water committee/balozi.

6) Livestock watering at domestic point:
Tap scheme attendant should tell herdman to stop.
Livestock watering make surroundings dirty and muddy.
In this way some diseases can spread from the livestock to people.
It may be necessary to report livestock owners to the village water committee/balozi.

7) No water in tap:
Close gate valve to illustrate the case. Tap attendant reports to scheme attendant. If water is not flowing the same day then tap attendant report to VWC. The village water committee contacts scheme attendant. Maybe it is necessary to buy spare part, or call MAJI.
Explain village responsibilities for maintenance.
and explain when MAJI should be called.

8) Domestic point surroundings are muddy or there is tall grass:
Explain that mud and tall grass breed mosquitoes (if you are in a mosquito area).
Tap attendants organize people to cut grass (or do it themselves).
Tap attendant organize people to cover holes and make drainage (or do it themselves). Demonstrate how this is done.
If scheme attendant sees tall grass and mud around domestic point he/she should ask tap attendant to do something about it.
It might be necessary to report to village water committee/balozi.

9) Build fences around domestic points:
In villages with a lot of livestock you should encourage tap attendants to organize people to build fences around the domestic points. This will prevent livestock from making surroundings dirty.

10) Encourage people to use the washing slabs:
washing clothes in rivers, streams and dug holes is dangerous to the health. For children to play in such water is also risky. Explain which diseases one might get from this.
Encourage people to use the slabs and encourage tap and scheme attendants and health aducators to talk to people who use the traditional sources for bathing and washing.

11) Soak-away is dirty or clogged:
Explain that dirty water from washing slab can cause diseases to everybody (involve village health educators in this discussion).
Tap attendant should organize people to clean (or do it themselves).
If soak-away is clogged, scheme attendant should be called. It might be necessary to remove all stones and clean up the hole (people should be asked to participate in this).
If the ground-water level is high, then it might be necessary to dig trench to lead the water away.
It may be necessary to report to the village water committee/balozi.

12) Gardens are irrigated with running water from domestic point:
Explain that if people let the water run to their gardens then there will not be water enough in all the domestic points for drinking water, washing and laundry.
No gardens must be irrigated with the help of trenches. If people want to carry water in buckets to their gardens, that will be all right.
Tap/scheme attendants who observe gardens irrigated by trenches should tell the owners to stop.
It may be necessary to report to the village water committee/balozi.

13) Planting on the trench lines:
When people till with jembes around the trench lines they may cut the pipes. Water will stop flowing and the village must pay the repair.
There should be a two metres wide area on top of the pipes where no planting must be done.
Tap/scheme attendants must ask people who plant on top of trench to stop. It may be necessary to report to village water committee/balozi.

14) Pipe leaks - water is coming out of the ground:
Tap attendant should report this to the scheme attendant immediately.
Scheme attendant may ask people to help to dig up the pipe, so that he can repair it.
It may be necessary to report to the VWC/balozi.
If somebody cut the pipe on purpose, he/she should be fined.

15) Pipes are exposed to the sun:
In some places pipes may not be covered with soil.
The reason is that the trench is not deep enough, or that the trench has not been properly backfilled.
Maybe the rain has washed the soil away.
When pipes are exposed to the sun they will loose their strength. After a while they will brake and water will stop coming to the domestic point.
Anybody who sees an exposed pipe should therefore report the case to the scheme attendant or the village water committee.
People should be organized immediately to cover the trench or to dig the trench deeper.
The scheme attendant should decide what to do.

16) Hand pumps:
Points 4, 5, 6, 8, 9, 10 and 11 also apply to hand pumps. Special problems with hand pumps to be discussed with villagers have not yet been completed.

17) When all relevant cases have been discussed then let VWC members and selected tap attendants repeat them, so that they can explain the case to fellow villagers (step 23).

18) When arranging for step 23 make sure that one person from the project will be at each domestic point/well (site assistants, other MAJI personnel, MAENDELEO, AFYA). All project personnel participating in step 23 should of course be familiar with the practical hints above.

19) If there is not project personnel enough for all domestic points/ hand pumps to carry out step 23 in one day, then do step 23 over several days.

Step 22: Establish village by-laws for the use of the scheme

Valid for:

All scheme types.

Purpose:

To make village able to administrate its responsibility with respect to operation and maintenance of the water scheme and sanitation.

Participants:

All village water committee members.
Scheme attendants.
MAENDELEO.

Preparations:

Bring form 22.

Tasks in village:

1) Discuss the use of and need for by-laws.
2) Discuss content of by-laws (example: form 22).
3) Agree on by-laws.

Duration in village:

One day.

Documentation:

Agreed set of by-laws.

Practical hints:

1) Ask village secretary to make copies of the agreed by-laws to be put on the wall in the CCM office, grinding mills, churches.

Step 23: Explain operation and maintenance procedure to users

Valid for:

All scheme types.

Purpose:

To introduce users of each domestic point/well to the tap and scheme attendants, and to operation and maintenance procedures.

Participants:

Users of each domestic point/well.
All scheme and tap attendants.
All village water committee members.
Project personnel (AFYA, MAENDELEO, MAJI).

Preparations:

Project personnel is distributed - one to each domestic point/well.
Village water committee has informed tap attendants, balozis and users to be at domestic point/well at a certain time/date.

Tasks in village:

1) Village water committee member introduces tap and scheme attendants to users.
2) VWC member and tap attendants explain operation and maintenance procedures.
3) Project personnel assist in this if need arises.
4) Arrange meeting for step 24.

Duration in village:

Several days depending on number of domestic points/wells.

Documentation:

None

Practical hints:

1) Project personnel should only assist in step 23 - they should not run the show.
   It is important that it is the VWC members and tap attendants who ex-explain the procedures.

2) Encourage the VWC members and tap attendants to show the different problems explained in step 21 to the users (if it is possible).

Step 24: Hand over scheme to village

Valid for:

All scheme types.

Preconditions:

MAJI has completed construction of the whole scheme.

Participants:

Entire village government.
All VWC members.
All tap attendants.
All scheme attendants.
MAJI.
MAENDELEO.

Preparations:

Bring village handing over document (form 24).

Tasks in village:

1) Reiterate village responsibilities.
2) Reiterate system of operation and maintenance.
3) Read document (form 24).
4) Discuss document.
5) Sign document.

Duration in village:

One day.

Documentation:

Signed agreement.

Practical hints:

1) If villagers or MAJI are not satisfied with the scheme completion, then list of remaining work should be made. No signing should take place before both parties are satisfied. MAENDELEO should support village in all reasonable complaints.

Step 25: Repeat follow-up on operation and maintenance

Valid for:

All scheme types.

Purpose:

Regular inspection for preventive maintenance of all parts of the scheme.
Evaluation of scheme attendants' operation and maintenance of village part of the scheme.
Evaluation of MAJI's maintenance of scheme sections outside the village.

Participants:

Village water committee members.
Scheme attendants.
MAJI.
MAENDELEO.

Tasks in village:

1) To inspect all parts of the scheme.
2) To make sure that the village has necessary tools and spares.
3) To receive operation and maintenance reports from scheme attendants and MAJI.
4) To agree on time and responsibility for necessary repairs.

Duration in village:

Half a day.

Documentation:

Operation and maintenance reports from scheme attendants and MAJI.

Practical hints:

1) If scheme (or tap-)attendants are not carrying out their work properly, steps should be taken to find out why, and to redress this, if necessary by selecting and training replacements.

2) If the village does not have money for posho, tools, and spares - and the down payment has been used up - MAENDELEO must help the VWC and village council to find ways to get and allocate funds for this. Otherwise the scheme will just continue to deteriorate. Under no circumstances must MAJI do repairs for the village without payment.

3) MAJI must keep proper and separate records on the down payment from each village, showing when and for what purpose withdrawals have been made (e.g. when village buys tools and spares, or has to pay MAJI for undertaking repairs which scheme attendants cannot manage themselves).

Form 1 : Preliminary work plan for MAJI, MAENDELEO and AFYA

Usage: For project personnel only.

I. Technical information on project (MAJI):

Village	DPs/pumps	Cattle-troughs	Main line (m)	Distrib. line (m)	Amount of money for washing slabs bathing units latrines	Population

Form 1 : Preliminary work plan for MAJI, MAENDELEO and AFYA

Usage: For project personnel only.

II. Available materials in village for domestic points/wells (MAJI)

Village	village can make bricks		Available within walking distance (yes / no)			MAJI must supply
	yes	no	firewood	sand	stones/boulders	

III. Names of field level staff to be assigned to project

MAENDELEO (Ward/divisional staff).
AFYA (Dispensary/health centre/divisional level staff).

IV. Preliminary time schedule

Activity	Responsible	Month/Year
Step 6 finished[1)]	MAENDELEO	
Step 9 finished[2)]	MAENDELEO	
Final design ready	MAJI	
Material on site	MAJI	
Digging starts	MAENDELEO/MAJI	
Health education starts	AFYA	
Construction finished	MAJI	

1) Agreement with village(s) signed
2) Location of domestic points finished/selection of boreholes finished.

Form 3: Village information sheet

Usage: For project personnel only.

Village: _____

Regn. No.: _____

Ward: _____

Division: _____

Ward secretary: _____

Divisional secretary: _____

Village address: _____

Ward address: _____

Divisional address: _____

Compiled by: _____

Date: _____ 19____

Sketch of village:

Show: Main roads/main populated areas/main settlement for cattle owners/rivers/streams/springs/water holes/school/dispensary/CCM Office/church/mosque/and name location of all sub-villages.

Size and organization of village labour force:

Total population:_____(19_____)

Number of households:_____(19_____)

% hh. in main populated area:_____(19_____)

Village totals	Male	Female	Total
All adults (19)			
All able-bodied (19)			

Sub-village	Full name of balozi	No. of hh.	Able-bodied		
			Male	Female	Total
Totals					

Village administration:

Chairman of:	Full name:	Sub-village:
Village		
Planning & finance		
Production & market		
Defence & security		
Education/culture/ social welfare		
Construction & transport		
U.W.T.		
.		
.		

Village government economy:

Source of income	
Shamba	Poultry
Grinding mill	Pigs
Shop	Truck/bus
Godown	Crop levies
Tractor service	Slaughtering fees
Oxen/plough service	Beer tax
Lumbering	Other ( )
Guest house	Other ( )

Village government employees:

	Posho/month
Shop manager	.....
Shop helper	.....
Grinding mill operator	.....
Office assistants	.....
Tax collector	.....
Watchmen	.....

Population movements:

Have many people moved to this village during the last two years ? D.K._____

No_____

Yes_____ How many ?_____

From where ?_____

Why ? _____

Have many people moved away from this village during the last two years ? D.K._____

No_____

Yes_____How many ?_____

To where ?_____

Why ?_____

Have many people from this village resettled within the village boundaries during the last two years ? D.K._____

No_____

Yes_____ How many ?_____

To where ?_____

Why ?_____

Does village have plans for expansion of plots (location of new houses) ? D.K._____

No_____

Yes_____ How many plots ?_____

Which sub-villages ?_____

To MAENDELEO

Have many villagers moved away from the area populated at present, due to soil fertility, overgrazing, changing climate etc. ? Give your opinion.

Compare your population figures with those of MAJI's. Discuss with MAJI if you think that many people are moving away from the village. Consider not to propose new water scheme.

Potential conflict over water use:

Irrigation:

How many households irrigate their fields or gardens ? D.K._____

Number:_____

In total, how many acres are irrigated during the dry season ? D.K._____

Acres:_____

Which crops are mainly irrigated ? D.K.:_____

Crops:_____

Where is the irrigation water taken from (name river(s) ? _____

To MAENDELEO:

Is the proposed intake at the same river as listed above ? N.A._____ Yes_____ No._____

Is proposed intake above or below irrigated fields/gardens ? N.A._____ Yes_____ No._____

Do you think that irrigators will complain when some of the water from the river is used for the water scheme ? N.A._____ Yes_____ No._____

If you think that there is a potential conflict over intake water use then discuss the problem with MAJI. Consider relocation of intake.

Livestock:

Number of cattle:_____

Goats:_____

Sheep: _____

Pigs:_____

In which river(s) is livestock normally watered ?

N.A._____

Dry season ?_____

Wet season ?_____

To MAENDELEO:

Is livestock watering done above the proposed intake ?

N.A._____

No_____

Yes _____

If you think that there is a potential conflict over water use then discuss the problem with MAJI. Consider relocation of intake or consider to provide cattle troughs.

Village acceptance of proposed water source:

	Village-chairman	Head-teacher	Others
Is taste of water from source acceptable ?			
Is smell of water from source acceptable ?			
Is appearance of water from source acceptable ?			
Has source ever run dry ?			
When ?			
Is there a better source around this village (which ?)			

If any villager you speak to express reservations about the proposed source, then discuss this with MAJI. Consider alternative sources.

Available material within village:

How many houses in village are built with bricks (approximate number) ? _____

Discuss the following with village leaders:

Do villagers know how to make bricks ? No_____

Yes_____

Can good soil for bricks be found within village ? No_____

Yes_____

Is firewood available for brickmaking within walking distance ? No_____

Yes_____

Is sand available within walking distance ? No_____

Yes_____

Where ? _____

Are stones/boulders available within walking distance ? No_____

Yes_____

Where ?_____

Comments:

(write down any other observations of relevance to the proposed water project).

Form 4: Proposed agreement on new water supply

For .....village

(Usage: Distributed to village with the appropriate parts filled in and the rest cut out).

This agreement is entered between .....village
and Idara ya Maji .....District/Region.

The proposed water supply:

All types: The water will come from wells/a borehole/.....
River. It will be possible to supply the following sub-villages with water: . .....

.....

.....

The following (parts of) sub-villages cannot be supplied with water for technical/economic reasons: .....

.....

Gravity scheme and wells: No engines or pumps or diesel is needed to supply your village with better water.

Pumped supply: An engine and pump will be installed at the borehole. The diesel needed must be supplied and paid by the village. The government will not provide you with free diesel.

Piped supply: Your village can get .....domestic points, and .....cattle troughs. Later you must decide where to locate these.
No private connections will be allowed.

Wells: .....test drillings were successful and can give enough water. The government will provide pumps and materials to build .....wells. Later you must decide where to build these wells.

CONSTRUCTION:

Piped supply: .....Village must volunteer to do most of the work necessary to build the scheme. This work is:-

- To cut grass and bushes on .....miles of trench line
- To dig .....miles of trench line. Most of them must be 3 feet deep.
- To lay all pipes assisted by MAJI and to backfill all trenches
- To build all domestic points, washing slabs and soak-aways assisted by MAJI
- To make and carry bricks (approximately .....) for all domestic points and washing slabs
- To find and carry the necessary sand/stones/boulders to each domestic point to be built.

Nobody will be paid to do this work. If the village fails to do it, the scheme will not be built.

MAENDELEO will assist you to organize all this work.

MAJI will assist you in building the intake/borehole; all tanks; laying pipes; and building domestic points and soak-aways (and cattle troughs). MAJI will also supply all pipes, fittings, cement, etc.

The cutting of grass and bushes is expected to start around .....
All bricks must be ready by .....
Digging is expected to start around ..... If all goes well you can draw tap water around .....

Wells: .....Village must volunteer to do most of the work necessary to build the wells. This work is:-

- To clear grass and bushes around all holes
- To provide labour for drilling
- To build all wells, washing slabs and soak-aways assisted by MAJI
- To make and carry bricks (approximately.....) for all wells
- To find and carry the necessary sand/stones/boulders/to each well to be built.

Nobody will be paid to do this work. If you fail to do it the wells will not be built.

MAENDELEO will assist you to organize this work.

MAJI will drill holes assisted by you.
MAJI will also assist you to build the wells, washing slabs and soak-aways.

All bricks should be ready by .....
The cutting of grass and bushes will start around .....
If all goes well, the wells will be ready around .....

Operation and maintenance:

Pumped supply: All cost of running the engine (oil, diesel) must be paid by .....village.

Piped supply (gravity or pumped): The water scheme will sometimes break down. MAJI will repair the intake/borehole/pump/engine, the main line and all tanks. And they will do this without cost to the village.

.....village must do all repairs on the small pipes (from the tank to the taps), the domestic points (and the cattle troughs).

MAJI will train two villagers (scheme attendants) to do such repairs. But the village must pay them a posho to do it, and must pay the necessary spare parts. The cost of all this is approximately Shs .....every year for the next 15 - 20 years.

If your village fails to pay the scheme attendants or the spare parts, the scheme will slowly stop working. The women must then again draw water from the same places as they do now.

Wells: The pumps and wells will sometimes break down. MAJI will repair the well without cost to the village.

If the hand pump brakes down or the washing slab or soak-away needs repair, ...village must fix it. MAJI will train two villagers (scheme attendants) to do this. But the village must pay them a posho to do it, and it must pay the necessary spare parts. The cost of all this is approximately Shs .....every year for the next 15 - 20 years.

If your village fails to pay the scheme attendants or the spare parts, the pumps will slowly stop working. The women must then again draw water from the same places as they do today.

Down payment:

All types: Before the government is willing to assist you to build a new water supply .....village must pay Shs. .....to MAJI. This money should be paid to the .....District/Regional water engineer, ...Region not later than one month after the signing of this agreement. Without this down payment this agreement is null and void.

When the construction is finished MAJI will supply ..... village with tools and spare parts worth the amount of money that was paid down.

Cancellation. Provided that the above conditions are met by both parties , this agreement is valid for ten years from the date of signing. After this date it can be cancelled by either ..... village or MAJI, ... District/Region.

Date .....

Signed Village chairman _____

MAJI .....District/Region_____

Form 7A : Village water committee - membership and terms of reference

(Usage:

To be given to each committee member)

Membership:

The committee consists of:-

- The village chairman
- The chairman of the committee for education, culture and social welfare
- One member from the construction committee
- Three women elected by the village assembly.

The committee elects its own chairman. Tenure of the appointed committee members follows their tenure on the village council. Tenure of the elected female members expires at the date of elections for the village council, at which date the village assembly elects or re-elects female members.

Terms of reference:

1) To define and represent village interest vis-a-vis government agencies on the issues below.
2) To inform fellow villagers on all aspects of the planning, construction, operation and maintenance of the water scheme and on latrine improvements and health education efforts.
3) To locate all domestic points/hand pumps/cattle troughs.
4) To organize and supervise self-help labour for construction, operation and maintenance.
5) To manage village responsibilities for operation and maintenance of the water scheme.
6) To supervise and support improvements in sanitary conditions and health education efforts.
7) To establish by-laws for the use of the water scheme and protection of environmental hygiene.

Form 7B : Project committee. Membership and terms of reference

(Usage:

To be given to each village water committee member on the group scheme).

Membership:

The committee consists of:-

- The chairman of each village water committee in the scheme.

The project committee selects its own chairman. Tenure on the project committee follows tenure on the village water committees.

Terms of reference:

1) To represent the interests of the villages as a group vis-a-vis government agencies.
2) To inform respective villages on all general aspects of the group scheme, latrine improvements and health education efforts.
3) To represent the villages in the group at regular meetings on operation and maintenance.

Form 10: Agreement with scheme attendant

(Usage:

This is a draft proposal that each village water committee may use as the basis for an agreement with the scheme attendants. Each village water committee member should have a copy during the discussion).

1. This agreement is between ....., as scheme attendant and .....village.

2. The scheme attendants will be employed by .....village starting from .....(date).

Duties during construction

3. To report to MAJI two full working days each week (..... and.....) for training and construction work.

4. Scheme attendant must under no circumstances be employed by MAJI during construction or after.

Duties when the scheme is completed (operation and maintenance)

5. a) To make every effort to keep the scheme working.
   b) To inspect the following parts of the scheme every ..... day:-
      - Intake/gate valves/air valves/tanks/break pressure tank/ main lines/distribution lines/domestic points/washing slabs/ drainage trenches/soak-aways/hand pumps.
   c) To report to MAJI and the village water committee any major problems and defects on these installations that cannot be repaired by the scheme attendant.
   d) To repair any defects that occur from the tank to the tap as soon as they occur.
   e) To advise the tap attendants on the proper upkeep of the surroundings of the domestic points/hand pumps.
   f) To take care of and protect all tools and spares that the village may decide to hand over to the scheme attendants.
   g) To advise the village water committee on the need for spare parts.

h) To assist the village water committee in purchase of spare parts and tools.

i) To participate in all meetings of the village water committee.

j) To carry out all other work on the scheme that the village water committees might decide.

6) The village council will each month compensate the scheme attendant as follows: .....

.....

.....

.....

This compensation will be paid starting from ..... (date), and then each month thereafter.

7) The village can cancel this agreement with one month's notice. The scheme attendant can cancel this agreement with one month's notice.

Signed:

Date:

Scheme attendant:

Village chairman:

Form 14: Able-bodied people under each balozi

(Usage:

Two copies to be given to each balozi to fill in).

Balozi_____ Sub-village_____

Name of family	Able-bodied persons		Not able to work		
	Males	Females	Males	Females	Reasons for not being able

Number of people

Date_____

Balozi (signature)_____

Village chairman (signature)_____

Form 20: Duties of tap attendants

(Usage:

Hand-out to each tap attendant)

1) To ensure that the surroundings of the domestic point/well are kept clean and free of excess water.
2) To cut grass around domestic point/well.
3) To ensure that drainage around the domestic points/wells works and is kept clean.
4) To ensure that users of the domestic point/well:-
   - Open and close the tap gently
   - Operate the pump gently
   - Do not bath on apron
   - Only wash clothes on washing slab
   - Do not water cattle at domestic point/well
   - Do not play around domestic point/well.
5) To report any breakages and vandalism on domestic point/hand pump to scheme attendants or village water committee or balozi.

Form 22: Draft by-laws for the use of the water scheme

(Usage:

This is a proposal, which is to be handed out to VWC for discussion. Each village must decide on its own by-laws).

The by-laws could contain the following:

1) All domestic points/wells/pipes/slabs/cattle troughs are under the protection of all villagers. The village water committee assures that the scheme is properly operated and maintained.
2) Villagers who through vandalism break taps/pumps/slabs/aprons/ pipes will be fined shs. .....(or other measure)
3) Villagers who water cattle above the intake will be fined shs..... (or other measure)
4) Villagers who divert water from the intake will be fined shs. ..... (or other measure)
5) No bathing, washing or cattle watering is allowed directly around the domestic point/pump.
6) Every villager that observes a breakage or a misuse of the scheme should report this to the scheme attendant/village water committee.
7) No private connections are allowed.
8) Tap and scheme attendants can ask users to help to clean surroundings, dig trenches, backfill trenches, etc.
9) No one must cultivate on top of the trench lines. A 2 metre wide area should be left untouched on all lines.
10) No one must irrigate gardens by making trenches from the domestic point to the garden.
11) Village health educators should encourage every family to have a latrine. The village water committee should ensure that all families have a latrine.

Form 24: Agreement on completion of schemes between .....
village and MAJI .....District/Region

(Usage:

To be adapted to particular village and signed by MAJI and village.)

Construction of the following has been completed.

.....domestic points/hand pumps are working

.....washing slabs have been completed

..... soak-aways have been completed

..... box chambers - one for each domestic point have been completed

..... tanks have been completed

..... cattle troughs have been completed

..... metre of main line has been completed and properly backfilled

..... metres of distribution line have been completed and properly backfilled.

Members of the village government and the village water committee have inspected all these constructions. They are satisfied that everything has been properly completed. They are also satisfied that pipes are not leaking.

As owners of the scheme .....village therefore accepts responsibility for operation and maintenance as agreed in the agreement signed with MAJI .....district/region on.....
date.

.....village will take over the scheme from.....(date)

Date .....

Signed village chairman _____ MAJI_____

Appendix II : Handbook for implementation of village health education projects in combination with rural water schemes

Step 1: Preparatory visit to the village

Valid for:

All types of schemes and villages (which is also the case for all subsequent steps).

Preconditions:

A water scheme is under construction in the village or its existing scheme is being rehabilitated. AFYA should have been present during the initial introduction of the water project. It is assumed that the water scheme will be completed within the next three months or that a rehabilitation programme is just about to start.

Purpose:

To explain in detail about the health education project for the village government and other village leaders.

Participants:

AFYA (district health officer, health assistant, rural medical aid, midwife and other workers at the dispensary - if any).
Village health workers (if any).
MAJI.
Village government and village leaders.
Village water committee members.
Head teacher.

Preparations:

Analysis of existing village data including those collected by the water project.
Informing on and discussing the health education component with MAJI and MAENDELEO.
Examining health data from village or area (available at district level).

Tasks in the village:

1) Be (re-) introduced to village leaders.
2) Explain in detail about the project (purpose, target groups, approach and time schedule).
3) Arrange date for actual start of the project.

Duration in village:

2 - 3 hours.

Documentation:

A file is opened on the project in the village. Minutes of this first meeting should be kept in the file.

Practical hints:

While presenting the project you should be careful explaining why the project addresses itself mainly to women. Tell them that water and health traditionally have been the responsibility of women. Explain that the project consists of two parts: the first part addresses itself primarily to women and children and the second part to each individual household in the village. Before the project is started it is important that the village government is in agreement with the approach to be used.

Step 2: Planning the health education project in the village

Preconditions:

Meeting date has been arranged during previous visit.

Purpose:

To plan the implementation of the health education project with village leaders.

Participants:

AYFA.
Village water committee members.
All ten-cell leaders.
Village secretary and head teacher.

Preparations:

Make sure that you have a good idea about how the project can be organized.

Tasks in the village:

1) Plan the overall framework for the project with the village leaders.
2) Obtain list of all ten-cell leaders.
3) Inform ten-cell leaders about their expected roles during the project.
4) Plan visits to each ten-cell leader for the following days (step 3).
5) Inform the headmaster of the expected role of the primary school during the project.

Duration in the village:

One day.

Documentation:

Minutes to be kept in village file.

Practical hints:

1) During this meeting the overall framework of the project should be agreed upon with village leaders.
2) The ten-cell leaders should be informed that the success of the project very much depends on their support. They will have to inform the project participants about meeting place and time.

3) You can also explain to the ten-cell leaders that you will need to visit their cells over the next few days. Make individual arrangements with each balozi.

4) The headmaster should be told that the project expects the school to emphasize health issues during the project period. He will receive the curriculum later.

Step 3: Visit each ten-cell leader

Preconditions:

Time for visits should have been arranged with each ten-cell leader.

Purpose:

To divide the village into manageable units in order that everyone from the target group will have the approximate same distance to the discussion groups and that you may know how many groups should be established to cover the village. Finally, the visits should give you a good understanding of the village.

Participants:

AFYA.
All ten-cell leaders.

Preparations:

Bring form 3.
(All forms are found at the end of the handbook, numbered according to the step they belong to).

Tasks in the village:

1) Obtain population data from each ten-cell leader - use form 3.
2) Combine small cells - distancewise and populationwise - in order that manageable discussion groups can be formed.
3) Familiarize yourself with the village.
4) Observe particular health hazards in the village.
5) Request each ten-cell leader to inform all women to meet at the village meeting-place on a pre-arranged date.

Duration in village:

Two to four days depending on the layout of the village.

Documentation:

None.

Practical hints:

1) On completion of this step you will have a fairly good understanding of the village. This will help you to decide on how large an area each discussion group should cater for. Sometimes 4 ten-cells may have to be combined to form one discussion group.

2) At the same time you will know how many village health educators are needed.

3) Each ten-cell leader should be told to call all women together for step 4 on the day after you expect to finish step 3.

Step 4: Meeting with all women in the village

Preconditions:

Everyone should have been called by their respective ten-cell leader.

Purpose:

To discuss the project with the women and to select health educators from among them.

Participants:

AFYA.
Village water committee.
All women in the village.

Preparations:

Based on the survey performed under step 3 you should by now have divided the village into manageable units in such a way that each unit contains approximately 50 women. This can be done by combining two or more adjacent ten-cells.
Bring form 4.

Tasks in the village:

1) Explain in details about the project, its aims and how it is planned to be carried out.
2) Elicit suggestions from the women on possible revisions of the proposed plan.
3) Election of village health educators - two for each group (form 4).
4) Plan training schedule with elected village health educators and arrange date and time of first training session.

Duration:

Approximately 3 hours.

Documentation:

Form 4, one copy in village file.

Practical hints:

1) Let the chairman of the village water committee introduce the project and the AFYA people to the women.

2) Explain to the women for how long the project may last, how much time is involved for the village health educators and what will be expected of them.

3) Two women should be elected for each discussion group - one of them should be literate.

4) When the election is completed you should ask the chosen ones to stay back for the planning of the training activities. The other women should be told that they will receive information from their respective ten-cell leaders on when and where discussion groups will start.

5) During the whole meeting you should encourage the participants to ask questions.

Step 5: Meeting with health prompters

Preconditions:

You should have called this meeting at least one day ahead. The village water committee should by this time have selected scheme - and tap attendants.

Purpose:

To urge the participants to use every opportunity to prompt the desirable hygienic and sanitary behaviour by informing them about the content of the health education project.

Participants:

AFYA.
MAJI field personnel.
VWC.
Ten-cell leaders.
Village government members.
Primary school teachers.
Adult education teachers.
Tap and scheme attendant(s).
Other interested villagers.

Preparations:

Bring health education curriculum (see step 6).

Tasks in village:

1) To explain the health education project.
2) To go through each topic of the health education curriculum used for training of the village health educators.

Duration:

Approximately 3 hours.

Documentation:

None.

Practical hints:

1) The participants should be told that they are expected to support the whole health education project.

2) For it to be a success they are expected to remind ("prompt") the villagers to follow the principles for proper hygiene and sanitation, whenever they see these principles broken.

3) If this meeting has been arranged during the morning hours you could have arranged the first training session for village health educators in the afternoon of the same day (see step 6).

Step 6: Training of village health educators' first session: water use at home

Preconditions:

Time for this first training session should have been arranged at previous meeting when village health educators were elected.

Purpose:

Train village health educators in order that they will be able to conduct discussions for the women of their neighbourhood on the subject "water use at home".

Participants:

AFYA.
All village health educators.

Preparation:

Bring form 4 to keep an attendance list.
Bring available posters, pamphlets and the health education curriculum - form 6. If the village has got any specific water related health problems you should by now have included this in the curriculum (see also step 3).

Tasks in the village:

1) Check attendance of village health educators (form 4).
2) Discuss the problems raised under the subject for this step: water use at home.
3) Select a number of village health educators to present today's subject at the following meeting.
4) Brief introduction of next day's topic: water use at tap.
5) Arrange for new meeting.

Duration:

Approximately 2 hours.

Documentation:

None.

Practical hints:

1) Use the health education curriculum - form 6.

2) When you arrange this meeting you should be careful not to lecture. The idea is to train the participants in discussion techniques. Therefore you should raise questions and encourage questions from them. Instead of you answering the questions, the participants should answer them. Once a problem has been identified, the participants should try to find a practical solution to the problem. For example:
Problem: Children have often diarrhoea.
Question: Why ?
Answer: Maybe water in storage vessel is dirty.
Question: What can we do about that ?
Answer: Clean the vessel daily and cover it.

3) Before you start discussions on the subject for this step you should select a number of village health educators to present the subject at the following meeting (step 8). In this way the women will gain experience in speaking in public.

Step 7: Meeting with all primary school teachers

Preconditions:

The head teacher has been informed about the project during the preparatory meeting (step 1) and the other teachers took part in the meeting for health prompters (step 5).

Purpose:

To ensure that the teachers pay special attention to the subjects of the health education project as long as the project lasts.

Participants:

AFYA.
All teachers from the village primary school.

Preparations:

The meeting should have been called at least two days before.

Tasks in the school:

1) Discuss how the subjects of the health education project can be integrated with the school lessons during the project period.
2) Distribute the curriculum - form 6 - to all relevant teachers.

Duration:

2 hours.

Documentation:

None.

Practical hints:

Since the teachers are professionals it must be assumed that they know how to impart the subjects to the children.

Step 8: Training of village health educacors, second session: water use at the tap

Purpose:

Train village health educators in order that they will be able to conduct discussions for the women of their neighbourhood on the subject "water use at the tap".

Participants:

AFYA.

All village health educators.

Preparations:

Bring forms 4 and 6.

Tasks in the village:

1) Check attendance (form 4).
2) Presentation of yesterday's subject by selected village health educators.
3) Discuss the problems raised under the subject: water use at tap.
4) Select a number of village health educators who should present today's subject at the following training session.
5) Brief introduction of the following day's topic: water use at traditional source.
6) Arrange for new meeting.

Duration:

Approximately 2 hours.

Documentation:

None.

Practical hints:

1) Follow the same advice as given for step 6.
2) Remember to select some village health educators, who should present the subject by the start of the next training session. When the training is completed all village health educators should have been given an opportunity to present a subject and lead discussions on that subject. In this way the women will gain experience necessary in the discussion groups they shall lead later and at the same time you will be able to evaluate their comprehension of the programme.

Step 9: Training of village health educators, third session: water use at traditional source

Purpose:

Training of village health educators in order that they will be able to conduct discussions for the women of their neighbourhood on the subject "water use at traditional source".

Participants:

AFYA.

All village health educators.

Preparations:

Bring forms 4 and 6.

Tasks in the village:

1) Check attendance (form 4).
2) Presentation of yesterday's subject by some village health educators.
3) Discuss the problems raised under the subject: water use at traditional source.
4) Selection of a number of village health educators who should present today's subject at the following training session.
5) Brief introduction of the following day's topic: sanitation and personal hygiene.
6) Arrange new meeting.

Duration:

Approximately 2 hours.

Documentation:

None.

Practical hints:

Follow the same hints which have been given for step 6 and 8.

Step 10: Training of village health educators, fourth session: sanitation and personal hygiene

Purpose:

Training of village health educators in order that they will be able to conduct discussions for the women of their neighbourhood on the subject: sanitation and personal hygiene.

Participants:

AFYA.
All village health educators.

Preparations:

Bring forms 4 and 6.

Tasks in the village:

1) Check attendance (form 4).
2) Presentation of yesterday's subject by some village health educators.
3) Discuss the problems raised under the subject: sanitation and personal hygiene.
4) Selection of a number of village health educators who should present today's subject at the following session.
5) Brief introduction of the following day's topic: a water related health problem of specific relevance for this particular village.
6) Arrange next meetings.

Duration:

Approximately 2 hours.

Documentation:

None.

Practical hints:

1) Follow the same hints which were given for steps 6 and 8.
2) If your examination of the health data from the area (village) (see step 1: preparations) combined with your visit to the different areas of the village (step 3) have revealed any particular health problems related to water sanitation and personal hygiene this could constitute the topic for the fifth training session (step 11). In the training curriculum we have given an example of a topic which is relevant for a cattle area: cattle keeping.

3) If there is no relevant topic for a fifth session you should divide the subjects which have been part of the training programme among all village health educators in such a way that everyone will present a topic at the follow meeting, i.e. at this meeting you go from task no. 4 of step 10 to task no. 5 of step 11. The following meeting will be step 12.

Step 11: Training of village health educators, fifth session: a health problem related to water, sanitation and hygiene, specific for the village

Preconditions:

That a specific health problem has been observed in the village besides those covered by the first four subjects in the curriculum.
Otherwise proceed to step 12.

Purpose:

Training of village health educators in order that they will be able to conduct discussions for the women of their neighbourhood on a health subject related to water, sanitation and hygiene with specific relevance for the village.

Participants:

AFYA.
All village health educators.

Preparations:

You should have examined health data available at district level (step 1).
You should have visited all parts of the village (step 3).

Tasks in the village:

1) Check attendance (form 4).
2) Presentation of yesterday's subject by some village health educators.
3) Discuss the problems raised under the subject for this training session.
4) Selection of a number of village health educators who should present today's subject on the following training session.
5) Divide all the subjects in the training curriculum among the village health educators in such a way that the training sessions will be repeated and everyone will get a chance to present a topic.
6) Arrange next meeting.

Duration:

2 hours.

Documentation:

None.

Practical hints:

1) The subject for this session could be one or more of many possible ones: it may be that bilharzia is a problem, it could be that cattle are the cause of health problems or it may be that the customs and beliefs of the village constitute a particular obstacle to the health of the villagers.

2) At the end of this session everybody should be given lessons for the following session (step 12) in order to make sure that all subjects in the curriculum have been grasped fully.

Step 12: Summary of training programme

Purpose:

To repeat the five (four) lessons of the training sessions to make sure that all topics have been covered and that everyone gets a chance to present a part of the curriculum.

Participants:

AFYA.
All village health educators.

Preparations:

None.

Tasks in the village:

1) Check attendance (form 4).
2) Allow every village health educator to present and lead a discussion on the topic she was given to prepare.
3) Distribute form 12: registry of women in discussion groups.
4) Ask each pair of village health educators to get all names of the women who will be part of their discussion group (form 12) and tell them to bring the filled forms for next meeting.
5) Arrange next meeting.

Duration:

3 hours.

Documentation:

None.

Practical hints:

1) This is the last training session and by now all the village health educators should have practised leading a discussion. Everyone should have been trained in asking questions and talking in public. Tell them that they can arrange the discussion groups in the same way as the training sessions were made: One new topic each day, while you repeat the one from yesterday and give a brief introduction of the following meeting's topic. Emphasize that before closing a discussion they should have sought practical ways of solving the problems raised. Remember that the water project may be able to help with certain kinds of materials and practical advice.
2) Each pair of village health educators should ge given 2 pieces of carbon paper, since form 12 should be filled in with two copies.

Step 13: Planning of discussion groups

Purpose:

To plan the discussion groups in such a way that each village health educator is fully aware of her duties.

Participants:

AFYA.

VWC.

All village health educators.

Village secretary.

Preparations:

All the village health educators should have filled in form 12. You must have prepared a list of key words based on the training session.

Tasks in the village:

1) Each pair of village health educators returns a copy of form 12.
2) Meeting days and times are agreed for each discussion group.
3) Village government (secretary) is asked to exempt the participating women from communal work (2 hours daily, three times a week).
4) Get VWC members and secretary to inform the respective ten-cell leaders about meeting times so that they may inform the women participants.
5) Distribute list of key words - form 13 - to all village health educators.

Duration:

Approximately 4 hours.

Documentation:

Minutes should be kept in file. One copy of form 12 for each group for file. One copy for AFYA and the original for the village health educators.

Practical hints:

1) When the meeting days and times are arranged you should be careful to prepare them in such a way that all discussion groups can be visited by you during each meeting.

Below is a proposed schedule for discussion meetings - but feel free to make your own.
Based on experiences during the pilot project the following time-table for group discussions is suggested if there are 10 groups supported by two AFYA people:

Group	Days of meeting	Time of meeting
1	Monday, Wednesday and Friday	8 - 10 a.m.
2	"	9 - 11 a.m.
3	"	10 - 12 (10 a.m. 12 noon)
4	"	2 - 4 p.m.
5	"	3 - 5 p.m.
6	Tuesday, Thursday and Saturday	8 - 10 a.m.
7	"	9 - 11 a.m.
8	"	10 a.m. - 12 noon
9	"	2 - 4 p.m.
10	"	3 - 5 p.m.

Following this timetable two AFYA people will be able to support the village health educators of 10 groups.

2) In form 13 is shown a list of proposed key words. The idea is that the key words should help the village health educators to conduct the discussions efficiently. Feel free to add or change .....

3) Try to get the secretary or VWC members to inform the respective ten-cell leaders about the meeting times for the discussion groups in order that they can inform the women accordingly.

4) When you ask the village government for permission for the women to be relieved from communal activities you should remember that each group will probably meet four or five times only, that is four or five days 1½ - 2 hours daily.

5) Remind the village health educators to keep attendance records (form 12) at each discussion meeting.

Step 14 - step 18: Village health educators conduct discussions in groups for all women in the village

Purpose:

To ensure that all village health educators lead discussions in women's groups according to the training they have received.

Participants:

AFYA.
All village health educators on their respective meeting times.
All women in village on their respective meeting times.

Preparations:

All village health educators have been given a list or key words.
The balozis have been informed by the VWC/secretary to call all women for the discussions.

Tasks in the village:

1) Supervise all health education discussion groups.
2) Ensure that the village health educator keeps attendance record (form 12).
3) Support the discussions when necessary.

Duration:

The whole day for approx. 10 days.

Documentation:

None.

Practical hints:

You should by now have arranged the groups in such a way that you will be able to supervise all of them for at least some period each time they meet.

Step 19: Planning practical projects proposed by the health education discussion groups

Preconditions:

That some proposals have been put forward. Otherwise proceed to step 20.

Purpose:

To plan implementation of proposals for solving health problems which have been made by the women in the discussion groups.

Participants:

AFYA.
All village health educators.
Village secretary.
MAJI.
VWC.

Preparations:

Collect such proposals from the village health educators and discuss them with the involved parties (such as MAJI).

Tasks in the village:

1) Review project proposals from village health educators.
2) Consider the feasibility of proposals.
3) Plan the implementation of the projects.
4) Select site(s) for projects.
5) Divide responsibility for project implementation between village and water project (MAJI).
6) Arrange date for inspection of projects by AFYA and VWC (allow at least one month).
7) Arrange for a new meeting with VHEs.

Duration:

Approximately 3 - 4 hours.

Documentation:

Minutes of meeting should be kept in village file, one copy with AFYA and one with MAJI.

Practical hints:

1) At this meeting the VHE educators should present the outcome of the discussion in the women groups. The proposals may concern construction of washing slabs, pit latrines at public places, refuse pits at the market, public bathing facilities, protection of traditional sources, facilities for watering cattle etc.

2) The meeting should agree on the responsibilities for the project(s). Maybe the village provides all labour and all locally available materials and the water project may provide cement and advice. The meeting may agree that the village should pay for all costs involved or they may decide to apply to the district or to the water project for coverage of these.

3) The plan should also involve a time schedule for its implementation. Ensure that the VWC arranges all practical matters left to the responsibility of the village. From the minutes it should also appear when inspection of the works should be carried out by AFYA.

4) MAJI will be in charge of the day-to-day supervision of the project(s) and assist whenever possible.

Step 20: Evaluation of the health education discussion groups

Purpose:

To evaluate the work made by the village health educators in the groups in view of revising the project.

Participants:

AFYA.
All village health educators.
Village water committee.

Preparations:

You should have collected and analysed the attendance lists, form 12, from the discussion groups.

Tasks in the village:

1) Ask each village health educator to mention one thing which was not so good in the project.
2) Ask each village health educator how she thinks that the project can be improved.
3) Prepare revisions of project together.

Duration:

Approximately 4 hours.

Documentation:

Copy of minutes to village file, and AFYA.

Practical hints:

It is very important to allow everyone to share her experiences with the group. This sharing may lead to fruitful suggestions, which may improve the health education project and lead to changes in the handbook and the curriculum.

Step 21: Inspection of health/sanitation projects

Preconditions:

That some projects were started, otherwise skip this step.

Purpose:

To inspect the works carried out or under construction as a result of the health education project.

Participants:

AFYA.
VWC.
MAJI.
Village secretary.

Preparations:

You have been informed by MAJI about the progress.

Tasks in the village:

1) Inspection of the completed works/the works in progress.
2) Evaluate whether the works constructed are being used optimally.
3) If necessary, instruct VWC in the proper use of the facilities.

Duration:

Approximately 3 hours.

Documentation:

None.

Practical hints:

This visit is made to ensure yourself that the works agreed upon during step 19 actually have been completed satisfactorily or are in progress under the supervision of MAJI. If necessary you can instruct the VWC in the proper use of the completed works.

Step 22: Visit each household in the village

Purpose:

To follow up on the decisions made in the discussion groups to ensure that they will have an impact at household level.

Participants:

AFYA.
Two members of the village water committee.
(If enough AFYA personnel is available more than one team could be formed).

Preparations:

Through the respective ten-cell leaders you should have notified the household of your visit at least one day before. Use the check list shown in form 22.

Tasks in the village:

1) Introduce yourself to the members of the households.
2) Observe the house and its environment by using the check list.
3) Give relevant suggestions on how to aleviate observed health hazards.

Duration:

1 hour with each family.

Documentation:

The names of households who do not meet the legal requirements for proper sanitary facilities should be kept in the village office. The check list with data from each household should be filed in the dispensary or with the health assistant.

Practical hints:

1) If you visit five households daily it will last you approximately two months to complete visits in an average village of 250 families.
2) When you visit a household you should try not to appear as police officers. Remember that the main purpose is to follow up on the health discussions given to women. It is therefore important that the husband is present, since he most likely is the one who decides e.g. on the

purchase of extra containers and the like for safe storage of water. Only when it is obvious that the household is a health risk for its members and neighbours,for instance by not having a pit latrine, you may act as law enforcement officers and report the head of the household to the village officer.

3) When using the check list you should start by noting the general condition of the buildings. Give a brief description of what you observe. If the conditions are such that they may cause a health risk you should ask the inhabitants to take action in order to aleviate this risk. If any revisits should be made you can note this under "any other comment". In this way you proceed through the list.

4) If the household has to be reported to the village authorities for negligence you should state the reason and the date the report was made.

Form 3: Village population data

Name of balozi	No. of households in 10 cell	No. of people	No. of women in 10 cell	Other characteristics

Form 4: Village health educators' attendance record

Name of village health educator	Balozi	Age of health educator	Literate Yes / no	Attendance (tick) at meetings							
				1st	2nd	3rd	4th	5th	6th	7th	8th

Form 6 : Health education curriculum

The health education curriculum is divided into five lessons - four of which are intended to be standard lessons in all villages. The fifth lesson is optimal and the topic will depend on the particular health situation of the village.

For practical reasons each lesson has been arranged on pages divided into three columns. In the left column is stated "The specific behaviour to be achieved" as a result of the health education project. In the middle column the "Training content" is shown. This column makes up the nucleus of the training of the village health educators. The last column gives some examples of "obstacles" towards achieving the desired health behaviour.

Lesson 1 : Water use at home

Specific behaviour to be achieved	Training content	Obstacles
(a) Water consumption per day should be at least one debe per person.	(a) Every household should have sufficient water utensils to avoid the usage of dirty water which have already been used but have been stored in order to be used again. Water related disease, like cholera, dysentry, diarrhoea, and typhoid can easily be spread as a result.	Many households do not have enough containers and other utensils. Discuss: Problems of purchasing these - costs and availability.
(b) Drinking water should be kept covered at all times.	(b) Have sufficient water containers and covers with handles and use them in order that dust, flies, faeces of animals, birds, vectors, putrified matter cannot find their way to contaminate the water.	Soap: Presently, soap is often not available in the rural areas. Discuss: Alternative means such as ashes and locally produced "soap".
(c) Water for washing hands should be kept ready near storage container for drinking water.	(c) If available soap should be used for washing hands. This should be done before scooping water from storage container for drinking water in order not to contaminate the water with dirty hands which can have infectious bacteria like typhoid which can spread easily if they found their way into the water. Soap has got a bactericidal agent and if used will kill the bacteria found on hands.	Boiling: Is very resource demanding. It takes a lot of time and needs a lot of firewood. Discuss: Alternative means, such as leaving the water to "rest" for a day or two before drinking it or using a simple sand filter: two jars on top of each other, the top one having holes and sand at the bottom.
(d) Cup for scooping drinking water should be clean at all times and have a handle.	(d) This will help the drinking water not to be contaminated with the cup if touched with dirty hands. The cup should be washed regularly.	
(e) Storage container for drinking water should be cleaned daily.	(e) Boil enough drinking water which can last for a day and be sufficient for the family. Make sure the storage container for drinking water is cleaned with boiled water before filling it with fresh boiled water. The risk of contaminating drinking water by utensils, cups, hands, water containers will be minimal because clean water will be filled daily.	

Lesson 2 : Water use at the tap

Specific behaviour to be achieved	Training content	Obstacles
(a) Water container and hands should be cleaned before filling water into container.	(a) Hands and containers should be washed (if possible with soap) before filling the container with water so that bacteria from hands and water containers can be washed away and the bacteria be killed.	Many villagers prefer to use the area around the taps for various purposes: laundry, bathing and watering of domestic animals.
(b) Laundry, bathing and cattle watering should not take place right at the tap.	(b) Due to dirty water resultig from laundry, bathing and cattle watering, it is not advisable that these activities take place right at the tap.	This preference is due to the distance most people have to walk if the same activities should be carried out at home.
(c) If laundry, bathing and cattle watering most conveniently take place near the tap, separate facilities should be established with their own drainage.	(c) Washing slabs, sheltered bathing facilities and cattle troughs with their own drainage would help keep the areas around tap clean and sanitary.	Discuss: Problems of constructing laundry and bathing facilities (costs, availability of materials, organizing village self-help etc.).
(d) Drainage trench and soak-away should be established.	(d) Construct drainage trenches and soak-away pits so that standing water can be drained away. This will prevent bad smell to be emitted due to putrifying materials, and mosquitoes will not be able to breed. If there is a pipe leakage or back siphonage dirty water can't contaminate pipe water.	Cattle troughs: Should domestic animals be watered in the village or outside :
(e) No unnecessary use of water should take place at the tap. If need be, a metal cup should be chained to the tap for drinking purposes.	(e) Chain the cup to the tap so that each water user can use it instead of using their bare hands which may be dirty or instead of putting their mouth direct on the water tap.	

Lesson 3 : Water use at traditional source

Specific behaviour to be achieved	Training content	Obstacles
(a) Bathing and laundry should not take place in the source.	(a) Construct bathing facilities at home and do laundry away from the source so that dirty water from washing and bathing which contain harmful bacteria should not contaminate the water.	The water source may be of such a kind that it will be difficult to divide it into sections for different activities.
(b) Cattle watering should not take place above intake (if river supplies a scheme) or at a place for collection of drinking water.	(b) The water source - if a river - should be divided to suit different activities so that one activity will not contaminate water for other activities; for example: a place for drinking water collection or intake should be upstream while the activities of bathing, laundry and cattle watering should take place downstream.	How can one prevent nomadic people from using the water source for their cattle. The cattle needs water, but the problem is that the nomads do not necessarily feel responsibility for the quality of the water.
(c) If it is found more convenient to bathe and do laundry near the source special facilities for this should be established.	(c) Supply washing slabs along the river so that villagers will use particular parts of the river for washing and laundry purposes rather than washing and bathing indiscriminately in the river.	It may be difficult to prevent children from defaecating and urinating in the water source. Discuss: How can children get into a habit of relieving themselves before going to the water source.
(d) Defaecation and urination should not take place near or in the source.	(d) Defaecation and urination should take place far away from the river/source so that during the rainy season the faeces and urine cannot be carried into the river by rainwater causing diseases such as cholera, schistosomiasis, typhoid, hookworm, roundworm, which are spread by faeces and urine.	
(e) Refuse should not be thrown into the water source.	(e) Refuse should not be thrown indiscriminately along the river. Refuse should be thrown very far away from the river or dig a trench and dump the refuse and abandon that trench, in order that the refuse will not be blown by the wind into the river or be carried away into the river by rainwater.	

Lesson 4 : Sanitation and personal hygiene

Specific behaviour to be achieved	Training content	Obstacles
(d) Water for washing hands should be kept in or near latrine.	(d) In order to promote good personal hygiene habits should be developed of cleaning hands with (soap and) water after visiting the toilet so that dirt on the hands can be washed away. A water kettle or a water container with a lid on should be kept near the latrine (together with soap) for washing hands after visiting the toilet.	If the compound of a household is small and many pit latrines have to be built over a number of years, all available space will soon be used. Discuss how long lasting (permanent ?) latrines can be built.
(e) Pit latrines should be covered.	(e) Emphasize importance of pit latrine covers with handles to cover the pit hole. This will prevent flies from entering the pit.	Having a specific room for kitchen requires space and extra materials. Does the compounds in the village have enough space ? Is the husband prepared to build a kitchen ?
(f) Refuse should not lie around the house.	(f) Clean all house surroundings and dump the refuse in a refuse pit or burn it so that the refuse will not be blown around by the wind and pollute the air. Refuse being around will purify and cause bad smell to the surroundings inviting flies which will carry and transmit infectious bacteria from man to man through food and water.	Who should organize the construction of refuse pits and pit latrines at public places ?
(g) Each household should have a pit for refuse.	(g) Every household should dig a pit for refuse so that the refuse will not scatter around the surroundings of the house and pollute the air or cause bad smell inviting flies.	
(h) The market place should have a pit for refuse.	(h) Every village should have a refuse pit at public places (market place, schools, pombe clubs etc.) so that all refuse can be dumped or burned.	
(i) Cooking utensils should be kept on an elevated stand if not kept in a separate room.	(i) Wash all cooking utensils and keep them in good and safe place so that children or animals, like dogs, will not play around with cooking utensils and make them dirty. Construct "vichanja" (elevated stand) for drying and keeping cooking utensils.	

Lesson 4 : Sanitation and personal hygiene

Specific behaviour to be achieved	Training content	Obstacles
(a) Each household should have a pit latrine.	(a) Every household should construct and use a decent pit latrine. The pit latrine should have the following quality to prevent spreading diseases such as cholera, hookworm, roundworm, typhoid, dysentry, hepatitis and other diseases like polio:- • The pit should not be less than 8 feet deep so that it will not fill up in a short time • The floor should be smoothed for easy cleaning and ashes used to eliminate bad smell • There should be a cover with handle to cover the pit hole so that flies will not enter the pit • The superstructure of the pit latrine should be in a good state to enable easy repair. The walls should be of mud, bricks or burnt bricks and have a height of 7 feet. The roof should be of grass or corrugated iron sheets. There should be a door and a window for easy ventilation • If there is an improved latrine in the village its qualities should be explained.	In some places the soil is of such a quality that it easily causes the pit to collapse. Discuss what can be done. (Reinforce pit with bricks or boards). Often it is difficult to have somebody to clean public latrines. If a caretaker is not employed by the village the latrines will soon be rendered useless. Water should be kept in or near the latrines to reinforce the habit of washing hands after using the latrine. This means that each household will have to buy another container or basin. Are these available ? What about costs ?
(b) Primary school, church, mosque market place and pombe clubs should all have a pit latrine.	(b) Sufficient pit latrines should be constructed and be used at public places (schools, church, mosque, pombe clubs). Instruction should be given on how to use the pit latrines and keep them in a good state. Otherwise they will contribute to spreading diseases.	
(c) The village should ensure that the public latrines are kept up to standard.	(c) In order to ensure that public latrines are kept up to standard the villagers should be educated on how to use the pit latrines and keep them in a good condition. It is advisable at market places and pombe clubs to have special workers employed who will clean and make sure that the pit latrines at all times are in a good condition.	

Lesson 5 : Cattle keeping (lesson 5 is optional. Any water related health problem can be included as long as it is relevant for the particular village)

Specific behaviour to be achieved	Training content	Obstacles
(a) The udder should be cleaned before milking the cows.	(a) Wash the udder before milking the cow so that dirt from cows' bedding like cow-dung which have stuck on the udder will not contaminate the milk causing diseases like anthrax, tuberculosis etc.	Among most people cattle keeping is the responsibility of the men. This may cause certain problems when teaching women.
(b) Milker's hand should be washed before milking.	(b) Milker's hand should be washed with (soap) water so that dirt is washed away to prevent contamination of the milk, which may cause infectious diseases. Diseases likely to be spread to man through milk are: typhoid, paratyphoid, cholera, dysentry and tuberculosis.	
(c) Bucket used for milking should be cleaned.	(c) All utensils used to store milk should be cleaned with soap water and then rinsed in boiled water to prevent contamination.	
(d) Milk mixed with water should be boiled before consumed.	(d) Milk should be boiled before consumed. If the cow has tuberculosis, the milk will carry tuberculosis bacteria. These tuberculosis bacteria reach man when he drinks milk which is not boiled. Milk can also be contaminated from utensils which have been washed in dirty water. Some milkers add water to the milk in order to increase the quantity. Normally raw water is added to the milk and hence can contaminate the milk and spread diseases like cholera, typhoid, dysentry to man through drinking unboiled milk. Therefore boil milk before drinking it.	

Form 12: Registry of women in discussion groups and attendance record

Name of participant	Attending meetings (tick) 1st	2nd	3rd	4th	5th	Topics discussed
						1st meeting:
						2nd meeting:
						3rd meeting:
						4th meeting:
						5th meeting:

Form 13: Key words for village health education discussion groups

1) Matumizi ya maji nyumbani:-

- Yawepo maji ya kutosha shughuli zote
- Funika maji yako kila wakati
- Nawa mikono yako kila mara kabla ya kushika kikombe cha maji, pia ukitoka haja
- Tayarisha vikombe au kata mbili, moja chotea maji toka kwenye mtungi, ya pili tumia kwa kunywea tu
- Safisha mtungi wako kila mara kwa majibu au sabuni.

Umuhimu: Ili kuepukana na magonjwa kama kipindupindu, kuhara n.k.

2) Matumizi ya maji bombani:-

- Nawa mikono, safisha ndoo, mtungi, debe kabla ya kuchotea maji
- Kufua, kuoga na kuosha vyombo kusifanyike karibu na bomba, fanyia shunghuli hizi mbali kidogo na bomba
- Mifereji ichimbwe ya kupitishia maji machafu toka bombani kwenda mbali au kwenye bustani
- Kila mwanakijiji atumiaye bomba ana haki ya kumkosoa mtu anayetumia bomba vibaya.

Umuhimu: Kuzuia kusambaa kwa magonjwa.

Maswali:

1. Kwa nini tunashauriwa kufunika maji ?
2. Kwa nini tunawe mikono yetu mara kwa mara ?
3. Kuna umuhimu gani wa kuosha mtungi wako kila mara ?
4. Kuna umuhimu gani wa kuwa na kikombe cha kuchotea maji na cha kunywea tu ?
5. Kwa nini tuchimbe mifereji ya kutolea maji machafu bombani.

3) Matumizi ya mto na kisima:-

- Usioge wala kufua kwenye chanzo cha maji
- Ng'ombe na wanyama wengine wasiruhusiwe kutumia chanzo cha maji
- Usitupe takataka kwenye mto/kisima au karibu na sehemu hizo
- Usitumie mto kama choo, kama kukojolea ndani ya maji
- Kuoga, chota maji ogea mbali kidogo na mto ili uchafu usirudi ndani ya maji
- Magonjwa yatokanayo na maji machafu ni kuhara, kichocho, homa ya matumbo, minyoo, kipindupindu na kuharisha damu.

Tfanyeje ili tuepukane na magonjwa kama haya:-

- Chemsha maji ya kunywa
- Chuja maji na kufunika
- Usipendelee kukanyaga maji yalioysimama muda mrefu
- Unapopatwa na magonjwa kama hayo nenda hospitali kutibiwa.

Umuhimu: Kuzuia kusambaa kwa magonjwa.

4) Usafi wa mwili:-

- Oga kila mara
- Fua nguo zako kila mara kwa sabuni au kuchemsha
- Weka nywele zako na za watoto katika hali ya usafi
- Ogesha watoto.

Mazingira:

- Kila kaya iwe na choo
- Funika choo chako na kisilibwe kila mara
- Weka maji ya kunawa ukitoka chooni
- Kila kaya iwe na shimo la takataka
- Uwanja ufagiliwe
- Siliba nyumba yako kila mara na kufagia ili kuepukana na wadudu kama papasi na kunguni
- Jiko lako likae kwa hali ya usafi
- Vyombo vipangwe vizuri ndani ya nyumba
- Tulale mahali pazuri na watoto wetu (kitandani).

Chakula bora:-

- Tule chakula cha kutosha
- Tutenganishe mtoto mdogo na mkubwa wakati wa kula ili yule mdogo atosheke
- Tusikose kula matunda kama vile; ndizi, machungwa, mapaipai, maembe n.k.
- Maziwa yachemshwe kabla ya kuyatumia.

Form 22: Check list for household visits

Name of head of household: _____

Number of people in household: _____

Visited by: _____

Date visited: _____

Observe conditions of:	Brief description	Action to be taken
Buildings		
Compound		
Kitchen facilities		
Pit latrine		
Refuse pit		
Room (living/sleeping)		
Water storage		

Household reported to village office on: (date) ....., 19.....

Reason: .....

6. EXPERIENCES WITH VILLAGE PARTICIPATION ON PIPED WATER SCHEMES

6.1 Introduction

Experiences obtained by the socio-economic group with village participation on gravity water schemes are now quite extensive for the planning and construction phases, but rather limited for the selection and operation and maintenance phases. Very little experience with shallow wells and no experience with rehabilitation of existing schemes has been gained.

Experiences on piped water schemes are presented below. They are based on work by the socio-economic group in 14 villages in one district in Iringa Region; 15 villages in four districts in Mbeya Region (including two schemes with boreholes); and 7 villages in two districts of Ruvuma Region. All schemes have been funded by DANIDA and constructed by MAJI. the socio-economic group has acted as an extension unit for village participation in these villages although MAENDELEO has gradually been involved in this work from December 1982 onwards (see chapter 4.5.3).

The detailed procedures for participation on the gravity schemes in the three regions have, however, differed somewhat. This was done deliberately in order to gain as much experience as possible on which to base a common procedure. It is the sum total of these experiences that has been incorporated in the handbook, chapter 5, appendix I.

6.2 Experiences with selection of projects

Village participation in this phase is extremely important as pointed out in chapter 3.3. Unfortunately, it has not yet been possible to implement the policy on cash down-payments (policy 7) stated in this chapter. To demand a cash down-payment prior to the start of the construction requires a political decision which only the Tanzanian authorities can give. No such decision has yet been made.

On the DANIDA funded projects, villages were simply offered a water scheme with very few conditions: no down-payment, no cash contributions to spare parts, etc. Only self-help labour during construction and compensation of scheme attendants upon completion of the scheme were required of the villages. No one refused that offer.

6.3 Experiences with planning

In volume 12, chapter 6.7.4 the experiences with village involvement in the location of domestic points and cattle troughs were described. Such involvement, it was concluded, helped to secure:-

- Better match between location of domestic points and the village settlement pattern.
- Lower construction costs per person actually served with water from the scheme
- More fair distribution of the domestic points between the poor and rich segments of the village

Experiences gained since then confirm these positive conclusions. Village participation in the location of domestic points etc. is an unqualified improvement over the pre-participation situation. The procedure followed for this activity has therefore remained basically unchanged. It is described in the handbook, chapter 5, appendix I, steps 8 and 9.

6.4 Experiences with construction

6.4.1 Development of procedures

In an average Tanzanian village of 2500 inhabitants, approximately 8 - 900 people are able to participate physically in communal activities ("able-bodied" as defined by the village authorities). On group schemes this should be multiplied by the number of villages. The sum total easily runs up to 4 - 5000 people. Organizing so many people to participate in the construction tasks is not easy. It requires considerable skills both among project staff, villagers and relevant government and party employees. Such skills are not acquired overnight. Thus the procedures presented in the handbook have developed over time by trial-and-error.

Failures have been as helpful as successes in developing the procedures for village participation. An account of the trial-and-error process is therefore appropriate. The schemes in Iringa Region will be used as illustrative cases since the experiences from the three regions are fairly similar. Only where specific experiences from projects in Mbeya and Ruvuma Regions have let to changes in the procedures, are they explicitly mentioned.

The Image group scheme was the first DANIDA funded project in Iringa Region. It includes 5 villages. On this scheme village water committees were formed when trench digging had almost been completed. By and large only the village chairmen were communicated with. MAJI simply told them to organize trench digging within the village boundaries. Project personnel (i.e. from MAJI and the socio-economic group) did not assist the villages to make work plans for self-help work. Neither was any project staff present at the trenches during digging. Shallow and bending trenches were consequently dug and progress was slow. In the end the Regional Water Engineer decided to pay the villagers for the digging to avoid further delays and to improve the quality of trenches.

Two lessons were drawn from this. Villagers should be assisted to draw up work plans and to organize self-help labour (to be the duty of the extension unit). And MAJI should assign people to assist and supervise the villagers working on the trench lines (to be duties of the site assistants). This was then tried out in all three regions.

Organizing self-help work

In Iringa Region the next DANIDA funded scheme was Tanangozi, phase I, consisting of three villages. The socio-economic group assisted the villages in making work plans. Based on information from the village secretaries the able-bodied persons (as defined by each village) were divided into groups of around 100 people (i.e. 2 - 4 balozis in each group). A group was then assigned a day on the trench line per week (or per two weeks in the largest village with a total of 10 working groups). On each working day a member of the village water committee was supposed to be present at the place of work. This member should help the balozis to keep attendance and direct the villagers. The site assistants should ensure that work was done properly and should assist the VWC member and the balozis to guide the villagers.

On the schemes in Ruvuma Region, work was arranged differently. Each balozi was allocated a section of the trench to dig. Where possible, balozis were allocated sections in their own sub-villages. Three to five ten-cell leaders were mobilized at a time, and once they had finished their sections another group of ten-cells were involved until all the work was finished. Within each ten-cell each person was again assigned 5 - 10 meters to dig.

This system was also followed in some villages in Mbeya Region. And here weekly meetings were held between MAJI, the village water committee and the balozis participating in construction during the week preceding and following the meeting.

Thus two ways of organizing work were tried out. In the one used in Iringa, balozis take turns. Each person shows up weekly or biweekly so that other village or private activities can be carried out simultaneously. One group starts digging where the former reached the day before. Each group will therefore dig in all sub-villages and in both soft and hard sections of the trenches. Attendance is rather difficult to check because a new group shows up every day. The Ruvuma model causes people to work intensively for a limited period, followed by several weeks without work on the water scheme. During the intensive period no other work is possible. Being piece work there is no need to keep good attendance records. People may, however, end up doing very different amounts of work depending on the soil conditions in their respective sub-villages. Based on these experiences the following changes in procedure were made (and they are now included in the handbook, chapter 5, appendix I):-

- Work plans should be made by the village water committee and the balozis in cooperation (assisted by the extension personnel). The balozis are the key persons in mobilizing people for self-help work and they should be drawn more actively into the process.
- Regular meetings between MAJI (site assistants), the village water committee and the balozis should be held during the whole self-help work period. Problems can then be tackled immediately. Village government and ward secretaries should be kept informed of the progress.
- Villagers should be given a choice between the two ways of organizing work. It makes it possible to adjust to local conditions.

In all three regions many villages introduced by-laws to deal with absentees. Some measures were quite drastic: Fines of shs. 50 to shs. 150 could be imposed. But it proved difficult for almost all villages to actually enforce the by-laws. This takes strong will and good organization. Otherwise people are hit randomly and this is bound to cause dissatisfaction. The procedures in the handbook have therefore been designed to increase attendance through social pressure among the participants - rather than through

fines etc. A small example: Water should not be allowed to flow from the DPs before proper backfilling is completed. In cases where a village decides to use fines these should be administrated entirely by the village and not by the project personnel.

Site assistants

This is a new staff function within MAJI. It has been established on a trial basis in all three regions. No rigorous evaluation of the work of the site assistants has been made but the impression is that they have had a significant impact on the quantity and quality of trenches dug per day.

There is room for improvements, however, and these are included in the handbook:-

- Site assistants should take over more of the day-to-day extension work during construction: Informing the balozis of up-coming work, changes in plans, etc.; help VWC members and balozis to encourage attendance, etc.
- Site assistants should consequently be trained in basic community development techniques and should be encouraged to use them.

Further development of construction procedures

The new ideas on organizing self-help work and on site assistants are now being tried out in the six villages included in Tanangozi, phase II, Iringa Region. Village participation will, furthermore, be expanded to include pipe-laying and construction of washing slabs and domestic points (which has not yet been tried out). But it is too early to tell if these new ideas (all included in the handbook, chapter 5, appendix I) will prove successful. The trial-and-error process continues.

6.4.2 Special surveys of self-help construction work

Two surveys were made in the villages included in Tanagozi, phase I, Iringa Region.

Attendance and output

During trench digging the site assistants kept daily attence records. The results are shown in figure 6.1 and cover approximately two months'

work from the start of the digging in each village.

Attendance in Tanangozi and Ugwachanya villages during this period fell to half the initial level. In Wenda, however, attendance almost doubled. Although not shown in the figure, it is interesting to note that there was no consistent difference between male and female attendance during the period under investigation.

Also with respect to output (meters dug per day per person present) the trends are different. In Tanangozi the fall in attendance was compensated for by an increase in output. In Wenda output was fairly stable, whereas it fell steadily in Ugwachanya.

Leadership capabilities and village conflicts are the two main factors explaining these differences. With respect to both, there are problems in Ugwachanya. Here the chairman (prior to the recent election) was sick and did no work for more than two years. Furthermore the secretary (female) does not have much authority. Finally the continuous conflicts between the three sub-villages of Ugwachanya make it very difficult to get people from one sub-village to dig trenches in the others.

Based on these results the following rule-of-thumb can be made: If 100 able-bodied persons are called to dig, less than half will show up and each participant will dig around three meters. Thus the total daily output is 100 - 150 m trench for each 100 persons called with the particular way of organizing work used in Iringa Region (see 6.4.1).

Participants and absentees

More detailed investigations of participation in digging were later made in Ugwachanya approximately 6 months after digging had started (October - November, 1982). A total of 102 people were interviewed, that is all able-bodied persons under eight balozis. People that showed up at the trenches (38) were questioned here, while the absentees (64) were interviewed at home. Answers to the following questions were sought: Are the absentees "different" from the participants ? How do the participants look at the absentees ? What do people suggest should be done about absentism ?

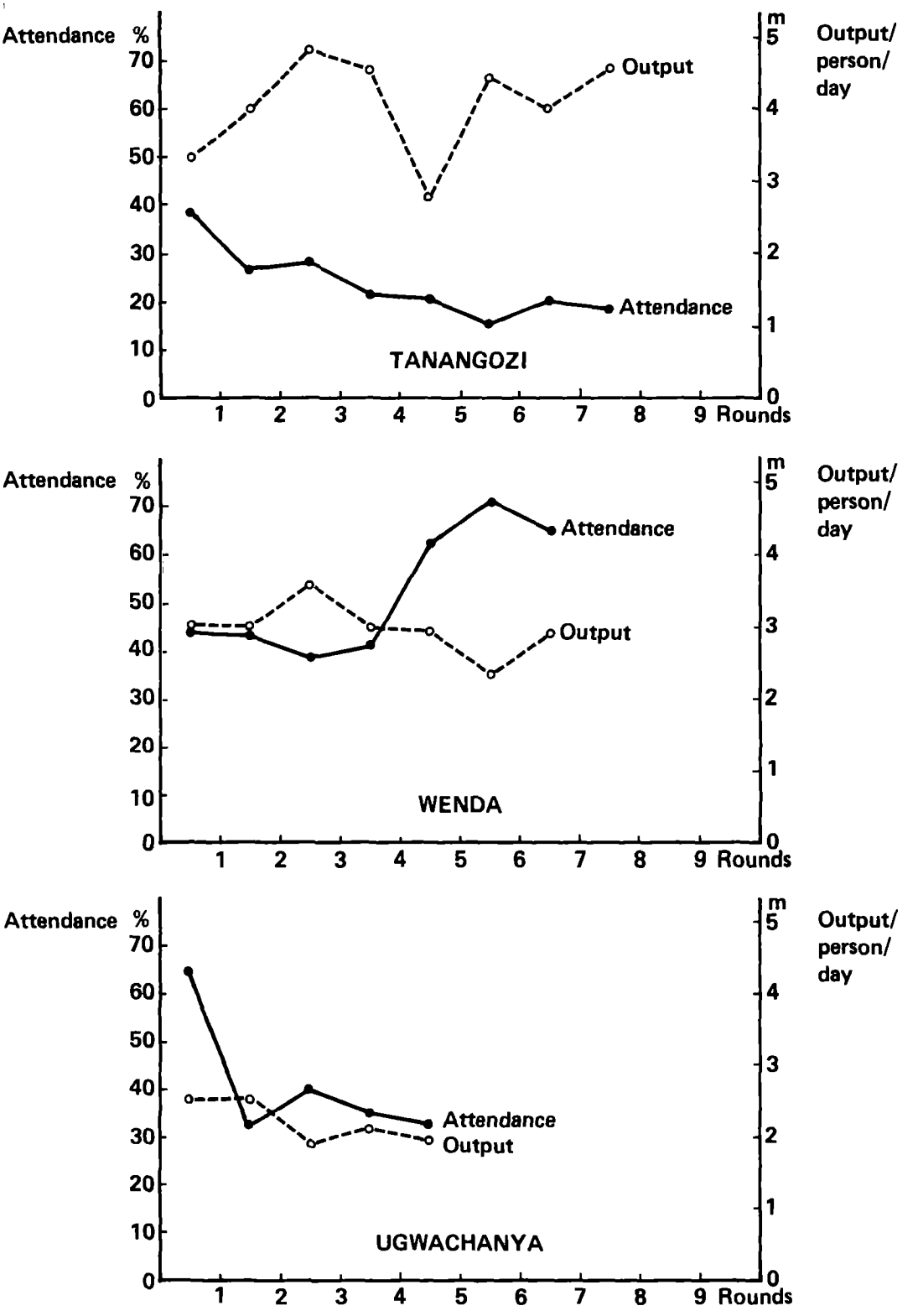


Figure 6.1 - Attendance and output by work round in thre villages in Iringa region.

First, two surprising results: Attendance was largely the same in all age groups (15 - 30; 31 - 45; etc.). There was no "generation gap". Attendance was also largely the same among groups with 0; 1 - 4; and 5 - 7 years of primary school education. No "educational gap" was found.

Two other comparisons gave results closer to prior expectations. One was that absentism was twice as high among the "rich" as among the "poor" (the former living in houses with a corrugated iron roof, the latter in grass thatched ones). Part of the explanation could be that the "rich" may be wage earners that were on duty when the digging took place (the village had decided that they should not participate in the digging, but instead pay shs. 20 per turn to the village government (few of them did)). Another explanation could be that the "rich" were powerful enough to escape communal duties without retaliation from the community.

The second expected result of the survey was that people with very many (above 7) or no children participated more than people with just a few children. Presumably the latter have a problem taking care of children that larger families do not. Here older children can look after the toddlers while the parents participate in the communal activities.

During the interviewing, attendance among the people in the eight ten-cells was 37 %. (The questioning no doubt motivated some people to show up at the trenches). Attendance was, however, much higher (61 %) among men than among women (23 %), but this difference is not typical for the three villages in the scheme as mentioned in the section above. Why were only approximately one of every three able-bodied persons present at the trenches ? This question was put to both participants and absentees. The reasons most frequently mentioned by each group respectively is given in table 6.1 below.

Order of frequency	Reasons given by participants	Reasons given by absentees
1.	Illness	Illness
2.	Lazy, stubborn drunk	Work (agriculture, livestock, wage labour)
3.	Funeral	Lack of information

Table 6.1 - Reason for absentism.

It should be noted that the participants may have tried to cover up for their fellow villagers, while the absentees may have lied (only five percentage of the latter said they had no reason for showing up). But no doubt illness (own or family's) is a major cause of absentism. The table also indicates that better information and more social pressure on absentees may increase attendance (see also 6.4.1).

Among those present at the trenches there was agreement (72 %) that absentees should be fined. Without being specifically asked, the participants suggested fines of 50 shs. (27 %); 20 shs. (21 %); while 24 % did not specify the size of the fine. Another fifteen percent proposed that the absentees should explain themselves to CCM. There is also broad agreement that it is the village chairman who should take initiative to prevent absentism.

However, only 6 out of the 64 absentees interviewed had actually been fined. Four had been asked to turn up another day to do the digging. The rest said either that they had informed the balozi about their problems and had gotten permission to be absent, or they said that no steps were taken against them. It is apparently difficult for a village to establish the will and the efficient administration needed to fine absentees consistently and fairly. This impression is confirmed by experience from other villages (see 6.4.1).

6.5 Experiences with operation and maintenance

6.5.1 General

Village participation in operation and maintenance activities have been limited. One reason is that few of the DANIDA funded schemes have been completed for very long. The other reason is that it has not been possible to make villagers directly responsible for part of the operation and maintenance as proposed in chapter 3.2. Tanzanian authorities have insisted that water should remain a free public good. Apparently the recent statement by the party chairman (see 3.2.4) has not yet been operationalized for implementation in the ministries, the regions and the party itself. There is an urgent need, however, for working out realistic and detailed operation and maintenance procedures. They are a pre-condition for further development of the rural water sector. To continue to build schemes without any clear idea about how to maintain them is like planting crops without preparing for the harvest.

Due to this situation the socio-economic group has only been able to do some limited experiments with the employment conditions for scheme attendants. And attempts have been made to strengthen the village capability to carry out operation and maintenance tasks by introducing tap attendants (see 4.1.1).

6.5.2 Scheme attendants

Normally scheme attendants are employed and paid by MAJI. This creates a number of problems as discussed in volume 12, chapter 6.

As a first step towards full village participation in operation and maintenance, scheme attendants on DANIDA funded projects were therefore to be selected by the village. During the construction phase these attendants would then be trained and paid by MAJI. At the completion of the schemes, the attendants would be employed by the village and paid by it.

This arrangement proved problematic. On the DANIDA funded Image scheme in Iringa Region only one out of five scheme attendants has been regularly paid. Another is paid on an ad hoc basis. This is contrary to prior agreement between the villages and the attendants, which stipulated that compensation (posho) should be paid monthly. In villages in Mbeya Region where a similar system has been tried out, experiences are somewhat better. Here there are two scheme attendants per village (against one per village on the Image scheme). On one scheme the two attendants get shs. 150 - 200 each per month, while in another village the attendants are paid on an ad hoc basis.

Irregular compensation of scheme attendants leads to deteriorating work performance. There might be many reasons why villages fail to keep their agreements with scheme attendants. One is that some villages are well aware that MAJI usually pays attendants: It is difficult to introduce a new policy of this kind areawise. Secondly, politicians have been reluctant to promote the new policy and to explain it to villagers. Thirdly, the villages concerned were never required to show that they wanted a water supply. It was the regional authorities which chose to build a scheme in their village. No doubt such schemes are regarded as government property. Finally both MAJI and DANIDA are understandably reluctant to let a scheme deteriorate if the villagers do not maintain it. And villagers soon understand that.

Contrast this lack of payment to the scheme attendants with village compensation of its own employees: The shop manager and the shop helper; the grinding mill operator; the watchmen, etc. In all villages investigated these employees are paid out of village incomes. The typical payment is shs. 150 - 200 per month. Some villages pay up to shs. 500 per month to such employees. Regularly, it seems. It is difficult to avoid the conclusion that on projects initiated by the villages themselves (shop, grinding mashine, etc.) without outside promotion, they are also willing to pay the people working on the projects. A water project is, typically, initiated from above. It is consequently regarded as government property for which different rules apply.

It is in an attempt to change such attitudes that policies regarding considerable village involvement in planning and construction, down-payment, and cash contributions to operation and maintenance, have been proposed by the socio-economic group (see chapter 3). They will force the village to become an active partner and contributor to the scheme - if it really wants improved water supply.

The specific experiments with scheme attendants' employment conditions have also led to changes in the way they should be employed. These are stated in the handbook and imply that scheme attendants should:-

- Be paid by the village also during training
- Never be on MAJI payroll
- Be employed as soon as construction starts.

These guidelines will be followed in the villages in phase II of the Tanangozi project, which has just started.

6.5.3 Tap attendants

In four villages in Mbeya Region female tap attendants - one for each domestic point - were appointed by the village water committees and the balozis in cooperation. Normally a woman from a house close to the tap was chosen. The job is unpaid and consists of a few simple duties (see table 4.4).

The impression is that the tap attendants have helped to increase the hygienic standards around domestic points and have helped to limit misuse of water around the taps. The appointment of tap attendants has therefore been included in the handbook, chapter 5, appendix I.

6.5 The roles of MAJI and DANIDA

The development of village participation procedures has been done in close cooperation with MAJI staff from the three regions. Generally this staff has been positively inclined towards the experiments - some even enthusiastically so. In the few instances where this has not been the case, efforts to promote village participation were not very successful. This clearly shows that a positive attitude towards village participation among the technical staff of MAJI is extremely important for the outcome of the participatory process. And it indicates the need for involving the technical staff at all levels of the MAJI organization in discussions of the participatory approach.

The DANIDA Steering Unit has positively encouraged the experiments on village participation on the projects funded by it. The unit has also provided much positive criticism of these experiments. Furthermore, through an efficient supply of construction materials to the building sites in the three regions, the Steering Unit has played a very important role in the implementation of the participatory procedures.

The implication is very clear: Without an efficient executing agency, village participation will fail. Good planning and efficient implementation are pre-conditions for successful village involvement in water projects.

6.7 Conclusions

Since 1967 villagers have been encouraged to work together for their common good. Unfortunately the motivation to do so seems lower today than previously. Most of the reasons for this situation have to do with factors which a water supply programme can do little or nothing to change. But one obstacle to the successful participation of villagers in communal activities can be influenced, and that is the skills for organizing large groups of villagers on self-help projects.

Such skills are conspicuously absent among most village leaders and party leaders at the grass-root level - and in most government institutions as well (although there are notable exceptions). No doubt this is one of the reasons why many officials only use one method for organizing self-help labour - namely exhortation. Villagers are merely told to do this or that.

In some villages where water schemes have been built, the militia has been used to chase absentees (words like "making a campaign" and "sweeping up" were used to describe it). Much less efforts have been used to motivate people to participate or to bring social pressure to bear on those who do not show up for communal activities.

Motivation, social pressure and appropriate organization of self-help work are the key words for success. How to go about inducing this in a community should be the challenge.

In the handbook a practical approach has been outlined. The mere size of this manual and the amount of detail it contains will no doubt convince many that village participation is impractical to introduce in the rural water sector. The fact is that successful village participation requires just as careful planning and sophisticated skills as are required for construction of water schemes. It also requires regular follow-up during the operation and maintenance period. Without it, schemes are likely to deteriorate.

To follow all the procedures in the handbook is, however, <u>not</u> possible at present. Political approvals are needed before implementing such crucial policies as village down cash payment prior to the start of construction and cash contribution to operation and maintenance. If the policies proposed in this report, or some realistic alternatives to solve the same problems, are not approved, investments in new water schemes during the coming decade might turn out soon to have as low a service level as many of the investments made in the rural water sector during the sixties and seventies.

7. WOMEN PARTICIPATION ON WATER PROJECTS

7.1 Introduction

During the implementation programme of water projects in Iringa, Ruvuma and Mbeya Regions, women have participated with different intensity. In some villages an equal proportion of men and women were involved, in other villages almost only men participated, while in others it was found that women formed the majority of participants.

Traditionally, women have been responsible for fetching water, whether it was fetched at a traditional source or at a standpipe. Presumably, women therefore have a greater interest than men in a well functioning water supply as well as in appropriate locations of the public standpipes. Following this trend of thought it was decided to carry out some studies on the following aspects:-

- Women as members of village water committees. From the very beginning of the project village governments were asked to select a certain number of women (together with men) as committee members. To what extent did these women influence the project ?
- Women's participation and attendance. It was considered relevant to know whether women actually had any extra time and energy to spend on development projects, such as a water project.
- Women as scheme attendants. Traditionally men have always been chosen as scheme attendants. On the present project the village water committee in some villages was required to select women as scheme attendants. It was assumed that a woman would have a direct personal interest in keeping the scheme in good condition to reduce interruptions of the water supply. Furthermore, it was assumed that a female scheme attendant would be under direct pressure from the other women in the village to repair a brakedown without delay, whenever it occurred.

Before we proceed, a word of admonition is required. The findings reported below are based on data collected in Mbeya Region alone. However, since the period of experimentation is still in progress, due to delay of phase 2 of the implementation programme in Mbeya, data collection has been in-

complete. Accordingly, the analyses and recommendations put forward here should only be considered as preliminary.

7.2 Implementation programme, phase 1

7.2.1 Organizing village participation

During phase 1 of the water implementation programme it was learned that village participation very much depended on the ability of the MAJI field staff and the village leaders to organize the villagers into work groups. Since neither MAJI staff nor village leaders had any systematic experience in this area it was necessary to support the organizing of able-bodied villagers.

In some of the phase 1 villages MAJI had to employ villagers to complete the work which should have been carried out through village self-help. This resulted in extremely low attendance figures. Naturally, the villagers would rather be employed than contribute labour on a non-paid basis. However, since the project at times was unable to pay village labourers - skilled as well as unskilled - for long periods, the construction would sometimes come to a complete standstill, because nobody turned up on the site.

Furthermore, low attendance during this phase was caused by poor communication between project staff and the villagers. The village water committees had not had their terms of reference properly defined and the MAJI field staff had no experience in working with the newly established water committees.

7.2.2 Village water committee

Due to shortage of extension staff in Mbeya Region compared with the number of project villages the village water committees (VWC) functioned at the discretion of the MAJI field staff in most of the project villages during phase 1. The committees often saw themselves as an extension of MAJI rather than of the village. In many cases the committee was very isolated from the other villagers.

When evaluating the completed phase 1 scheme it was found that only 52 % of randomly selected villagers had heard of the village water committee and 15 % knew of its composition.

This meant that it was left to the MAJI staff (often the foremen) together with the MAJI site engineer to define the tasks for the committee work. Though guidelines had been prepared by the socio-economic group, they were interpreted in such a way that the committee would not interfere with the traditional priviledges of the MAJI staff. It was argued that the committee did not have enough technical understanding, and their influence was thus kept at a minimum.

It was found that in 5 out of the 7 phase 1 villages the village water committee had had no influence on the location of domestic points. Whenever changes of location of domestic points took place this was more often the result of pressure from individual villagers, such as the chairman and other influential villagers.

Whenever MAJI field staff had meetings with the committee, they usually addressed themselves to the male members of the village water committee. The advice of the female members were seldom sought and only in villages where the socio-economic group operated did the female committee members occasionally speak up.

7.2.3 Attendance

The village input during phase 1 was very disorganized. In preparation of trench work the MAJI foreman would tell the village chairman or the committee that a certain number of people were needed. On the morning on which the work force was required a good number of men and women would turn up. But because no procedure had been developed to alternate the village work force, attendance would drop significantly already the following day.

In some villages the participation of women was felt to be particularly low. These problems were studied closely in one village which illustrates the issue of women's participation. Once when the village water committee was called in order that problems of village attendance could be discussed, only men turned up. It turned out that no one had informed the female members of the committee.

The example shows clearly that the village leaders did not support the participation of women. Since no women in that particular village held any responsible posts in the village they lacked self-confidence and thus needed to be supported to ensure their rights.

The women in the mentioned village realized the importance of their participating in the water project. But because of the traditional division of labour they seldom had time left for the project. Traditionally, women are responsible for the daily tasks in the family and also for a major part of the agricultural production. In a survey among 48 households in Mbeya District, it was found that women on an average spend 10 hours on work activities, with a range from 5.5 hours to 15 hours. The men worked on an average of 8 hours daily, with a range from 3 hours to 14 hours.

Furthermore, though women are food producers they are more prone to malnourishment than men, as they always eat last and they certainly eat least, and when we also consider that women in their childbearing age may well be pregnant half of the time, we realize that they have only few resources left which can be spent on self-help activities on such projects as water projects. Because of the work load they have not been able to influence the development of village life significantly.

7.2.4 Scheme attendants

On all phase 1 schemes where MAJI field staff were left in charge of organizing village input on the water project, all the scheme attendants were males. Often they were even chosen without the cooperation of the village water committee.

In the village referred to above, the socio-economic group proposed that two scheme attendants be selected, one man and one woman. The village water committee agreed. Two people were chosen, one of them being the secretary of the local branch of the UWT. However, she never turned up for maintenance training. It turned out that her husband had forbidden her to participate and had threatened her with beatings. In the end, a divorcée was chosen for the job.

7.3 Is women's involvement needed ?

If we accept that people's willingness to participate depends on available resources and how future benefits from participation is perceived, then we are led to conclude that men are more likely to participate in development projects than women.

Though women stand a good chance of being the primary beneficaries of a water project, the direct costs as well as opportunity costs weigh heavier

in most cases. Generally the obstacles for women's participation is higher than for men's. Because women work at home and in the field their opportunity costs are greater, and because they have less experience and fewer resources, the direct costs are higher. Realizing these obstacles to the involvement of women on the water project we had to ask ourselves if their involvement was needed. Would it not be sufficient to have the schemes completed as fast as possible even without the involvement of the women ?

There is little doubt, however, that understanding among the primary users (i.e. the women) of how the scheme operates, of causes of possible breakdowns, and of responsibilities for operation and maintenance is a precondition for a reliable water project. Consequently, it was attempted to introduce measures for a more active involvement of women on phase 2 of the water implementation programme.

7.4 Phase 2

7.4.1 Women on the village water committee

Throughout the three project regions, steps were taken during phase 2 to ensure women's representation on the village water committees and it was decided that at least three women (half) should be members of the village water committee.

In Mbeya Region positive discrimination was applied to give these women an impact on the water project. During the first meetings, a female extension worker was present. The idea being that she should support the women and make sure that they were being heard. It was also possible for her to make special briefings for the female members of the committee. Furthermore, she was instructed to make sure that the female members in particular, but also the committee in general, informed the other villagers about project activities. Finally she was to make sure that the MAJI staff held meetings with the committee every Saturday.

Based on only three months of observations it has been found that the female members of the village water committee act with more confidence during meetings. The very presence of the female extension worker seems to have a positive impact on the behaviour of the women members of the village water committee as well as on the MAJI field staff.

While there seems in general to be a great need for training of village leaders, the need seems even greater for women. Once women have learned to stand up during meetings, daring to discuss project issues with male members, they gain self-confidence and become increasingly aware of their new power. In some cases this has led to conflicts with the men, who in some villages give no support to their wives at all.

But once this trend of conscientization has started it is irreversible, and it has a great educational impact on everyone concerned, men as well as women. A water project can thus be used as an instrument for raising women's political consciousness. Eventually women may raise demands in other fields. Development agents such as agricultural extension officers, will be forced to address themselves to women and not only to the men. It is, somehow, a paradox that the main agricultural producers seldom receive extension service. The reason is that the women at present most often have no voice. Our experiences - and those of others as well - show that women need to practise political skills which eventually enhance their ability to influence village decisions on any type of project. A village water project seems to satisfy these requirements.

7.4.2 Attendance

Once the women in a village realize their new role on the village water committee and see that they are considered as equal members with the male members they show even more effort than the males to keep the agreement made between the village and the project.

In Mbeya Region such an agreement was signed between the village and the project. In this agreement the village promised to supply a certain number of ten-cells with all able-bodied men and women on working days when village input was required and the project promised to supply all materials and skilled manpower necessary for the completion of the scheme.

An attendance sheet was kept which distinguished between male and female attendance. Every working day one committee member was present at the site. She/he supervised the village attendance. The table below shows attendance for a period of 12 days in two villages in Mbeya Region.

	Village A		Village B	
Day	Men	Women	Men	Women
1	37	52	57	59
2	80	93	72	83
3	76	66	60	89
4	50	50	85	91
5	64	84	65	81
6	25	42	70	66
7	55	60	56	70
8	27	73	19	71
9	9	55	48	61
10	50	36	100	91
11	50	60	55	70
12	0	66	72	76
Unweighted average	43	61	63	75

Table 7.1 - Men's and women's attendance percentages in two villages in Mbeya.

We notice that attendance is much better in village B irrespective of sex. In Village B the MAJI foreman organizes village participation expertly. He likes to work with the people, whereas the foreman in village A has been in opposition to the village participation component.

In village A many men are engaged as casual workers at a nearby industrial estate. This may explain why a larger percentage of women participate here. In village B, however, one should expect higher participation of men than women considering the daily work load of the latter, but the opposite is the case. Bearing in mind that these data were collected during the agricultural season, the high attendance of women is noteworthy. We believe that it can be explained by the following factors:-

depd on ... ? (see p. 7-4)

- The female members of the village water committee are respected on equal terms with male members by the project team
- The female members received support from a female extension worker
- The project staff had accepted that positive discrimination be carried out in respect of women

- The village water committee helped to organize the village work
- A village water committee member supervised daily attendance and kept check of this together with the socio-economic group
- Through a weekly meeting the village water committee was informed about the programme for the following week.

An additional factor may be 'status', i.e. that women use the project to raise their status, that is, to prove their worth to the other villagers. For men, manual work has never carried much status. This is not a new observation. Development students in Tanzania have for a long time noticed that women are more prone to act according to government policy, whereas men are more likely to act if it also will enhance their traditional status.

7.4.3 Scheme attendants

At present it is not known who will be responsible for the daily maintenance of a village water scheme. There are indications, though, which point in the direction of the village itself taking responsibility. If the village in the future will be in charge of maintenance of its water supply it is likely that the payment of the scheme attendant will be minimal. The work as scheme attendant may thus not attract male villagers.

The primary users of the water scheme - the women - have a vested interest in a smooth running of it. Consequently, experiments have been started in Mbeya Region with selection and training of female villagers as scheme attendants. In three villages women have been chosen by the village water committee to be trained as scheme attendants. Four villages were deliberately left to chose men in order to enable us to compare the reliability of schemes with attendants of different sex. The project staff can interfere after a trial period of two weeks. If the candidate is trainable she/he is employed by the project during the construction period. Afterwards it is up to the village to decide on which terms she/he should continue employment.

In one village the choice of a woman was made after days of discussions in the village. The (male) village secretary declared that there was no woman in the village who would be capable of doing the job, indicating that a man should be chosen. When the matter was discussed with the women alone, a female candidate was proposed. This candidate was finally accepted by the village government and is now receiving training by the project staff.

7.5 Summary and recommendations

The phase 2 implementation programme is not yet completed. It would thus be too presumptious to give any definite conclusions at this stage, since the studies on women's participation have just begun. It was shown though, that in face of obvious obstacles, women have time and energy to participate in planning and construction of water projects. It was also shown that women are interested in taking responsibility for the maintenance of it, in face of opposition from male villagers. At this stage of the implementation programme we will have to do with some tentative conclusions:-

- Participation can be high and regular. When the project is properly explained to the villagers, participation is high as well as regular. Monitoring through regular (weekly) meetings between project staff and the village water committee as well as monitoring at the site is necessary - at least until the village itself has learnt how to organize village self-help activities.
- Women's participation can be higher and more regular than that of men. When special attention was given to the problems of women's participation it was found that women constituted a more regular work force. It was also found that once women felt they were being supported by project staff they were not afraid to express their opinions in the village water committee.
- Women are willing to be trained as scheme attendants. When asked to select a villager to be trained as scheme attendant the committee would generally choose a man. It appeared that neither female nor male members of the committees had considered the possibility of choosing a woman as scheme attendant. Only when the project staff insisted that a woman be chosen in a couple of villages did the village water committee see this possibility. Generally, the women accepted the proposal faster than the men who usually had many reservations. The project staff reports that the women chosen are very receptive to the training they are given. Furthermore, they appear to accept their new role.

- Any new activity involving women, such as training as scheme attendants, should be discussed thoroughly with the village government and respective husbands in order to obtain acceptance of the idea - if not support. Without some kind of acceptance the activity will not succeed.[1)]

Though experimentation with various forms of community participation and the involvement of women continue, it is therefore recommended that:-

- A female extension worker should pay special attention to the problems of women in the project village
- Initially she should participate in all village water committee meetings and be prepared to support the women in the committee
- She should be willing to participate actively in the project together with the other village women, while she organizes and monitors these very activities.

Though - at present - we are unable to predict the outcome on the reliability of schemes by having female attendant, we feel strongly that:-

- Women should be encouraged to become scheme attendants.

7.6 Closing remarks

It should be noted that there are two main reasons for the emphasis on the involvement of women:-

- It may create some of the conditions necessary for the equality of women, while at the same time enhance their role in the development of their village
- It may make the water scheme more reliable.

It is recommended that UWT alongside development projects, such as the water project, in which men and women work together introduces separate development measures for women, whenever it proves necessary. These separate programmes should teach the women skills in organizing, administering, planning, public debate, public speaking etc.[2)]

Experiences have shown that such changes do not occur by themselves. It is doubtful whether the village water committee would have had any female members if it had been left completely to the village alone to decide on its composition. At the same time steps should be taken to reduce the work load of women both at home and in agricultural production. Such changes, however, do not occur overnight as a result of legislation, but depend on the introduction of new means of production.

Notes to Chapter 7

1) B. Madsen: Women mobilization and women integration in Tanzania, CDR project paper, A81.8.Oct., 1981. p. 121.

2) M. Mbilinyi: Women in Rural Development of Mbeya Region, for RIDP, March, 1982. p. 88.

8. PROBLEMS OF EXISTING WATER SUPPLY SCHEMES

8.1 Introduction

Out of a total of 1509 villages in Iringa, Mbeya and Ruvuma regions only 321 villages (which is 21.2 percent) are served with improved water schemes. Preliminary estimates also indicate that only about 60 percent of these schemes are in good working condition. It is, therefore, evident that, besides undertaking construction of new water supply schemes, it will also be necessary to rehabilitate the existing schemes if the 1991 national target of every rural inhabitant having access to nearby sources of adequate and potable water is to be achieved.

The causes of scheme failures identified by consultants who have been working on the Water Master Plans for Iringa, Mbeya and Ruvuma regions are all of a technical nature, which tend to give the impression that the main and probably the only problems confronting rural water supply schmes are indeed technical. However, a closer look at the problems confronting rural water schemes reveals the existence of non-technical problems besides the technical ones. It is also evident that the non-technical problems are significant causes of the low level of service provided by most water supply schemes.

Solutions to technical problems have been presented in other volumes of the Water Master Plans and the implementation of some of the recommendations has already started in all the three regions. Unfortunately solutions to non-technical problems have not been suggested. This omission is understandable since the problems have not been identified by the consultants in the first place.

The purpose of studying some of the existing water supply schemes in Iringa rural district was first, to identify the non-technical problems which affect the performance of water supply schemes; second, to look for possible solutions to these problems.

8.2 Study design and methodology

As a start on this exercise of identifying non-technical problems which confront water supply schemes, some of the existing schemes in Iringa rural district which were listed in the Regional Water Master Plan as being of high priority in the rehabilitation programme were chosen for the study. These

schemes were selected because there is at least a hope of getting them working at full capacity in the near future. The selected schemes are listed in table 8.1, and their location is shown in maps 8.1 and 8.2.

The selection was followed by a collection of information concerning each scheme. The information collected included demographic data, traditional sources of water, type of existing water scheme, water demand, capacity of the water source, a period which the scheme is expected to be working in a day and the estimated costs for scheme rehabilitation. The required information was obtained from documents available at MAJI regional office in Iringa.

Documentary research was followed by visits to water schemes themselves. The purpose of scheme visits was to collect on site information which was not available or could not be obtained from project files, such as the present working conditions of the schemes. While on the schemes discussions concerning the schemes were held between the village leadership, scheme attendants and sometimes with village residents who volunteered to offer additional information concerning the scheme. No formal questionnaire was used during the visits, but the researcher kept a check list of questions which were asked to solicit answers to specific aspects of the schemes.

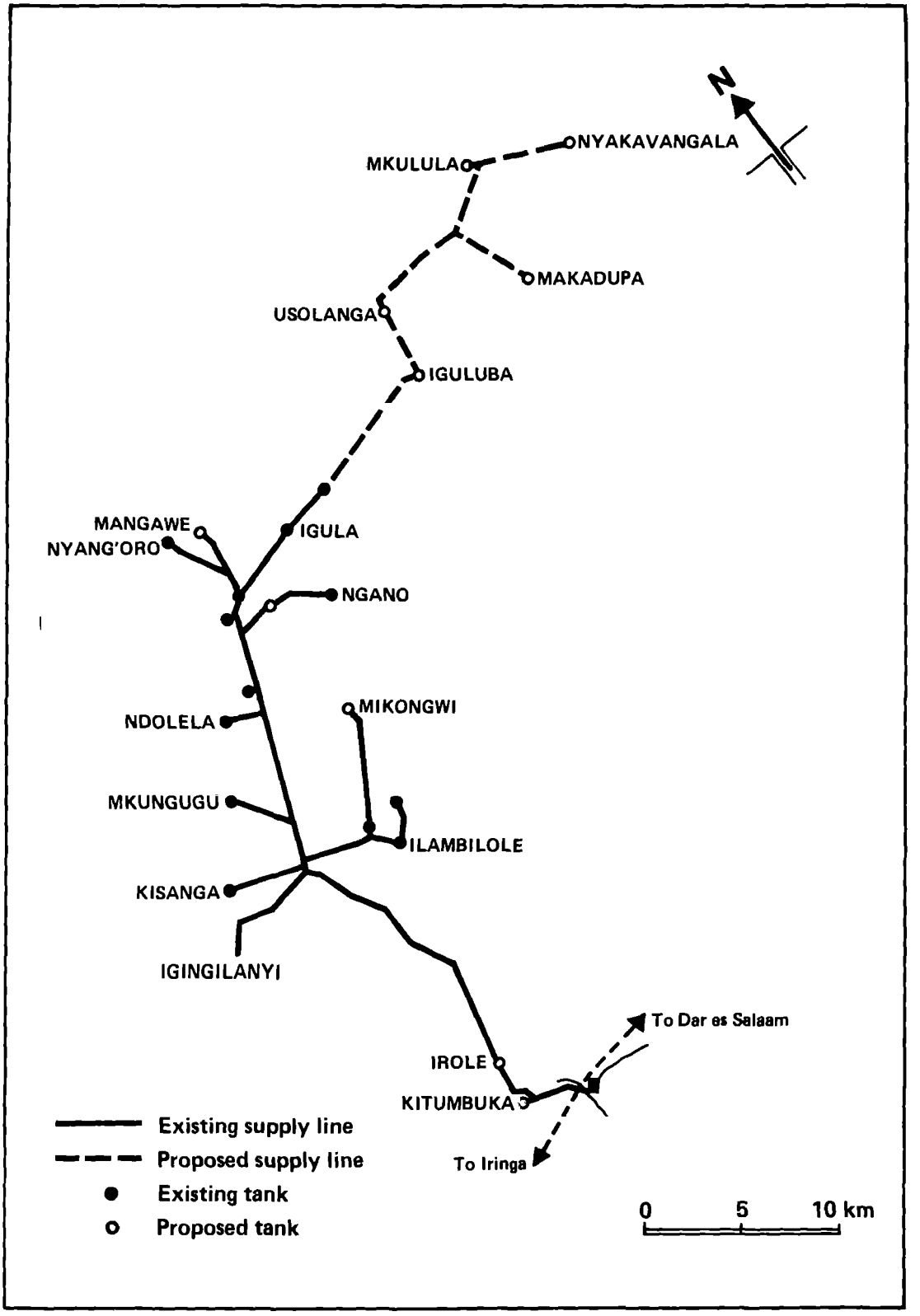
8.3 Description of water schemes

A note of clarification on the use of the words "project" and "scheme" is necessary to avoid confusion. In this volume the word "scheme" is used to mean a water supply to one village and "project" to mean a water supply system to a group of villages. It will for example be noted in table 8.1 that the eight villages listed are considered as constituting eight different water supply schemes although two, three or more villages are getting their water from one pipeline.

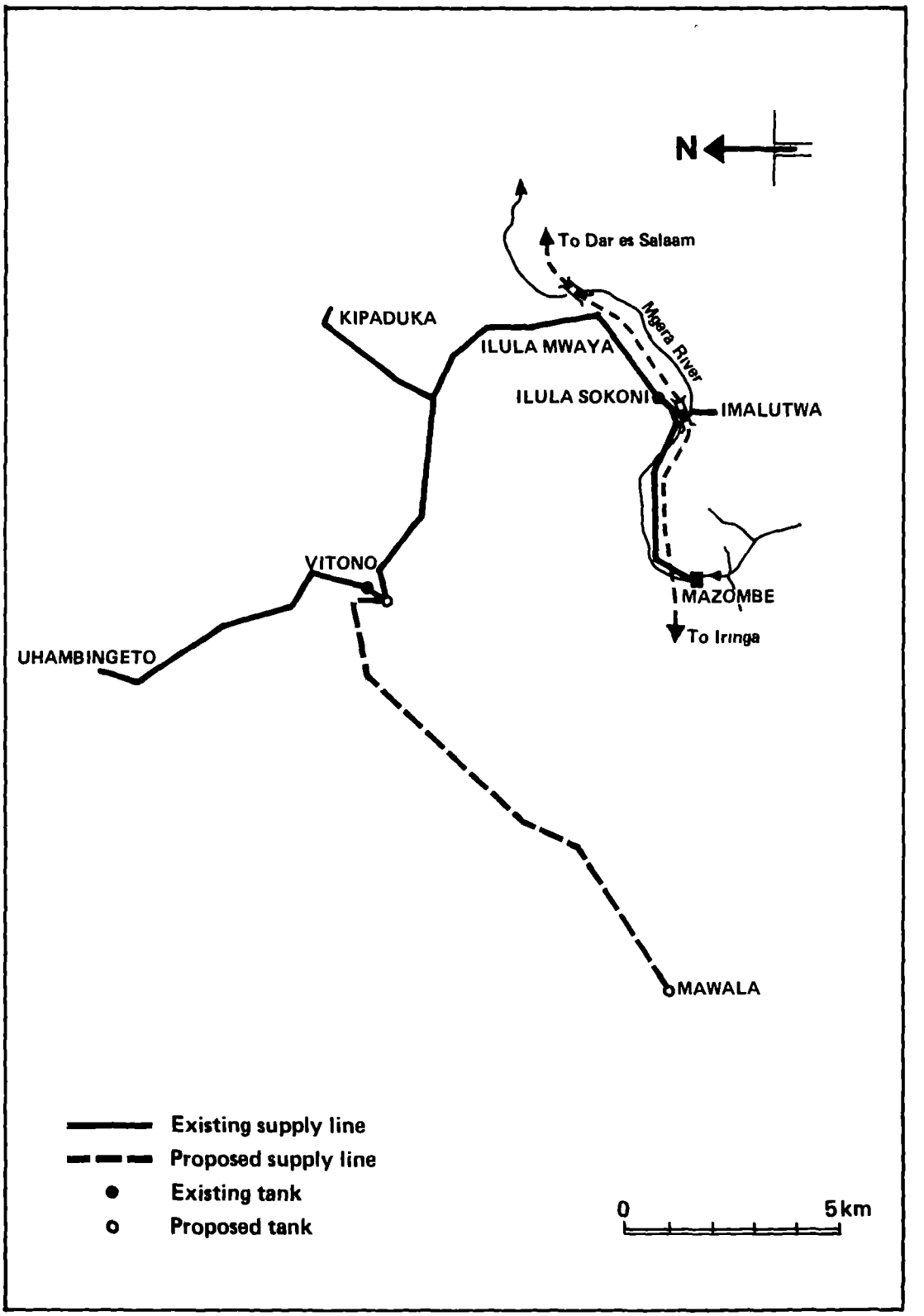
With reference to table 8.1 villages of Igingilanyi, Kitumbuka, Irole and Nyangoro get their water from one big project known as Ismani Water Supply Project. This is a surface gravity water supply project. It takes water from a stream which flows through Lugalo village near the Iringa-Morogoro road and the pipeline runs in a South - North direction for a distance of 44 kilometres supplying water to fourteen villages on the way and ends in

	Present population	Design population 20 years hence	Traditional sources of water	Type of existing scheme	Water demand M^3/day	Source capacity M^3/day	Operating period Hrs./day	Cost of rehabilitation per cap. (Shs.)
Igingilanyi	1837	2443	dug holes	P/gravity	61	5615	24	478.00
Kitumbuka	2185	4741	"	"	118	5615	24	115,00
Mawala	1314	2851	"	"	71	803	24	97.00
Kipaduka	2752	7668	"	"	191	803	24	51.00
Irole	1148	3800	river/str.	"	94	5615	24	109.00
Nyang'oro	1943	3081	none	"	77	5615	24	68.00
Imalutwa	1531	4435	dug holes	"	110	803	24	69.00
Vitono	1264	2791	none	"	69	803	24	81.00

Table 8.1 - Some selected water schemes for rehabilitation in Iringa rural district.



Map 8.1 - Ismani water supply project



Map 8.2 - Mazombe - Ilula water supply project

the villages of Nyangoro and Igula. There are proposals for extending the pipeline so that villages of Iguluba, Usolanga, Makadupa, Nyakavangara and Mkulula can also be supplied with water from this project.

Water from this project is for domestic use and for watering livestock. Domestic stand pipes are constructed in different places in each village and village residents collect their water from the domestic points (DPs). Cattle and goat troughs are also provided. In some villages domestic points and cattle troughs get their water directly from the main pipeline while in others water from the main line is first collected in storage tanks where it flows to the domestic points and cattle troughs.

The villages of Kipaduka, Imalutwa, Mawala and Vitono get their water from the Mazombe - Ilula water supply project. This is also a surface gravity water supply project. The mode of supplying water to the people and cattle is the same as in the Ismani project.

All gravity schemes are expected to supply water for 24 hours a day. The operation and maintenance is supposed to be performed by scheme attendants who are employed by MAJI. Attendants reside in villages which are served by the schemes which they are in charge of. Their duties involve cleaning the intake, operating the washouts, checking the working condition of air valves, fixing leaking pipes and seeing to it that the scheme is always in good working condition. If there is any problem which they cannot solve on their own they are supposed to report it to the district water engineer's office which has to send better qualified technicians to do the required repairs.

8.4 Technical problems

8.4.1 General

In the schemes under study lack of water at the domestic points or at the cattle troughs is attributed to technical problems which confront the schemes. Technical problems which are often mentioned are broken pipes, lack of spare parts, lack of transportation, and shortage of water at the intake.

In some sense these problems are real and they contribute to lack of water. But as it will be shown later, these are not the only causes of the low level

of service found in these schemes. It will be shown that even if these technical problems are taken care of, if other non-technical problems are not identified and solved the level of service cannot be expected to improve very much. Before the non-technical problems are discussed, let us first see how the technical problems affect the schemes' performance.

8.4.2 Breakage of pipes

Breakage of pipes appears to be one of the most common causes of lack of water in the villages under study. This causes certain sections of whole villages to go without water.

What is more depressing is the fact that it takes a very long period of time from the time that pipes get damaged to the time when they are finally repaired. As a result, a lot of very valuable water is lost and at the same time people and livestock go without the much needed water. There are many factors which may account for this apparent negligence, bearing in mind that each scheme has an attendant whose job is to see that the scheme is always in good working condition.

One would be tempted to think that damaged pipes remain unrepaired because those responsible for repair and maintenance are usually not aware of the damage. In very few and isolated cases this may probably be the case but in a majority of cases this is not so. Scheme attendants and MAJI personnel are alsmost always aware of the damage. Lack of information cannot be advanced as an explanation of the undue delay in fixing broken pipes. What is not clear is why, in spite of the available information, MAJI does not take immediate action to rectify the situation ?

The problem may lie in motivation. It appears that the scheme attendants are not motivated to do something. There are numerous cases where scheme attendants were found to be aware of the damage and the possible solutions to the problem but no action was being taken to rectify the situation. It is difficult to identify the reason behind this kind of apathy. In a majority of cases scheme attendants live in villages which are served by the schemes which they are in charge of. Therefore when there is no water flowing at the tap they also do not get water. Their families have to resort to unsafe sources which usually do not provide sufficient water. Why then, are these people who are responsible for the repair and maintenance not motivated to see to it that water is always available at the domestic point ?

8.4.3 Lack of spare parts

Shortage of spare parts is also one of the most common reasons given to explain the delay in fixing broken pipes. This partly explains the steps which have now been taken by DANIDA to import spare parts to assist in the rehabilitation of water supply schemes.

A vivid example of the constraints caused by lack of spare parts is in the Ismani project. This project was built using the asbestos pipes. There are no spare parts in the country for this type of pipes. When pipes, connectors and other accessories break, the damaged parts cannot be replaced. As a result, the whole line is dotted with pools of water. It will be necessary to replace certain sections of the pipeline with other types of pipes which are available in the country if a lasting solution to the problem is to be found.

8.4.4 Transportation problems

Lack of transportation is often advanced by water technicians as contributing to the delay in fixing broken pipes.

This explanation can be accepted to some degree. Operation and maintenance of rural water schemes is the responsibility of the District Water Engineer's office. In spite of this tremendous responsibility, in Iringa district, the district water engineer's office, it is claimed, has no vehicle although the regional water engineer's office has many vehicles at its disposal. Every time the district water engineer needs a vehicle to perform his duties he has to request one from the regional water engineer's office and sometimes the request arrives at a time when all vehicles have been assigned to other duties. It is argued that this lack of vehicles at the time when they are needed frustrates the efforts of repairing the schemes in time.

8.5 Non-technical problems

8.5.1 General

It would be unrealistic to ignore the impact of technical problems on the operations of the schemes. But what is obvious is that these are not the only problems which cause the low level of service found in many schemes. The experience we have shows that the technical problems are exacerbated by non-

technical problems and it is almost certain that if technical problems are tackled in isolation of non-technical ones not much progress can be achieved in improving the supply of water to rural communities.

The experience gained from the eight schemes in Iringa rural district leads to the conclusion that the major non-technical problems which plague rural water schemes are:-

- Conflicting water use at the source
- Lack of proper operation and maintenance procedures within MAJI
- Lack of MAJI supervision of scheme operation
- Lack of political interest in and support for operation and maintenance of existing schemes.

8.5.2 Conflicting water use at the source

Water supply schemes in rural areas are intended to provide water for human consumption and sometimes for watering cattle and goats. Village water schemes are not intended for irrigation purposes. The conflict which has been observed in existing schemes is mainly between vegetable growers and those who need water for domestic and livestock use. To illustrate the nature of the existing conflict and how it affects the level of water service, let us take the example of Ismani water supply project.

Water for Ismani project is obtained from a stream which rises in the Kisinga - Rugalo forest reserve mountains and flows past the villages of Mbigiri and Lugalo. The intake of the Ismani pipeline is downstream in Lugalo village but the project does not supply water either to Lugalo or Mbigiri villages. The project, however, supplies water to other villages which lie lower than these two villages through which the stream flows.

On the other hand, residents of these two villages have been using water from upstream to grow vegetables, maize and other crops during the dry season. They therefore divert water from the stream for irrigation purposes. Since the irrigation methods used is flooding, it is claimed that a lot of water is taken from the stream and no diverted water flows back to the stream. Consequently the volume of water available for the water supply project falls below the required level.

Villagers who depend on the scheme for their domestic water supply complain that lack of water at their domestic points is caused by "alienation" of water by vegetable growers and they have tried several times to persuade vegetable growers to stop diverting water for agricultural purposes. Their persuasion, it is lamented, seems to have fallen on deaf ears. There are reasons why this has been so.

First, the stream, which is the source of water for the water supply project, rises and flows through the villages which are not served by the project. Instead villages which lie far away do get water from the project. Consequently, the people in the villages where the stream rises do not see why they should not use the water and instead let the water flow pass for use by other people far away. They do not see the reason why they should be responsible for the water needs of other people at the detriment of their own welfare.

Second, the main activity of these villagers, besides keeping livestock, is the growing of vegetables especially tomatoes. Without irrigation, no harvest can be obtained during the dry season. The income derived from this agricultural activity is very high and there is no way people, who depend on this activity for their livelihood, can abandon using water without being offered other alternative sources of income.

It has been argued that much water is extracted from the stream when the flooding system of irrigation is used. Vegetable growers have been advised to use watering cans instead of irrigation channels which take a lot of water. This request seems to have gone unheeded at least for some time.

There are two main reasons: One is the fact that vegetable growers have already invested much in terms of energy in the development of irrigation channels and they therefore do not see any reason why they should not use their developed infrastructure. Second, not all fields are near the stream. Whereas use of watering cans would be feasible for fields which are adjacent to the stream, the work of carrying water from the stream to distant fields would be tedious and time-consuming, the result of which would be to leave certain sections of the gardens unwatered. This is obviously unacceptable to a vegetable grower.

Lack of water in the scheme because of the conflict between water needs for domestic use and for irrigation is primarily not a technical problem. It is more of a managerial problem. No foreign assistance can be expected to solve such problems. It is up to the concerned parties to sit down and discuss the issues and arrive at a compromise on how best to share the existing water. Lack of water at the intake because of the diversion of water upstream is a real problem and it cannot be solved by expanding the intake reservoir indefinitely because the available water is limited. It can only be solved by the concerned parties working out the water sharing procedures and devising a method of reducing wastage of water.

The second type of water conflicts is between water for domestic use and water for livestock. Although in the construction of water schemes the needs of livestock have been taken into consideration by constructing cattle and goat troughs, yet there are cases where cattle owners have interfered with pipelines under the pretext of providing their animals with water. Pipes and other fittings are known to have been broken so that cattle could get unlimited supplies of water at places where cattle owners considered "convenient".

It is not quite clear why people would prefer to water their animals by breaking the system instead of using the provided watering points. Most probably the conflict between water demand for domestic use and livestock use stems from the unsatisfactory distribution of water points. There are sections of the villages which have no watering points for cattle. These are forced to go to neighbouring villages for water. Under this situation the temptation of getting water nearby is greater and may lead to the damaging of the pipes which is being experienced in some of the rural water supply schemes.

8.5.3 Lack of proper operation and maintenance procedures within MAJI

Many rural water supply schemes fall out of use or operate below capacity because of poor maintenance. Poor maintenance stems from many factors.

First, MAJI does not have a systematic programme of maintaining schemes. It would be expected that after schemes have been constructed MAJI would establish a programme of when and how each scheme would be operated and

maintained. One way of ensuring that schemes are always in good working order would be to pay regular inspection visits to all the schemes. Periodic visits would enable MAJI to identify problems when they are starting and to deal with them before they develop into major breakdowns. Unfortunately the experience from the eight schemes under study shows that regular visits to schemes are never done. MAJI seems not to be interested in preventive maintenance and it is difficult to understand why.

Lack of systematic maintenance programme is definitely not due to shortage of necessary resources, such as transportation, as many people in MAJI would like us to believe. With the available vehicles in MAJI, at least at regional level in Iringa, MAJI would be able, in that region, to pay regular inspection visits without causing undue constraint to the transport section within the regional administration.

Poor maintenance of water supply schemes is primarily due to the low priority given to this aspect of water supply management. There is a general disinterest among MAJI personnel for maintenance work; and this apathy may be attributed to the prestige attached to new projects constructed as compared to maintenance work on already completed schemes.

Second, maintenance problems stem from the process by which scheme operators are chosen. Selection of maintenance personnel is usually made by MAJI in consultation with village leadership from among the labourers who happen to be working on the schemes during their construction.

It is claimed by MAJI that before the selection of maintenance personnel, the village leadership is always informed about the nature of the job which is to be performed by the chosen person(s). Usually for gravity schemes, the maintenance personnel is expected to work on a part-time basis. Unfortunately, the village government understands it differently. The selected person is regarded as having achieved some kind of status and he is to be employed on a full-time basis. Therefore the tendency of those in power in the village government is to recommend their next of kin or their close friends in disregard of competence or dependability.

Since the selected maintenance personnel had been engaged on a full-time basis during construction, they resent to be reduced to part-time workers.

The issue of payment complicates the matter further. Most of village leadership have somehow been led to believe that there is a special fund allocated to MAJI by the central government to pay for the maintenance. Therefore under such arrangements, they argue, the village government should not pay whoever maintains the scheme. As a result some maintenance personnel are not paid by the village governments. Some are then paid by MAJI, but others not at all. Even villages which are financially capable of paying for maintenance, the belief that water should be a free good to be provided by the central government makes the village leadership to plead unable to meet the costs under the pretext of the village being poor.

The problem of maintenance is further complicated by the habit of village maintenance men changing jobs. After scheme attendants are selected, they are usually trained in the different arts of maintaining the schemes. They thus acquire some skills which can be used not only in water but also in other sectors. When a demand of people with such skills arises in other sectors and when working conditions and renumeration in these sectors are better than in the water sector, people tend to leave MAJI and drift to these new sectors which offer more lucrative working conditions. MAJI is left without any alternative other than to look for new recruits whom it has to train. This drifting of personnel affects the operation and especially the maintenance of water schemes.

Organizationally MAJI has maintenance units at both district and regional levels. However, the operational problem with these units is that their duties and responsibilities are not clearly defined. Furthermore there is no coordination between the district maintenance unit and the regional maintenance unit. It would be expected that the regional maintenance unit would perform those tasks which are beyond the competence or capacity of the district maintenance unit. This is, unfortunately, not the case. The experience we have shows that the regional maintenance unit hardly does any maintenance work in districts other than in the one in which the regional headquarters of MAJI is located.

Another problem with maintenance at both district and regional level stems from lack of separation between maintenance and construction personnel. The people who are engaged in the construction of new schemes are the same ones who are expected to carry out maintenance work. The outcome of such arrangements is that emphasis is placed more on construction than maintenance because the former carries some kind of prestige.

Lack of separation between construction and maintenance personnel is also reflected in the acquisition and storage of spare parts. Storage of maintenance spares and materials is mostly done along with construction materials. Since the persons in charge are more interested in the construction of new schemes one finds that even spares and other materials which are acquired for maintenance purposes are used up in new schemes. This may partly explain the constant cry of lack of spare parts for maintenance of existing schemes.

Shortage of finance to cover maintenance costs causes many water schemes to fall in disuse. It has been reported that the funds which the regions get from the central government to meet operation and maintenance are not enough even to last for quarter of the financial year in question.

The problem of financial limitation is further exacerbated by poor financial administration/management. In practice, maintenance of rural water schemes is the responsibility of the water department at district level. But for most cases 50 percent or more of the funds which are voted for maintenance or rural water schemes is retained at regional level. The district usually gets less than 50 percent. The funds which are retained at regional level, it is claimed, are hardly used to maintain rural water schemes.

8.5.4 Lack of MAJI supervision of scheme operation

Once the construction of water schemes is completed the practice is to entrust the operation of the scheme to attendants. Very often MAJI does not keep an eye on how these attendants execute their day to day duties. MAJI knows about the operating conditions of the schemes through the reports it receives from the attendants.

Very rarely, if ever, does MAJI go out to see how the schemes operate. This is more so for gravity schemes. Lack of supervision over the operation of the schemes denies MAJI the opportunity of knowing the problems which confront the schemes, and this leads to further deterioration of the services of these schemes.

8.5.5 Lack of political interest in and support for operation and maintenance of existing schemes

This is probably the root cause of the appalling state of most of the existing water supply schemes in the rural areas. It appears that the political leadership, at both regional and district level, in spite of the repeated warning by the top party leadership that the existing tools and infrastructure should be adequately maintained, is interested more in the development of new schemes rather than in the maintenance of the existing ones. This misconception may stem from the fact that many political leaders tend to consider development in terms of the number of new schemes constructed.

In practice, very little attention and emphasis is put on proper operation and maintenance. Nobody at the top, for example, insists that schemes should supply water every day. This attitude is reflected all the way down the bureaucratic and political hierarchy. When it happens that a regional commissioner or a local member of parliament does not insist on these aspects of operation and maintenance the functional leaders do not feel compelled to put much emphasis on these issues either. The technical personnel will always concentrate on those aspects which the political leadership emphasizes.

No study - no matter how extensive or expensive, and no reorganization regardless of sophistication - can improve this situation significantly if general apathy towards the aspects of operation and maintenance of rural water supplies pervades the whole leadership system from top to bottom. More funds and vehicles is no remedy either despite the constant appeal for them. Injection of such resources may result in temporary improvements and apparent changes for the better. But unless the root cause is tackled as well, no long-run benefits for the villagers of such investments are likely to occur.

It is our conviction that with proper political interest and support for proper operation and maintenance, many existing schemes,which are not operating properly or not at all,would be brought back into operation with very little input in terms of finance and materials. This observation is supported by the experience of one case in Iringa district where a scheme was rehabilitated with minimal inputs because of one man being interested in its rehabilitation.

8.5.6 How an amateurish advice, a village meeting and one bag of cement brought water back to five villages

To test the strength of the above observation, restoration of water services to villages served by the Ismani project was undertaken by two socio-economic researchers. Ismani project was chosen for two reasons: first, it is located very close to Iringa town. The nearest village in the project is not more than 15 kilometres. Furthermore, the transport situation in MAJI is never so bad as to prevent somebody who wants it from touring the villages within the project. Under the prevailing conditions the political as well as the technical leadership have easy access to the project and are well placed to know what is taking place in the project villages.

Second, the water supply situation in all villages covered by the Ismani project is simply desperate. At least for the last two and a half years the project has not functioned properly. It could not easily be determined how many times the villagers had complained to higher authorities about the poor water services. But from discussions the researchers found that the authorities were aware of the poor water supply situation in the Ismani project.

This being the water supply situation in the Ismani project two researchers from the socio-economic study group decided to visit Igingilanyi, one of the villages in the project. All the taps were found to be dry and had been so for a very long time. Villagers of Igingilanyi thought it was because the water at the intake at Lugalo was used for irrigation purposes. To pursue the problem further one of the researchers went to the intake together with the assistant district water engineer and the project attendant for the Ismani project.

This group found that a substantial amount of water was indeed being used for irrigation above the intake; that laundry took place just before the intake itself; that a regulating overflow at the intake did not work properly and it was leaking; and that at least five villages: Kitumbuka, Irole, Ismani Tarafani, Kihorogota and Igula did not get water on that day.

An advice given

This being the water supply situation in the project, the researcher who visited the intake made the following recommendations: that the scheme

attendant with some assistance from a few villagers, if necessary, should repair the regulating overflow; that a meeting with the irrigators be held; and that laundry in the stream above the intake be banned forthwith. It was estimated that only one bag of cement was enough for repair of the overflow and the researcher transported this bag from Kihorogota where there is a store for the project to the intake site where repair work was to take place.

Actions taken

The repair of the overflow was immediately done by the scheme attendant with some assistance from the villagers. Also the ward secretary took action now. He called the irrigators for a meeting and persuaded them to limit the use of water. It might have helped his argument now that the overflow had been repaired because the irrigators had previously argued that there was no need for them to save water since a lot of it was flowing past the intake through the leaking structure any way. The laundry activity just above the intake was as well abolished. In addition, fencing around the intake was undertaken.

Results of these measures

After the repair of the overflow, water was found to be flowing to all the five villages which previously had no water. However, one domestic point in Irole was still dry. Lack of water to this domestic point was diagnosed as being due to lack of balance in the system. After balancing the system by adjusting the gate valves water started flowing to this domestic point as well.

The cost of bringing water back to the five villages

The cost of bringing water back to the five villages was estimated to be Shs. 1100/-. The minimum number of beneficiaries were all people in Kitumbuka, Irole, Ismani Tarafani, Kihorogota, and Igula. It was estimated that there were 7300 people in these villages. For all these villages it is safe to assume that no one will use water from traditional sources if the schemes continue working properly. It is also probable that the supply to some of the other villages in the project improved as well.

Given this underestimate of the number of beneficiaries it is safe to say that the cost of bringing water back to at least five villages was less than fifteen cents per person !

Main observation from the Ismani experience

The key question that comes to mind is: why did MAJI not take any action to do the small improvements that were needed ?

Definitely it was not because the MAJI people involved in the exercise of maintaining the schemes were incapable of doing what was done at the intake. They know the project very well. The cement was in the store and the Ward Secretary was around. Transport of cement and the attendant to the scheme was always available. Yet nothing was done to fix the project until an outsider advised them to do so; and with minimum efforts they themselves repaired the project. Why did they not take these steps much earlier ?

These questions send us back in search of the root cause. The problem seems to lie in the apathy towards operation and maintenance which appears to start at the top and run right to the bottom of both the civil service and the political leadership.

This is, of course, a depressing observation. It also implies that attempts to involve villagers in the operation and maintenance may fail. For regardless of any enthusiasm and initiative villagers may show for keeping their schemes in good operating condition, they cannot succeed in this unless they are supported by the government machinery. It is not only the villagers who need to be educated about the benefits of having a good water scheme that supplies potable and adequate water but also the leadership should develop a keen interest in the operation and maintenance of the infrastructures which have already been developed.

8.6 Remedial measures

Conflicting water use appears to be one of the main causes of the low level of service in many water supply schemes. These conflicts stem from competing water demands which are not properly taken care of during the planning and construction stages. It is suggested that such conflicts can be avoided, at least in the new schemes, by taking the following steps:-

- Before construction of schemes, demands for cattle watering and irrigation purposes should be determined in consultations with the actual and potential users of water. If it is found that the

available water at the source is not enough, a system of water sharing should be developed and agreed upon by all the concerned parties. The experience we have from the Ismani project shows that the irrigators are, for example, willing to compromise their demands, provided the arrangements of water sharing are agreed upon and adhered to by all involved groups. Development of water supply schemes to satisfy domestic needs in total disregard of other water demands is bound to result in conflicts as no user group would be willing to sacrifice its use of water

- In the case of Ismani project, and most probably in other projects as well, the problem of water shortage and the ensuing conflicts are further exacerbated by lack of storage tanks in many villages within the project. Many villages get their water supply directly from the main line. As a result, as soon as there is water shortage at the intake because of the diverted water, villages without storage tanks are immediately affected. It can be argued that with storage tanks in each village, the conflicts of water which are found in many schemes would be minimized. These storage tanks would fill up during the night when there is virtually no water use, so that during the day when irrigation would be using a lot of water from the source, domestic water needs would be satisfied with water from storage tanks. Storage tanks would, for example, be designed in such a way as to be able to hold enough water to meet a day's demand
- The conflict between domestic water needs and water for livestock can be solved by making sure that the exact number and distribution of animals in each village is known and therefore enough watering points are provided. At present, it seems cattle troughs are provided on a basis of estimates and this practice results in either an undersupply of watering points in some villages or generous livestock watering facilities in others.

The problems of operation and maintenance can be reduced if MAJI and other concerned parties get more interested and emphasize more aspects of water supply. As it was pointed out above, it seems MAJI as well as the political leadership appear to value more the construction of new schemes rather than the maintenance of the existing ones. Improvement in the operation and maintenance of schemes can be achieved by taking the following steps:-

- MAJI should in each region or district develop a maintenance programme that would cover all schemes in an area. This programme would have to include periodic inspection visits to schemes
- There is absolute need of having a separate team responsible for maintenance duties. The practice of the same personnel being responsible for both construction and maintenance leads to serious neglect of maintenance aspects of many schemes. Materials and funds voted for maintenance purposes should be kept separate and should not be mixed with those intended for the construction of new projects
- Furthermore, funds allocated to maintenance of rural water schemes should be kept at district level where action is supposed to take place instead of being retained at regional level.

9. EXPERIMENTS WITH HEALTH EDUCATION

9.1 Introduction

9.1.1 Main problem

The socio-economic study conducted in Iringa, Mbeya and Ruvuma Regions in 1980-81 among others concluded that 'permanent improvements in health are unlikely unless a safe and convenient water supply is accompanied by other sanitary measures and health education' (cf. section 11.1 of volume 12). It noted that there is a high prevalence of infectious diseases in the three regions despite its confirmation that people have a fair knowledge about diseases and health rules. People's knowledge about diseases and health has not always changed their behaviour and attitudes about health, to make sure that knowledge about health leads to corresponding improvement in health and sanitation standard. The experiments with health education in selected villages in Mbeya and Ruvuma Regions have been initiated as a result of these conclusions.

9.1.2 National health policy

Post-independence national health policy stems from the Arusha Declaration of February 1967, which is an ideological blueprint for the socio-economic transformation of the Tanzanian society. Its salient features include emphasis on rural development, self-reliance as an instrument for socio-economic development, and mobilization of resources for elimination of poverty, ignorance and disease which were declared priority national problems. Self-help and self-reliance is the basis of socialist village organization and of rural socio-economic development with government assistance to back-up self-help efforts, especially in top priority areas such as health services, adequate and wholesome water, and education for the people.

The objective of the national health policy was therefore to extend comprehensive basic health services equitably to all within the limited available resources. This was to be achieved through the provision of a network of village health posts, i.e. dispensaries and rural health centres. These rural health institutions were to be adequately furnished with basic equipment and manned by inexpensive, suitably trained health workers. The villagization programme of the mid-1970s was supposed among others to render the extension of social services to rural areas economically viable.

Emphasis was placed on disease prevention, community involvement and health education of the public in preference to extensive hospital based care.

The present rural health delivery system officially aims at reducing the incidence of disease, with less and less emphasis on curative services which have only the capacity to influence the effects of disease but have virtually no impact on the incidence, except when it is applied to eradicate the reservoir of disease in a community.

Between 1970/71 financial year and 1978/79 the recurrent budget allocation for preventive services has grown from 5 % in 70/71 to 12 % in 78/79 while hospital services share have declined from 82 % to 63 % during the reported period. Development expenditure for preventive services have grown from 0.3 % to 10 % during the period.[1)]

Must compare Norway (add)

Community participation in the delivery of health care to rural areas is getting special emphasis in the National Health Policy.

"His Ministry (Ministry of Health) would put emphasis on community participation under the health policy now in preparation ..... the health policy to be prepared would put more weight on community participation in decision-making and implementation .....the current trend whereby the masses remained passive recipients must be changed ....." to quote from Daily News Saturday May 29, 1982 reporting on the Minister of Health, Dr. Aron Chiduo's speech while closing a five day seminar. Villagers are currently involved in construction of dispensaries and contribute labour and bricks and in planning and implementation of environmental sanitation in health campaigns against such epidemics as cholera, measles and bacillary dysentry.

The National Health Policy is clearly seen in the speech of the Minister of Health, Dr. Aron Chiduo while opening the second Annual Scientific Conference of the Paediatric Association of Tanzania on March 4, 1982 at the Muhimbili Medical Centre.

".....A primary health programme could make essential health care accessible to all individuals and families through their full participation, by means acceptable to them and at a cost the community can afford ..... the doctor's education which at present emphasizes his responsibility to the

care of the individual patients using all available skills would have to be changed to emphasize the care of the community ..... If Tanzania wants her people to benefit from the modern health care, she should not be obsessed with quality and emphasis should be put on the construction of small health units adequately furnished with basic equipment .... emphasis must be put on disease prevention and health education in an effort to improve the health and nutrition standard of the people."[2)]

9.2 Shortcomings of previous and present health education programmes

Man power and capital resources are too scarce to carry out health education activities in all villages. Health education therefore has been very sporadic and mainly confined to areas that fall victims of outbreaks of epidemic diseases such as cholera, diarrhoea, measles, malnutritional disorders and to villages in the close vicinity of hospitals, health centres and dispensaries.

Whenever an epidemic disease is on the verge, the prevention unit is very active. However, it appears that it is always one step behind. First the outbreak occurs and then attempts are made to trace the source. The same applies to individual cases being attended to at the dispensary. If a patient is received with diarrhoea the medical aid in charge will - if time is available - impart a little information on how to avoid diarrhoea in the future.

But treatment has priority. If the medical aid has got time for teaching s/he may make use of a leaflet or poster which illustrates causes and prevention of diarrhoea. But due to shortage of paper many dispensaries do not have all the leaflets published and most dispensaries do not have any posters at all. Man power is another constraint. Many dispensaries (as well as health centres) do not have sufficient staff to deal satisfactorily with the often huge numbers of patients. Usually, there is only time enough to treat the patient (if medicin is available).

However, particularly immidiately after an outbreak of cholera or dysentry the rural medical aid together with village and ward officials may make house-to-house visits to inspect the pit latrine and sanitation in general. During the period of such visits one will see villagers cleaning the compounds, digging new pit latrines etc. But this behaviour is seldom based

on a clear understanding of the reasons behind the requirements raised by the authorities, who usually fine households without proper sanitary facilities.

The villagers are often not being told why they should do this or that but are simply being ordered to do it or else ..... This practice is understandable in view of the shortage of man power and the little experience the authorities have of involving the villagers in a meaningfull way in the improvement of their environment.

In short there are no standardized methods for carrying out health education programmes. The most effective health education programme that is said still to have some impact on awareness among the rural population on diseases is the "Mtu ni Afya" (1973-74).

The vigour of the campaign cooled down soon after the evaluation exercise of 1974 because there has been no proper follow-up. People's awareness of diseases has hardly resulted in the development of permanent desireable health attitudes and habits that could make the application of health rules in day-today life a matter of course.

The health and sanitation standard of the rural people is still below the desired standard. Much remains to be done if the year 2000 target has to be attained.

Below follows a description of two experiments with health education which were carried out in Mbeya and Ruvuma in view of discovering guidelines for implementation of health education projects, which could be followed in spite of the mentioned scarce resources. At the same time the experiments should lead to firm proposals for the integration of health education with water projects.

9.3 The experimental health education projects in Mbeya and Ruvuma

9.3.1 Background

A health education project was scheduled for the third year of the Socio-economic study on the DANIDA Water Project (see Quarterly Report No. 7, March 1st. 1982). In view of the present status of health education in

Tanzania it was decided to make experiments with two health education projects - a rather bold attempt considering the fact that we had few previous experiences on which to base our demonstration. A Unicef paper states that "there are few documented cases of comprehensive education activities that have been implemented in conjunction with and specifically related to the problems of water and sanitation improvement".[3)]

In chapter 11 on Water, Sanitation and Health of volume 12 of the Water Master Plan, two approaches to health education were outlined:-

- Education through formal channels
- Education through informal channels.

In the experiments described below a mixture of these two approaches have been followed with more emphasis on the latter.

The study from Wanging'ombe (Iringa) reported on in volume 12, chapter 11 showed clearly that most villagers have a clear understanding of most common diseases. Almost 75 % of all respondents gave "correct" answers as to the cause of diarrhoea and 71 % of the respondents knew about faeces-related diseases (p. 11.14 and p. 11.15). The study concluded that "in the Wanging'ombe area most respondents are fairly well informed about the causes and preventions of diseases" (p. 11.22). For this reason we only paid little attention to the etiology of diseases. More emphasis was given to practical solutions, in order that the villagers could improve their health without investing resources unnecessarily.

9.3.2 Objectives

While the overall purpose of the experiments has to be seen in the context of the planning of future health education projects in combination with water projects, the specific objectives for the health education experiments were:-

- To increase awareness among the target group of all diseases which may be related to water in one way or the other or to poor hygiene or poor sanitation
- To encourage individuals and groups to improve or change their environment in such a way that it can facilitate and reinforce a behaviour pattern which is in agreement with principles for proper health, hygiene and sanitation.

It was assumed that behaviour modifications can only occur when health education is accompanied by changes in the physical environment of the villagers.

9.4 Experiment with health education in Mbeya

9.4.1 Baseline study

Utengule village was chosen for the experimental project though it already has a piped water supply (gravity). The implementation of the DANIDA Water Projects had not progressed far enough for us to include a health project. Secondly, it was found unwise to experiment simultaneously with two unknown variables, viz. village participation and health education. Finally, Utengule village was well known from previous studies (see Chapter 10: Contamination between collection and consumption).

Before the pilot project was designed, a baseline study was carried out for three reasons. First, it was assumed that any health education programme should be based on the actual disease patterns of the villagers in order that it could have any impact, and secondly, without a baseline study it would be impossible to estimate the impact of the programme (albeit, it is admitted, that a real evaluation is impossible within the short time at our disposal for this experiment). Finally, we found it necessary to carry out observations of the present health practices simply in order to increase our understanding of the village.

The baseline study consisted of 4 parts:-

- A study of the contamination between place of water collection and consumption
- A study of hygienic and sanitary habits among the villagers
- A survey among 34 households selected through cluster sampling and
- A study of the practice of local medicine women compared with the standard of the local dispensary.

Contamination between collection and consumption of water

The "contamination-study" has been described in chapter 10 of volume 12 of the Water Master Plan study and in chapter 10 of this volume. This study showed generally that "the water in the storage containers .....was of a worse quality than that in the pipes", that is, at the tap.

Hygiene and sanitation

~~To explain our findings~~ from the "contamination study" 14 days were spent in the village to observe people's behaviour as it relates to hygiene and sanitation.

The findings from these observations are reported in chapter 10. The main findings were: children between two and six years of age were very dirty and maybe the primary cause of contamination of the water in the storage vessel; the cup for scooping water from the storage container was seldom cleaned; some women would irregularly clean the storage vessel with sand, but in most cases new water was just poured on top of the old in the vessel; rubbish was lying around the house; most women did not wash hands when dealing with food; children seldom washed hands before meals; pit latrines were not equipped with water for washing hands, and nobody was observed washing hands after using the latrine.

Based on the findings of the studies on contamination and hygiene/sanitation we concluded that a health education component ought to be part of any other project which aimed at improving the health of the people.

The household survey

To get an indication of the impact of the pilot project 34 households were selected through cluster sampling. Two areas were selected. One area was just around the dispensary and the other one was more than 400 metres away from the dispensary. Within these two areas the mentioned number of households were randomly selected.

It was assumed that the households nearer the dispensary, which incidentally also meant that they are situated in the main populated areas would have a higher degree of cleanliness around their houses whereas we assumed that households far away would keep their surroundings less clean. The reasons for these assumptions are that households in the main populated area near the dispensary will be under the influence of the latter as well as under a general social pressure from neighbours. Furthermore, government officers may pass their houses at any time and sometimes they may carry out inspection of pit latrines.

The table (9.1) below confirms our expectations. We notice a relatively high percentage of households without a pit latrine as soon as we move out of the main populated area. In the household survey conducted in 1980 in preparation of the Mbeya Water Master Plan it was found that 19 % of the households in the Dry Zone were without a pit latrine. In our small sample of 32 households almost 13 % of the households were without a pit latrine, but when we moved more than 400 metres away from the dispensary this percentage increased to 21 %.

Characteristics of sanitary facilities	Percentage of households by distance from dispensary	
	more than 400 metres (N=14)	less than 400 metres (N=20)
Without pit latrine	21	5
Dirty pit latrine	14	20
Yard dirty	71	42
No pit for refuse	57	47
No separate kitchen	28	15

Table 9.1 - Sanitary conditions among Utengule households before pilot health education project

The general impression gathered from the table is that the further away a house is situated from the village center (viz. the dispensary) the more likely it is that its inhabitants do not strictly follow principles for sanitation and hygiene.

It was expected that the evaluation of the pilot project would show an improvement among all households, but not that the relative difference among the two types of households would vary from the above.

The practice of local medicine men and the state of the dispensary

To arrive at a good understanding of the present health situation in Utengule we talked with all the practising medicine men. Altogether there are seven. One of them is a woman.

Combined they received approximately 200 patients during the month before their being interviewed. Thus, based on reports from the medicine men them-

selves about 11 % of the villagers made use of them assuming that all patients came from Utengule village. However, most likely some of these medicine men have exaggerated their number of patients. When we asked 30 randomly selected women we were informed that only 3 % of the adults had gone to the medicine men while reportedly none of the children did. Since the villagers know that they are expected to attend the dispensary when sick, they are most likely to give too low figures. The true number therefore is probably somewhere between 11 % and 3 %.

The medicine men claimed that 43 % of their patients were children and 31 % of them women. Even if the percentages are exaggerations we notice that women and children have more health problems than the men, in as much as their visiting both the dispensary and the medicine men can be taken as an indication of this.

People visited the medicine men with numerous symptoms, the more important of which were diarrhoea, convulsions in children (degedege), measles, cough, vomiting, childlessness, and evil spirits.

All the medicine men charge for their services, whereas the medicine at the dispensary is free.

Based on informal talks with randomly selected women we believe that the health education project will not have a direct impact on the number of visits to the local medicine men as long as the facilities of the dispensary do not improve. The reason being that people almost always first go to the dispensary with their symptoms, because it is free, but when the symptoms continue, many consult the medicine men. It may thus be assumed that only when the availability of different kinds of medicine increased and the capability of the dispensary staff improves the visits to the medicine men will decrease. However, it is beyond the scope of this study to interfere with those variables, that is medicine and staff. Consequently, we did not intend to do a follow-up of the practice of the medicine men.

Utengule village is served by a dispensary which was built in 1942. Five people are employed at the dispensary. However, at the time of our visit it appeared, that only two were present. Those were the rural medical aid and a nurse assistant.

The dispensary is open for the public during normal office hours for government institutions. Most patients attend during the morning. The rural medical aid complained about a general lack of medicine.

The work of the staff is divided between preventive and curative health services. Most of the time, however, is spent on treatment. The rural medical aid claimed that she spent five minutes each morning teaching the waiting patients about the importance of sanitation and personal hygiene. It is our impression that this "teaching" is administered as commands rather than information on disease and their causes. It was observed that patients just listened. They did not try to ask questions.

The dispensary has two rooms. One of the rooms is full of equipment and drugs, with an examination and delivery bed in one corner separated by a screen. This room is used for both maternal and child care clinics. There are no chairs for women to sit on. They sit on the floor in a long line holding their babies as each baby gets its vaccination or drops. Consultation and advice is given in the same room, the screen and bed are used for examinations and deliveries, as well as for injections for both men and women.

9.4.2 The design of the Utengule Health Education Project

In view of the considerations made above and bearing in mind the constraints of the present man power shortage of health workers in the rural areas it was decided to carry out a pilot health education project which as much as possible should apply a participatory approach. We aimed at training a cadre of villagers who should teach other villagers. It was also decided that the project primarily should focus on women and children, since they are the first ones to be hit by sickness. The district health authorities were involved in all aspects of the planning of the project, but due to a cholera outbreak elsewhere they were not involved in the actual implementation.

Originally, it had been planned to involve local Afya staff and the primary school teachers. But the teachers' tight working schedule combined with the final exams for standard seven made this impossible. The dispensary staff could not participate fully either because the times of the meetings chosen by the women participants (see below) were not compatible with their

working hours. Most project activities took place in the morning when the dispensary staff were busy attending to patients, consequently they too could not be fully involved. For these reasons it was decided that the socio-economic group would implement the pilot project. The project staff consisted of two female assistants with occasional support from the ward health assistant.

Criteria for project design

The project design described here made up the background for the preparation of the curriculum and for the actual implementation of the experiment. Assuming that a given behaviour pattern reflects some kind of rational thought then behaviour modification requires changes in the conceptual set-up of the individual. Presumably a villager will give some kind of intelligent answer if asked why s/he behaves in a certain way. It may be that s/he bathes in the river because it is too troublesome to carry the water all the way to the home. In most cases the argument is that a behaviour pattern has become instituted because it is timesaving and thus - in the short run - energy saving.

In order that a new behaviour can be instituted it simply does not suffice to command the individual. S/he must be made to understand that - if taking a longer view - the same behaviour may lead to deterioration of her/his health.

The health education project should lead to new knowledge and thus a change of attitudes. However, this will seldom be enough. Sometimes, actual changes in the physical environment will be needed to prompt the desired behaviour modification. Furthermore, since attitudes are formed in the process of interacting with other people, group discussions were considered to be the best method for modifying attitudes and behaviour.

Mothers, infants and young children belong to the highest risk groups. Furthermore, traditionally they are the ones with responsibility for the collection of water. Therefore the aim of the pilot project was to improve the health of mothers and children and thus indirectly that of the whole family - through modification of behaviour patterns specifically related to water, sanitation and personal hygiene.

Guidelines prepared for project staff

The following sections were given to the project staff before moving into the village and meant as guidelines in their implementation of the project:

"Methods
At village level the programme should make use of two kinds of "teachers", both of whom should have received an Afya prepared crash course covering the most common water related diseases - their causes and prevention. The two kinds of "teachers" are 1) village health educators and 2) health prompters.

Village health educators
The village health educators should all be women. Each village health educator shall lead discussion groups consisting of approximately 10 people from the target group. Most likely she is not an expert on health, but knows sufficiently about water/ sanitation related health problems to raise awareness among members of the group. She should also be able to lead the discussion to proper solutions. The village health educators can be chosen from among the village water committee, tap-attendants, primary school teachers, adult educators, village leaders (when they include women), or other interested female villagers.

Upon completion of the crash course, each village health educator will be equipped with a list of key words, so that she does not forget important problem areas when conducting the discussions.

In the primary school all the teachers should be involved. Health issues should form an integrated part of all subjects.

Health prompters
The health prompters include anybody who is in a position to prompt the appropriate behaviour. They include in particular village water committee members, tap-attendants, scheme attendants, teachers in general, village leaders, MAJI-staff (especially during scheme implementation), and other relevant, but interested individuals.

The tasks of the health prompters are to 'remind' the villagers of the right behaviour. This may happen whenever they observe that the appropriate health behaviour is not being followed (e.g. at the domestic point, at the pombe club, at the traditional source etc.).

In this experiment the health prompter will play a minimal role except maybe for members of the village water committee. Ten-cell leaders with responsibility for the care of domestic points may also play a prompting role during the project.

Planning

It is envisaged that the whole programme to a large extent will be planned together with the villagers. This is particularly important in view of timing, but also when it comes to explaining the whole programme and ensure support from the villagers. About one week should be enough for planning the implementation of the pilot project together with the villagers.

Approximately one week should be used to train the health educators and health prompters - and about three weeks should be used for conducting group discussions. Before the training begins, one or two films should be shown to all the villagers. Hopefully, this will catch the interest of the villagers.

In a village with about 2,000 inhabitants one will need to train approximately 20 women as village health educators. Each woman should lead two discussion groups consisting of approximately 20 women in each group. It is suggested that each group should meet twice weekly, an hour each time for maximum three weeks. During the same period the primary school teachers will provide health information to the schoolchildren."

These were the guidelines given to the project staff. Below it will appear that the actual implementation had to differ from these on certain points.

Curriculum

The main subjects to be covered during the training of the village health educators were suggested by the socio-economic group. It had also specified

the desired behaviour to be achieved in relation to each main subject. The actual training items were prepared by the district health officer. It had been agreed that the training items should include reasons for the desired behaviour to be achieved.

The subjects were divided into five topics:-

- Water use at home
- Water use at the tap
- Water use at traditional sources
- Sanitation and personal hygiene and
- Cattle keeping.

In the appendix to chapter 5 the complete content of the training manual for the village health educators is shown.

Some of the "training items" are not realistic in some parts of present-day Tanzania. Several times during the training the participants were to be instructed in the use of soap. This instruction would certainly have been a good one if soap had been available. Instead it was discussed what could be done when soap is not available. Another example is the introduction on the importance of boiling water. Naturally, boiling water is necessary in order to obtain clean water. But in view of the big work involved in fetching firewood it is doubtful how many women would boil the water even after having realized its importance. The importance of boiling water was emphasized, but so were other ways of avoiding contamination of the water.

Since the training of the village health educators was imparted in an informal atmosphere other topics cropped up and were freely discussed. These topics included problems of family planning and child spacing, food and nutrition, expansion of a maternity wing and more privacy at the dispensary etc.

9.4.3 Village health educators in Utengule

On arrival in the village, the project team called all village women together through the ten-cell leaders (balozis). Approximately 100 turned up. During this meeting they were informed about the project in general

and specifically how it was intended to be implemented. The women present were given opportunity to give suggestions for changes. Generally, they expressed support for the project and 16 women were chosen as village health educators. These women were trained for 5 days about two hours daily. During the training everybody formed a circle together with the project staff. It was attempted to create a situation similar to that to be used by the village health educator during discussions with the other women.

The topics under discussion were not new to the women. They made suggestions, comments, asked for clarifications, different views were aired and deliberated upon. They did not agree all the time. On certain days lively discussions were held. Most of the women were very vocal and knowledgeable.

Although the group was comprised of women aged between 19 - 50, the discussions were well balanced. No one age group tried to dominate the other, each was willing to learn from the other as each had something to offer. The women benefitted too in that the programme offered them a chance to address fellow women publicly, to analyse problems and to find solutions to these problems.

The training was carried out with much enthusiasm from all group members and on all the meeting days every woman turned up except for two, who missed a day or two to attend to urgent matters.

Description of village health educators

What characterizes the village health educators selected by the women and to which extent can these characteristics be expected to have influenced the outcome of the pilot project ? It is beyond doubt that their personalities, their understanding of health problems, and their influence in the neighbourhood had a big impact on the progress and success of the project.

To clarify some of the issues involved the village health educators were asked about a number of socio-economic variables on which one could expect that they would differ from other village women. Since we did not choose a control group with which to compare the chosen village health educators we had to rely on our general understanding about village women.

From table 9.2 below it appears that none of the women were outstanding on any of the variables which were used for their description.

Number	Age	Marital status	Number of children	Educat. background	Position in village	Pos. of husband	Acres of shamba
1	34	Married	10	none	none	none	4.5
2	22	Married	0	Std. 7	none	none	7
3	24	Married	4	Std. 2	none	balozi	3.5
4	35	Married	3	none	none	lit.teac.	3
5	22	Married	1	Std. 7	none	vill.govn.	2
6	23	Single	2	Std. 7	none	-	2.5
7	40	Married	0	none	balozi	none	0
8	19	Married	1	Std. 7	none	none	2
9	50	Divorced	0	none	none	-	1
10	36	Widow	0	Std. 4	none	-	7
11	30	Married	6	ad.class	none	none	4
12	30	Married	0	none	none	Med.man.	6
13	25	Married	2	ad.class	none	none	10
14	25	Married	3	none	none	none	0
15	47	Married	1	none	none	balozi	2
16	29	Married	0	none	none	none	3

Table 9.2 - Description of village health educators.

Table 9.2 shows that 82 % of the women were married. The average age was 30 years. Almost 40 % did not have any children and 50 % were illiterate. Only one woman held any formal position in the village, while four were married with husbands holding some influential position in the village. The average size of shamba does not exceed that for the whole zone (see page 2.26 vol. 12).

We think that these women have been chosen by the other women because they are known to be outspoken on issues of village concern. All of them were known to take good care of their families and to keep the environment of their houses clean. The fact that 40 % of the women did not have children may also have given these women more time to spend on project activities.

The project team would not have been able to choose these very same women based on any formal criteria because the variables which presumably influence progress of the project do not allow themselves to be operationaliz-

ed. If the project team had decided that it should choose the village health educators it would probably have chosen age and educational background as important criteria. Had this been done we may have ended up with quite a different group of village health educators and consequently different results of our project. The cleanest house in the village was kept by a 40 year old illiterate health educator.

The importance of allowing the women to select their own village health educators cannot be emphasized too much.

Health prompters

As mentioned above it was not intended by the pilot project to give any training to health prompters. However, a certain spill-off effect from the project took place. It became obvious during the course of the project that the village water committee members, ten-cell leaders and dispensary staff carried out functions as health prompters.

Although the aspect of health prompters was not formally initiated in this village apart from the village water committee's regulations, a few concerned people within the village, by virtue of their position in the village or due to personal initiative, did make it their responsibility to keep reminding the villagers on the right hygienic behaviour.

9.4.4 The discussion groups

Originally it had been planned that each group should consist of twenty women. It was assumed that the smaller the group the more concentraction and attention each woman would get, but during the actual implementation it was realized that limiting ourselves to such small groups would result in the project staff not being able to control and monitor the groups effectively. Since it was assumed that attendance would never be total it was decided to group at least four ten-house-cells together, from which the women formed one discussion group. All together 8 groups were formed.

Ten-house-cells beyond three kilometres from the village centre were excluded due to the long travelling distance involved, which would have made supervision difficult.

These groupings were necessary for efficiency. Most of the women were familiar with each other. Consequently, the discussions tended to be infor-

mal, lively, and common experiences were easily shared without any inhibitions.

For each meeting the group leaders brought with them a register of the women's names in their own group. Each name was called and those present or absent were marked accordingly. They also brought with them a list of key words of the topics to be discussed.

There were two village health educators in each group. They were to act as discussion leaders. By assigning two to each group it was ensured that at least one leader would be present in case the other could not come for various reasons. At least one of them was literate. Furthermore, for a majority of them this was to be their first experience in addressing an audience publicly and it was thought that the two would be supportive of each other. The primary role of these village health educators was to lead and guide the discussions, and also to encourage each woman to participate and contribute ideas during the discussions.

Topics discussed in the groups

Below follow some examples of what was discussed in the discussion groups. All the village health educators had been given a list of key words on completion of their training. These key words were supposed to help them lead the discussions in a meaningfull way, while directing the discussions towards practical solutions of the problems raised.

On discussing "water use at home" everybody admitted that they did not boil tap water because they considered it to be clean. The women were reminded that this is not so, and that results of a survey carried out earlier had shown that tap water is polluted to some extent, and certainly water can become contaminated between collection and consumption.

The need of covering water from source to home was accepted but it was pointed out that it was not really practical since buckets for drawing water are made and sold without lids.

The participants emphasized the importance of having enough utensils for practical purposes in the homes. The question of utensils was discussed at length by all the groups. Women expressed their concern because they could not afford to buy all the utensils needed for safe storage of water.

Most items, for example plastic buckets, plates etc. were considered to be too expensive. The women are expected to provide all the utensils in the home. When she gets married it is left to her to provide pots, plates, and buckets, but with the present inflated prices women, especially newlyweds, find it difficult to acquire these essentials. Because of the high costs of utensils alternatives for cheaper traditional home-made items were suggested, for example containers made from gourd plants could substitute metal cups for drinking and scooping out water, "ungo" or a small woven flat mat for covering water instead of plastic plates etc.

When discussing "water use at traditional sources and at the tap" most women argued against bathing and washing laundry in the river but the majority admitted that it was labourious to draw water in a bucket and bathe and wash some distance away or at home. It is easier to wash and bathe in the river and do the laundry on the bank (or at the tap).

At this point of discussion some women made suggestions for building a bathing shed and washing slab near the domestic points. This, they felt would alleviate the problem of water contamination especially when bathing was done in the river.

The ideas of a washing slab and bathing shed were discussed with much excitement, one woman who had lived in Arusha, another in Mbeya, and Tanga towns respectively, described the different types of washing slabs they had seen, including their drainage patterns. Some women listened intensly because they had never seen a washing slab, drawings of a model were made and explanations given. The idea spread to all the groups.

When the groups discussed "sanitation and personal hygiene" some claimed that the habit of some men to build small houses left no room for the wife to arrange and maintain a better house; some households e.g. have no kitchen. The living room is used as kitchen, sleeping room and store for utensils etc. Under such conditions it became impossible to follow even simple principles for sanitation and personal hygiene.

When the topic of "cattle keeping" was raised in the discussion groups, many women initially refused to discuss it on the ground that cattle keeping is the responsibility of men, including milking. An argument was put for-

ward that women should discuss at least the aspects of health and cleanliness, such as washing of hands and cleaning of bucket before milking. It was also emphasized that milk plays an important role in the diet of especially the children and care should be taken to boil the milk before consumption. Milk is used for preparing vegetable soups, for porridge, drinking and for making of yoghurt. In the discussions the women group made use of the few posters and pamphlets which were available at the dispensary. The illustrations were studied carefully and the materials were exchanged between the groups.

Attendance

An indication of success of any project is found in the number of people attending during the project period. From table 9.3 below we see that almost 40 % (346) of all the village women enrolled in the health education project.

Mostly due to the start of the agricultural season attendance was never total. In total three discussion sessions took place in each group during a period of two weeks. Roughly speaking we notice that almost 50 % of the enrolled women participated in each discussion session. Group F had to cancel its first meeting because the members had not been properly informed.

Group	No. of members	Attendance			
		1st meeting	2nd meeting	3rd meeting	Mean
A	36	12(33%)	19(53%)	20(55%)	47%
B	51	22(43%)	32(62%)	31(61%)	55%
C	31	18(58%)	13(42%)	13(42%)	47%
D	59	13(22%)	25(42%)	24(40%)	35%
E	29	20(69%)	15(52%)	15(52%)	57%
F	30	none	15(50%)	13(43%)	31%
G	41	21(51%)	14(34%)	21(51%)	45%
H	44	32(73%)	25(57%)	14(31%)	53%
I	25	16(64%)	18(72%)	13(52%)	62%
Total	346	154(44%)	176(51%)	164(47%)	47%

Table 9.3 - Attendance during the pilot health education project.

The relative high attendance is attributed to the following factors:-

- The participants never had to walk far since they were selected among the neighbours of the particular village health educator
- The participants themselves choose the meeting times from days given to them by the project
- All group meetings were supported by the project team who were able to supervise all meetings at least for some time
- The concerned balozis informed participants on location and time of first meeting and often reminded them of the following meetings
- Each meeting was planned in such a way that whatever topic was raised within the theme of water, health and sanitation the village health educator would know how to prompt the discussion further by using a list of key words
- Attendance lists were kept in each group.

The reasons for absence were many and depended to a large extent on the individuals. Some had to attend a funeral, one had to thatch her house, others had to look after sick relatives. At other times the usual daily chores interfered with the project; e.g. fetching of firewood and water, grinding, child care and agricultural work. The latter activity demanded a lot of time from many women since the rainy season had just started. If it had rained the previous night, attendance would be adversely affected. In view of this the turn-out is remarkable.

Practical outcome of discussion groups

The project staff who had monitored all discussion groups were able to steer the final discussions towards solutions which were agreable to all groups.

One of the participants summed up the whole pilot project, when she said, that it was unrealistic to educate the people and tell them not to bathe in the river, not to wash in the river etc. when there are no other alternatives. Only with such facilities constructed at certain domestic points, some of the problems raised during the discussions may be alleviated.

After lengthy discussions, the participants decided in favour of a rectangular shaped washing slab and sheltered bathing facilities for men and women. After a meeting was held with the village water committee,the village secretary and the village fundi,the following agreement was made:-

- Members of VWC should supervise the construction of an experimental washing slab and shelter for bathing, carried out by the village fundis
- The fundis would be provided with enough labour on each of three working days normally used for communal activities
- The project would supply cement, and other building materials not available locally
- The village would supply locally available material such as sand, burnt bricks and skilled and unskilled labour.

After the meeting which lasted roughly about one hour, a visit was paid to the dispensary and the site for the washing slab was selected and surveyed.

9.4.5 The pilot project and schoolchildren

The original plan had been to include the schoolteachers both as health educators and prompters. Unfortunately because of their tight schedule at this particular time it was not possible to involve them. A survey of the school and its curriculum was carried out together with informal talks with both the teachers and pupils.

The curriculum includes some health education for all classes especially on personal hygiene and cleanliness of the surroundings. They are taught how to clean teeth, nails, clothes and bodies, how to use and clean latrines. Children in standard one to four are taught health related issues for one hour per week and pupils in standard five to seven are given health education for two hours per week. However, it was revealed that what is taught - if anything at all - is left to the discretion of the teachers. There was no evidence that pupils were taught about the causes and prevention of diseases.

There are no regular medical check-ups for pupils or vaccinations for that matter. The rural medical aid claimed that it was the responsibility of the district health authorities and that even if they wanted to, they could not, because they did not have sufficient drugs. Furthermore, they were understaffed.

However, the teachers agreed to include and teach health education to the adults during their adult literacy classes which were just about to start.

A copy of the health education programme was given to the teachers to use as guidelines for teaching. No attempt was made to check whether it was used or not.

9.4.6 Findings of the Mbeya health education experiment

The pilot project stretched over a period of $2\frac{1}{2}$ months including preparation, implementation and evaluation. Consequently, it is impossible at the present moment to make a final evaluation of the project's impact on health improvements. We did however make a follow-up of the household survey and we also looked at the frequency of visits to the dispensary and incidence rates of water related diseases. For logistical reasons it was impossible to repeat the "contamination study".

From table 9.4 it is seen that some changes of the sanitary conditions have taken place during the period of the pilot project. The data on which the table is based were collected two weeks after the completion of the pilot project.

Characteristics of sanitary facilities	Percentage of households before and after health education by distance from dispensary			
	more than 400 m (N=14)		less than 400 m (N=20)	
	before	after	before	after
Without pit latrine	21	7	5	0
Dirty pit latrine	14	7	20	10
Yard dirty	71	64	42	30
No pit for refuse	57	21	47	10
No separate kitchen	28	28	15	15

Table 9.4 - Sanitary conditions among Utengule households before and after the pilot health education project

There is a tendency towards improvement of the environment. This improvement corresponds with our own observations during and immediately after the pilot project in the village as a whole and not only among the selected households. Noticeable changes were observed taking place during the health education week. Latrines appeared to be much cleaner, a few of those without latrines were observed digging fresh ones, and among some of those who al-

ready had latrines a few were engaged in renovating them. The houses looked much better than during a visit five months earlier. Floors and walls were being smoothened and cracks filled in. There were also freshly dug rubbish pits. The yards and plots surrounding the houses were in many cases cleared and grass burnt, ready for the rainy season.

Strictly speaking, we are not able to conclude whether all these activities were the results of the pilot project alone. Simultaneously with the pilot project the Ward Secretary moved into the village to set up his new ward office. His presence is likely to have had a reinforcing impact on the behaviour of the villagers in the direction found desirable by the pilot project. Probably, the most important finding of the pilot project has to be found in its organization. The set-up of the project was an experiment right from the planning stage. Using attendance as an indication of success we conclude that it was successful. The attendance might have been even higher had the project taken place outside of the agricultural season.

Some women felt that the programme was inadequate since it left out the men. They felt that since the men are the major decision-makers in the home the project may not have any impact at household level. Our findings, however, did not support this.

Same as PHOJEC

However, the village leaders and the village water committees should be involved in all aspects. Since this was attempted in this study the project led to tangible results.

During the discussion sessions the women decided that one way of improving sanitation and hygiene at home and at the domestic points would be to have a washing slab and bathing facilities built. It was agreed that the village should supply all local materials, such as sand, bricks, wood and straw, whereas the project would supply enough cement to construct one washing slab and two baths - one for men and one for women. Three weeks after the completion of the discussion groups, the village had completed the washing slab which for educational reasons was built next to the domestic point at the dispensary. At the same time the village also completed a public pit latrine and cleaned thoroughly the compound of the dispensary.

We believe that the following points have had an important influence on the success of the pilot project:-

- The participatory approach of organizing the project
- Parts of the curriculum was specifically designed for this village based on findings from baseline studies
- The ten-cell leaders prompted the women to attend
- The discussion groups were regularly supported by project staff
- Project staff consisted of only women
- Solutions reached by discussion groups were executed immediately.

It may be assumed that the pilot project would have been even more successful if the following requirements had also been met:-

- Illustrated teaching materials should have been available
- Small pamphlets should have been distributed
- The project should have opened with a film on water and health. (Two films on water, sanitation and health have been distributed to all regions. However, no one was able to locate them in Mbeya Region. Furthermore the mobile unit is obsolete)
- The project should have taken place in periods when the women were less busy cultivating.

9.5 Experiments with health education in Ruvuma

9.5.1 Study area

Selection of study area

Health education is intended to accompany the provision of improved rural water supply and was therefore initiated in villages with on-going DANIDA water projects.

In Ruvuma Region there are two such group schemes in progress which are scheduled to be completed before April, 1983. These are the Mkongo group scheme in the intermediate zone in Songea District involving for villages (Mkongo, Nakawale, Mwangaza and Njalamatata), and the Mango phase one group scheme in the lakeshore zone involving three villages (Mango, Tumbi and Kihagara). The Mkongo scheme is serving about 8,000 people while the Mango scheme is serving 7,000 people.

For convenience the study has concentrated on the Mkongo ward of Songea District. Mkongo is both the headquarter of the ward and division. The

four villages are very close to the ward and divisional headquarter.

Geographical background of the Mkongo area

Villages in the Mkongo group scheme are located in Songea district to the southeast of Songea town and accessible by road 70 - 80 kilometres from Songea town. They are situated in an area of low hills separated by small river streams.

The average latitude of the area varies from 860 - 900 meters above sea level. The soils are rich well drained red/clay loams ideally suited for maize, tobacco and fruits. Rains are reliable in amount and duration falling between early November and late April. The annual average rainfall is between 90 - 110 cm.

The total population of the area is over 8,000 people (1980) of about four tribal origins - Ndendeule, Ngoni, Yao and Nindi. The four villages are close together and actually contiguous. Villagization has resulted in a rather compact settlement pattern except in the peripheral area.

Since July, 1982 they are served by a health centre which has replaced the former dispensary in Mkongo. The four villages form an important section of the catchment population of the health centre. The area has not experienced any serious epidemic and the people give the impression that their awareness of disease is fairly high due to the former Mtu Ni Afya campaign of 1973 - 74. Moreover a house improvement programme on self-help basis initiated since 1978 has received an encouraging response. The only bottleneck is the non-availability of building and roofing materials.

9.5.2 Objectives of the experimental health education project

Major objectives of the health education were:-

- To increase villagers' awareness of environmental health and personal hygiene so that they may develop habits and attitudes appropriate to a healthier living and make the application of such a health rule part and parcel of the daily round
- To broaden the scope of knowledge of the rural population on the core diseases and other health problems confronting them, and to stimulate the need to combat them effectively. Emphasis will be on water related diseases

- To encourage individuals and groups to take measures for improvement on the basis of self-reliance and to instil in them the confidence that they have power and control to change their health environment themselves.
- To become a continuous activity woven in the daily life of the villagers. The approach must be based on 'doing' or be action-oriented rather than theoretical and based on teacher-pupil approach. Habits are born only out of continuous doing.
- To be relevant to the real situation of the village and be directed towards really felt needs for solving particular health problems confronting the villagers.
- To ensure active community participation not only as recipients of educational benefits but also in planning, implementing and evaluating the health education programme in their village.

9.5.3 Project organization

The project was carried out by a team consisting of the district health education officer, divisional health assistant, ward adult education co-ordinator, and the socio-economic group.

The only participant who came from outside the area was the district health education officer, while all the rest were residents in Mkongo and had been working with the villages in their respective capacities.

The socio-economic group had been working with the villagers since the beginning of the scheme in 1981. This background put the team and villagers in very good working relationship and had created an atmosphere of mutual understanding very conducive to winning villagers support to the exercise. The team therefore also has a close knowledge of the living conditions, the needs and the aspirations of the communities.

9.5.4 Identification of health and sanitation problems

Health education is supposed to concentrate on health problems that are of immediate concern to the villagers. It is therefore imperative to recognize what these problems are and the degree to which these problems affect the health standard of the villagers. Only after recognition of the problems one can think of introducing health education as a means of solving them.

In the experimental villages health information was collected in three ways:-

- Informal discussions and interviews with village leaders, villagers and health workers and a wide range of observations on health habits made while living with the villagers.
- Health statistics from the dispensary and health centre.
- Collection of health data through a baseline survey using a check-list and questionnaire for every household in the area.

The child health survey reported on in chapter 11 was carried out in Mkongo and two other villages in this area and its results are expected to form an important input for the continued health education activities.

Meetings with ward and village leaders

The project team held several meetings with ward leaders and later with ten-cell leaders and village governments to deliberate on:-

- The need for health study and introduction of health education as a component of the improved water supply to make villagers understand and practise improved methods of hygiene in order to maximize the benefits of the improved water supply now being constructed.
- The involvement of villagers in the recognition of health problems confronting them and in finding solutions to these problems themselves.
- Planning and organizing health education as an integral part of village day-to-day development programme using local resources and local initiative (external assistance however may be sought to prop up village efforts).

Informal discussions on diseases

During the informal discussions with village leaders in the four villages and educational visits to households the most frequently mentioned diseases were malaria, diarrhoea, bilharzia (schistosomiasis), scabies, measles, hookworms, colds, and coughs. Villagers show a fair knowledge of diseases they are suffering from. This may be due to frequent attendance to the dispensary/health centre. The majority of the mothers have the MCH cards for their children and attend to clinics when children fall

ill though some still have recourse to traditional healers. They will go to the dispensary when the traditional healers have failed.

Health statistics from dispensaries/health centres

Until June, 1982 the four villages in the Mkongo area were served by a dispensary located in Mkongo village. In July, 1982 a newly built health centre replaced the dispensary constructed at the same location. Some health statistics were collected from both the dispensary and the health centre as indicated in the tables below.

Disease	No. of cases	%	General remarks
Malaria	2,593	26.5	
Dysentry	791	8.1	
Schistosomiasis	197	2.0	
Measles	164	1.7	
Respiratory diseases	3,144	32.1	
Digestive diseases	1,724	17.6	
Helminithiasis	240	2.5	
Others	939	10.7	
Total	9,792	100.0	

Table 9.5 - Diseases diagnosed at Mkongo dispensary January, 1981 - September, 1981.

Diseases	No. of cases	%	General remarks
Malaria	462	58.4	
Dysentry	109	13.7	
Schistosomiasis	15	1.9	
Measles	26	3.3	
Helminithiasis	34	4.3	
Respiratory diseases	59	7.5	
Others	86	10.9	Digestive diseases, eye diseases, malnutritional diseases, skin diseases, venerial diseases
Total	791	100.0	

Table 9.6 - Diseases diagnosed from Mkongo health centre July-September, 1982 (three months).

The figures, though scanty, do manage to give an impression of the nature of the disease pattern in the area.

9.5.5 Baseline survey and individual health education objectives

In order to understand real health problems confronting the villagers, the project team conducted a baseline survey in the four villages. It was planned to visit all households in order:-

- To identify current practices, attitudes, customs and beliefs that are risk factors for diseases
- To understand what the population can do for themselves in order to improve their health
- To get to know what people know about diseases and what measures they take to solve their own health problems
- To collect data that will form the basis of future group discussions in the course of health education
- To educate the household members on the spot on what they need to do to improve their personal hygiene and environmental sanitation based on observation of the household.

Organization of household visit

The district health education officer and the divisional health assistant helped to educate the rest of the team on aspects of public health. Almost one week was spent on this. The following week the whole team worked together in one single village for practical experience. Then the group split into two groups each with a health expert and each group was accompanied by a ten-cell leader of the area visited. The exercise started in early September, 1982 and took three months to end of November.

A total of 1,287 households were planned to be visited in the four villages, about 15 households a day. At the end of the exercise however, a total of 1,073 households (83 %) had actually been contacted.

The health information of every household contacted has been recorded and stored and might be used for an evaluation exercise later on.

Almost all ten-cell leaders were involved in the household contacts.

9.5.6 Findings of the baseline study

The findings of the study are shown in table 9.7 and summarized below.

Water and environmental hygiene

Drinking water is neither boiled nor filtered.

Some of the households do not have or do not use latrines. 93 % of households have pit latrines and 90 % are in use. Though they are only a minute minority, the probability that people defecate indiscriminately in the nearby shambas close to the courtyard of houses is a risk factor. In some cases human faeces were seen close to the courtyard surrounding the houses. Children do defecate everywhere and mothers collect the faeces and just throw them just beyond the courtyard of the houses.

People do not seem to wash their hands after defecation. The majority of latrines do not have water and washing facilities. Only about 2 % of all the households have water in the toilets. Since most of the latrines have poor quality super-structure, no covers and no doors, chances that flies from latrines contaminate food, water and food utensils are great.

Only 10 % of the households have rubbish pits for house refuse. This implies that house refuse is thrown around the houses and thence flies and domestic animals may contaminate food and utensils.

Lack of utensil racks make cooking and eating utensils lie on the floor and get contaminated by infected dust, flies etc. Only 2.5 % of households have utensil racks.

Improper housing standard has adverse effects on health.

Water collection points (dug wells and DPs) are filthy and people have improper water storage facilities at home.

Personal hygiene

Clothes and members of some of the households, especially children, are dirty. Lice and jigger fleas are very common in the area. There is a lack of bathing facilities in many of the households. Few people take baths at home. The majority take baths in rivers nearby.

Beliefs and attitudes

People often believe that some of the diseases cannot be cured by western style medicine, e.g. cerebral malaria, convulsions, hernia, ankylostomiasis (Safura Maji) etc.

Some of the diseases and deaths are not attributed to natural causes but to evil spirits (majini) and sorcery. Such diseases include advanced stages of schistosomiasis, ankylostomiasis, incurable wounds, blood poisoning, amoebic dysentry, and any unusual health hazard.

Household characteristics	Percentage of households visited, by village			
	Nakawale	Mwangaza	Njalamatata	Mkongo
Pit latrine	87	98	94	93
Pit latrine in use	85	96	93	88
Pit latrine with permanent (brick) superstructure	8	3	11	6
Pit latrine with cover	6	28	2	7
Clean latrine	50	72	55	40
Water in latrine	5	0	1	2
Permanent (brick) house	50	22	64	34
Bathing facility	50	46	64	66
Utensil rack	3	4	0	2
Rubbish pit	10	7	5	21
Boiling/filtering drinking water	0	0	0	0
No of households visited	274	178	240	381
% of all households	72	95	80	92

Table 9.7 - Environmental hygiene and sanitation characteristics of households visited.

9.5.7 Health education during home visits

The initial emphasis in the experimental health education project was to conduct health education alongside the baseline survey, as the team visited all (nearby) households in the three villages. During these visits, the team attempted to engage in informal discussions with the inhabitants of the households. The advice given to each household depended on the actual health situation of that household.

The main topics discussed were:-

Environmental hygiene

- Cleanliness of the courtyard around the house (and at leat 5 meters from the house)
- Digging of rubbish pit
- Building of utensil rack
- Building and use of latrines
- Safe preservation of water for cooking and drinking
- Filtering and boiling of water
- Draining of ponds
- Cleanliness of water sources (dug wells and domestic points).

Personal hygiene

- Washing of clothes to take place at site far from water collection point
- Need for washing slabs near domestic points
- Bathing should take place daily for both children and adults
- Every household to have bathing facilities
- Removal of toe and foot jiggers

Proper health practices

- Children to avoid playing in pools of stagnant water
- People to avoid bathing or washing clothes in stagnant water
- To avoid common use of drinking vessels especially in pombe shops. People are encouraged to use own drinking mugs (visonju)
- Defecation habits of children have to be looked into. Mothers should throw faeces in pit latrines instead of throwing them anywhere in the surrounding area
- People were encouraged to wear shoes or sandals
- Mothers are to attend MCH clinics regularly
- Sick people to attend to dispensary/health centre for treatment and medical advice instead of only attending traditional healers.

The advantage of individual house calls is that one is able to give relevant instructions to the members of the household based on actual, observed health problems.

However, in many homes the household members may be too conscious of the high-powered visitors sometimes making it difficult to illicit genuine answers to the questions asked. Ordinary villagers are not always used to engage in free discussions with civil servants at district level, so the "self-educating" effect of discussing obstacles to following some of the advice given, and of trying to find solutions to these obstacles, may not always be achieved.

A major problem with the household visit method is furthermore, that it is extremely time and resource consuming, and still leaves too short time for careful discussion with each household.

9.5.8 Group health education

After the preliminary household-to-household health education activities, the health education team organized group health education in the four villages.

The baseline survey had identified health problems that are of common concern to all four villages. A common health education manual consisting of a number of topics to be covered, more or less corresponding to those appearing in the handbook in chapter 5, appendix II, was prepared by the team. A list of educational material designed mainly for adults was compiled to be used as source material for the health education.

Various groups have been mobilized to include health matters in their activities , such as adult education classes, group education at the health centre/dispensary, primary schools, public meetings (routine and ad-hoc meetings). The only new groups formed are the sub-village (Mtaa) discussion groups drawing influential participants from the sub-village areas of each village. 4 - 5 such groups have been established in each of the four villages.

The success of the health education depends on this last type of group, which includes all ten-cell leaders, one influential woman from every ten-cell, village government and party leaders, and religious leaders, resident in the sub village.

A health educator has been chosen among the participants and given basic training in the use of the health education manual and in some basic knowledge skills in public health. The training is done by AFYA and the socio-economic group in the village.

The group meets once a week to discuss how they can improve their health environment. The participants will then educate their neighbours at home and supervise the group health activities in their own area. Female participants have a very important role to play to educate other women in various aspects of health. Women are the most responsible group for a healthy environment at home.

Reports on the progress of health in the 'Mtaa' is sent to the village water committee and then to the village government.

It is too early yet to evaluate the group approach under the experimental health education project in Ruvuma, as it was still under formulation at the time of writing. The trial and error process continues and is expected to be evaluated later.

9.6 Comparison of the Mbeya and Ruvuma experimental health education project

From the considerations made in the sections above we are now in a position to compare the two approaches applied in the experimental health education project in Mbeya and Ruvuma. This we have attempted to do in the table below:

Unit of comparison	Mbeya	Ruvuma
Target group	Women and children	Everybody
General approach	Informal	(In)formal
Participation	Self-reliant discussion groups, individual's own initiative	Hierarchical inducement through "influentials"
Duration	Campaign	Continuous
Curriculum	Water related	All health problems, emphasis on water related aspects
Implementers	Trained villagers	AFYA and trained villagers
Orientation	Selective and action oriented	Comprehensive and action oriented
Objectives (a)	Increase awareness of health issues	Increase awareness of health issues
Objectives (b)	Improvement of environment	Improvement of environment

Table 9.8 - Comparative characteristics of experimental health education in Mbeya and Ruvuma

Both approaches have certain shortcomings as well as advantages. In the Mbeya experiment it was noted that the project may not have the desired effect at household level, because the men did not take part in the project directly. The women argued for instance that if they had to improve the storage facilities for drinking water, they would have to buy more containers. But how were they to convince the husbands about this, since they did not participate in the project ?

The Ruvuma approach on the other hand does not seem to give the ordinary villagers very much opportunity to discuss their health problems, and possible solutions, while it does address itself to everyone - men as well as women, and has a long-term component.

9.7 Recommendations

By combining the positive sides of each approach they may complement each other, and a flexible trial-and-error line of action should be continued in this direction. It is proposed that the Mbeya approach precedes the Ruvuma approach.

When the water project in a particular village has 5 - 6 months left before completion, the health staff should move into the village to start up the health education project.

The health project should be implemented by local dispensary staff, supported by the ward health assistant and MCH-clinic and the socio-economic or MAENDELEO staff attached to the water project. If the dispensary is in another village and/or the dispensary staff has to participate during office hours, health staff from the district can probably be posted temporarily in the area to carry out the daily dispensary work. It is important that the rural medical aid together with the village midwife participate, since they are familiar with the village.

When village health educators have completed the discussion group it is time for the 'Mtaa"-groups and household visits to commence. These will function as a kind of follow-up of the work made in the discussion groups. They will also make sure that the proposals and decisions made in the discussion groups are executed.

The "Mtaa" group should include the village health educator(s) and one or two more women from the discussion group(s). Household visits can be carried out by members of the "Mtaa"-group.

We do not envisage that a thorough baseline study is necessary for each village. However, based on a short survey, the AFYA team should for motivational reasons emphasize water related health problems prevalent in the village.

For practical reasons a standard curriculum (with built-in flexibility) is proposed for use in all villages receiving a water scheme. It is also proposed that a health education component should be applied on schemes being rehabilitated.

Based on the experiences made in the two experiments described above a "Handbook for Implementation of Village Health Education" has been prepared (see chapter 5.3 appendix II). As more experience is made the handbook should be revised regularly.

Notes:

1. Evaluation of the health sector 1979. Report of the Ministry of Health, October 1980, pp. 34 - 35.

2. Daily News, Friday, March 5th, 1982.

3. JF 22/Unicef-WHO/79, Conference Room Document No. 1, p. 11.

10. CONTAMINATION BETWEEN WATER COLLECTION AND USE (SECOND STUDY)

10.1 Introduction

During the months of July and August, 1981 water samples were taken from 35 households in two villages on the Usangu Plains in view of discovering whether the water became contaminated between collection at source and consumption at home. (Vol. 12, Chapter 10). Since the E.coli sampler, manufactured by Millipore, was found to give highly inaccurate readings when samples were taken from the same water, it was decided to repeat these studies applying another method.

In order to facilitate comparison with the first study this chapter is organized in an identical manner.

The second study took place exactly one year later than the first one, in order to obtain similar study conditions. Naturally, households were selected from the same two villages. In Utengule village (with water supply) 31 households took part in this study while 30 households were included in Mporo (without water supply). It was not attempted to include the same households as those which were part of the first study.

10.2 Methods applied

10.2.1 Sampling

The same method as concerns sampling of the water was applied as in the first study. Samples were taken and tests for faecal coliforms (escherichia coli) were conducted at four points:-

- The water source
- The container immidiately after filling
- The container on arrival at the home
- The storage vessel for drinking water, approximately 3 - 5 hours later.

This method is recommended in Cairncross et.al.[1)]

10.2.2 Testing

Other water quality studies[2)] recommended the use of the membrane filtration method which provided results that are significant at the 5 % level.

Bacteria are retained on a membrane after the water sampled has been filtered through it. The membrane is placed on a selective nutrient medium in a petri-dish and incubated for 22 hours at 44.5 degrees Centigrades. After the incubation period the dish is taken out and the membrane is examined for blue colonies.

The membrane filtration method has one disadvantage, viz. its inability to deal with turbid waters. The membrane becomes clogged and the nutrients to be diffused to the growing bacteria are reduced. In Mporo village this disadvantage of the method became obvious when filtering 100 ml. of sampled water through the membrane. Suspended material appeared as a thick grey layer on the membrane, thus making readings of E.coli impossible. It was found that a 5 ml. sample diluted with 95 ml. sterile water gave good readings. However, there are occasions when the dilution technique is inappropriate as for instance when a sample has high turbidity and low E.coli density.

In Utengule as well as in Mporo counting was sometimes attached with difficulties. The blue colonies could vary in size and sometimes there would be different shades of blue. In this study all blue colonies were counted irrespective of their shade. Any errors which may have arisen by using this procedure are insignificant for our purpose. The objective of our study was to throw light upon any change of contamination between collection and consumption. The study is less interested in the actual E.coli content. The same enumerator was used to count all E.coli colonies, thus reducing the risk of reading errors due to individual biases.

In Utengule all E.coli counts were automatically expressed per 100 ml. since all samples were of 100 ml. In Mporo the following equation was used:

$$\frac{\text{number of col. counted x 100}}{\text{ml. of sample filtered}} = \text{number of E.coli per 100 ml.}$$

10.3 Description of the data

The data presented in table 10.1 show the E.coli readings from each sample taken in the two villages. Readings for households fetching water at the same time are arranged in clusters in rows (a.b.c.d. etc.). In order that one can follow E.coli changes between collection and consumption, the readings for households in each cluster are arranged in the same order in each of the relevant columns.

Clusters of samples taken at the same time	No. of samples taken	Readings of E.coli/100 ml by samples taken								
		From source	Collection container at source			Collection container arriving at home			Storage vessel five hours later		
			Each sample	Mean	Geometric mean	Each sample	Mean	Geometric mean	Each sample	Mean	Geometric mean
Utengule, piped untreated											
a	5	4	6,5,2,6,5	4.8	4.5	5,5,2,0,2	2.8	2.5	1,0,23,12,4	8.0	4.1
b	3	3	4,2,1	2.3	2.0	1,4,6	3.6	2.9	10,3,10	7.6	6.7
c	6	2	4,2,0,1,6,6	2.8	2.3	0,54,9,0,6,3	12.0	4.5	1,2,4,5,6,0	3.0	2.5
d	5	0	4,50,1,4,0	11.8	3.8	2,12,0,0,0	2.8	1.9	33,0,500,600,2	227	28.0
e	12	0	0,0,1,1,0,0, 0,0,0,0,0,1	0.3	1.0	0,0,0,0,9,0, 0,0,0,0,5,2	1.3	1.5	0,0,1,1,1,0, 0,1,0,0,0,0	0.3	1.0
a-e (mean)	31	1.8		3.6	2.0		4.1	2.2		39.4	3.1
Mporo River											
f	3	1800	0,1600,2000	1200	147	860,1640,0	833	112	0,120,0	40.0	4.9
g	3	2600	2200,0,0	733	13.0	300,0,0	100	6.7	0,0,0	0.0	1.0
h	5	0	1200,0,1440 540,0	636	62.2	500,1640,0, 520,0	532	53.2	0,100,0,0,0	20.0	4.8
i	9	20	0,0,0,640,0 0,0,0,80	80.0	3.3	0,0,0,0,2000, 20,100,0,80	244	8.8	0,0,0,0,0,0 0,0,0	0.0	1.0
j	3	0	0,0,0	0.0	1.0	0,60,0	20.0	3.9	0,20,0	6.6	2.7
k	7	0	0,0,0,0, 500,0,0	71.4	2.4	0,0,0,0,0, 180,0	25.7	2.1	0,0,0,0,0, 40,0	5.7	1.7
f-k (mean)	30	736		340	7.5		263	9.8		9.3	1.7

Table 10.1 - Contamination of water samples taken from sources, collection containers, and storage vessels. Utengule and Mporo villages.

Some of the differences of E.coli readings found between samples taken from the same household can probably be explained by the way the samples were taken. Strictly speaking the E.coli count can differ from sample to sample even when taken from the same bucket. The reason for this is that the E.coli may not be evenly distributed throughout the water. One sample may thus show almost no E.coli, but had the sample been taken from a different place in the bucket a different result may have occurred. This problem increases when the sampled quantity is reduced to 5 ml, which is subsequently diluted to 100 ml.

To express the mean value we have given both arithmetric mean as well as the geometric mean, "which is not oversensitive to the few extremely high values which will always be found in bacteriological water testing".[3] In view of the sampling problem mentioned above the "normal", arithmetric mean may anyhow give a better picture, especially for Mporo.

For Utengule village the table shows that though the E.coli count in the storage vessel for a few households is lower than that found in samples taken directly from the source then the general tendency is that the water in the vessel is more contaminated than the water in the pipes. This applies for all the rows.

The differences between E.coli counts in samples taken from the sources and those taken from collection containers at the source indicate that the E.coli content of the sources varies even within short periods, but also differences in cleanliness of containers. However, even when the readings taken from collection containers at source are compared with those of the samples from storage vessels we find an average increase in contamination as indicated by a higher average E.coli count. In two households did the E.coli count exceed 100 per 100 ml in the storage container.

The Mporo data show a gradual decrease of indicators of faecal pathogens between collection and storage container. Normally about 90 % of E.coli die off in 48 hours when kept out of daylight. The low E.coli counts in storage vessels may be because the water in these storage containers contain very low E.coli, but is probably influenced by the fact that the samples taken throughout the study in Mporo were of 5 ml diluted to 100 ml. However, compared with the readings of the faecal indicators found in samples taken from water in the container at the source and in containers

on arrival at home it shows a significant improvement of the water quality. This is even more significant when it is noticed that the water in the river shows signs of faecal pathogens indicated by E.coli counts ranging from 0 to 2600 per 100 ml.

Comparing the data for the two villages it was found that generally the water in the piped supply (Utengule) exhibit less indicators of faecal pathogens than in Mporo River, where the water appears to be highly contaminated. But while the water quality seems to improve in Mporo it deteriorates in Utengule before use.

10.4 Discussion of findings

The data presented in the table support the main findings from the first study of contamination between collection and consumption reported in volume 12 of the Water Master Plan. Here we summarized that:-

- The water in storage containers in the village drawing from a river was of a better quality than the water sampled directly from the source (river)
- The water in the storage containers in the village with a piped water supply was of a worse quality than in the pipes.

Possible reasons for these findings were put forward. We particularly emphasized one reason, but we were unable - at that time - to substantiate it. We suggested that:-

- The river-users observe higher hygienic standards than the tap-users.

It was argued that since the villagers in Utengule were led to believe that "Maji ya Bomba" (piped water) is equivalent to "Maji Safi" (clean water) they felt less need to observe hygienic rules than the people in Mporo, who with their own eyes can see the "dirt" (viz. high turbidity) of the water.

To clarify these hypotheses a number of families were observed in Utengule and Mporo while special attention was given to their behaviour at home (water storage, water use, food handling, food preparation, environmental

care) at the bathing place, at the pombe club etc. It should be emphasized that these observations were carried out by two assistants who were unaware of the hypotheses put forward after the first study. In general the observations made confirmed the explanations given.

In summary the following characteristics apply to Utengule:-

- Clothes were not washed enough and sometimes never - it seemed
- Children were almost always dressed in rags
- Children between two and six years of age were very dirty
- Rubbish was lying around the house
- The cup for scooping water from the storage container was seldom cleaned
- Some women would irregularly clean the vessel with sand, but in most cases new water was just poured on top of the old one in the vessel
- Women were observed not to wash hands when dealing with food
- Children seldom washed hands before meals
- Nobody were observed washing hands after leaving the latrine
- No water was outside the latrine for washing hands

The following characteristics apply to Mporo:-

- River is not used for dumping garbage
- Separate places for water collection and bathing
- Houses well kept
- Food handling done with care
- In most homes even children were observed washing hands before meals
- Women were often seen cleaning their drinking storage vessel.

On the positive side for both villages can be mentioned that almost all homes had their storage vessel for drinking water covered. However, since the standard of personal hygiene appears to be much lower in Utengule than in Mporo it is obvious that risks of contaminating the drinking water is much higher here. This can for instance happen any time one of the pre-school children helps himself to a cup of water. He may contaminate the water with the unclean cup as well as with dirt from his own hands.

In our opinion the social facilities present in Utengule have to be discussed when one wants to understand why sanitation and personal hygiene

are of a lower standard here than in Mporo. Utengule has a dispensary as well as a water scheme, whereas the villagers in Mporo have to walk about 10 kilometres to get to a dispensary. However, the villagers in Utengule don't seem to pay much attention to even the most simple health precautions. They have even been told by the authorities that the water is clean. By some people it is even believed that the tap-water can be used for sterilizing purposes. If one gets sick the dispensary is right there in the village.

In Mporo - on the other hand - the village leaders as well as schoolteachers frequently remind the villagers of the health hazards of the river water. The villagers are furthermore encouraged to follow simple health and sanitation rules. If they don't they know what the consequences may be. In the worst case they will have to walk to and from the dispensary, a journey which easily can last from before sunrise until after sunset.

So the social facilities in Utengule do not seem to have done much to improve the situation there - a situation which may be further aggravated by Utengule's more urban character, as a small trading centre.

Following the arguments above we find it of utmost importance that a health education programme be included as an integrated component of all projects which aim at improving the health of the villagers. Such projects include for instance: dispensary and water and sanitation programmes. It is a serious mistake to give the villagers the impression that their health will automatically improve when they collect water from a piped supply. The data collected in Utengule and Mporo emphasize some of the problems involved.

Notes to Chapter 10

1) Cairncross et. al. (1978) Evaluation for Village Water Supply Planning. John Willy & Sons, Chichester.

2) Broconsult (1979) Rural Water Quality Programme in Tanzania, Final Report, Main text and

Feachem, R (1978) Public Health Studies in Phase II of the slow Sand Filtration Project. A Practical Guide. Occasional paper, No. 16.

3) Cairncross: op.cit. p. 71.

11. DOMESTIC WATER SUPPLY AND CHILD HEALTH: RUVUMA REGION, TANZANIA

11.1 Introduction

By installation of gravity water schemes with public taps in Tanzanian villages the water related health conditions are supposed to improve where domestic water is otherwise collected from rivers, streams, springs, dug holes and lakes etc.

Diseases caused by microorganisms normally transmitted by drinking water, hands, skin, cooking utensils and bathing facilities will decrease if transmission is obstructed or if the concentration of the microorganism is substantially diluted with unpolluted water to such a degree that the general host immunity can prevent the organisms from causing disease in the host.

It is generally acknowledged that microbiologically improved water quality and increased water quantities are important means to diminish the prevalence of waterborne diseases caused by bacteriae and virus, but as transmission also depends on water storage, personal hygiene, traditional cleaning habits, cooking hygiene, housing (crowding) and general knowledge about transmissible diseases it is not at all sure that introduction of clean water into a Tanzanian village will improve the health conditions per se.

In order to be able to give some indication of the health impact of improved water supply, a health survey was carried out in 6 selected villages in Ruvuma Region.

A combined cross sectional and longitudinal study was planned in order to obtain an actual comparison between some villages supplied with water from unimproved sources and some with piped water installed, followed by a similar survey 2-3 years later emphasizing villages getting tap water within a few months after the first survey. The results should be used for Water Master Plans in the region, especially to elucidate the need for eventual health education campaigns and other primary health activities which ought to be going on parallel to the installation of piped water if the health condition should improve substantially.

The survey was planned to be simple and inexpensive so that it could easily be repeated by local health authorities on regional or district level in the future. An essential part of the study was used to test the reliability and simplify the survey methods.

All children in the villages between one and four years of age were chosen as the survey population for the following reasons:-

- The general health situation of small children can be expressed statistically by registration of the physical growth by groups
- In a tropical rural population the children in the weaning period are most susceptible to diarrhoea caused by transmissible micro-organisms
- Maternal antibodies received during pregnancy will normally have disappeared at the age of 12 months
- The governmental health service already have "Under five clinics" to care for children under 5 years of age, so the concept of examining the same population was not a new or alien idea for the people working in the existing health infrastructure, and the age of the children was supposed to be recorded on the "Road to health charts"
- Random sampling was avoided as it is not used in the normal health care system and it might not be understood by the villagers and their leaders in connection with health examination
- Mothers probably best remember births, deaths, and causes of death concerning the youngest children
- Small children were supposed to be more readily available around the mothers than older children would be.

Valuable help and comments for the survey was received from the Department of Community Medicine of the University of Dar es Salaam, the Ministry of Health, the Regional Medical Officer, Ruvuma and the health institutions in the survey areas, including both government and mission institutions. Local health institutions with shortage of drugs received supplies from the survey team in accordance with agreement with the RMO. These drugs were generously supplied by the Danish Red Cross.

11.2 Survey methodology

11.2.1 Organization

The survey was carried out over 4 weeks from October 18th to November 13th after logistical preparations done by the resident researcher. According to the plan this should be at the end of the dry season, when roads are passable for mothers, children, and landrovers, and when women's agricul-

tural work load is relatively small. When the rain actually started one month "too early", i.e. in the middle of the survey period, it only caused minor disruptions, though.

Two survey teams were established, each consisting of an experienced physician, a socio-economic researcher with one or two assistants, and seconded from the regional hospital or local mission or government health institutions, one or two nurse/midwives or MCH-aids with one or two assistants, and two laboratory assistants/aids. Each team had a landrover.

Children found in need of medical treatment were referred to the local health institutions, which cooperated throughout the survey.

Three villages were selected in and near each of the two DANIDA funded water schemes in Songea and Mbinga Districts, i.e. Namabengo, with an existing water supply, Mkongo, within the nearly completed water supply scheme, and Limamu, which is not expected to get a water supply in the near future - all in Songea District - and Lundo, existing water supply, Mango, water supply under construction, and Lipingo, no water supply - all on the lake shore in Mbinga District.

The two teams worked together in Namabengo for the first week, to ensure uniformity of methods used, after which they split up between the two districts.

In all but one village the survey took place at the existing health facilities (Health Centre, bedded or non-bedded dispensary), while in Lipingo the school was used.

In each village the survey started the first day with a meeting between survey personnel, local health personnel, village leadership and all ten-house-cell leaders (barozis). The survey was discussed, the village was divided in sections for attendance in mornings and afternoons on each of the following 3 days, and forms were distributed on which the barozis were asked to record all children born in the last 5 years, those who subsequently died, and the causes of death.

The following three days each barozi came with the completed forms bringing all the mothers in the cell with their children between 1 and 4 years.

Full attendance was secured as far as possible by checking with village lists of households per barozi and with their own filled-in forms. A fourth day was reserved for late-comers, and in some cases barozis and mothers needed reminding visits, undertaken with the help of village leaders.

Through checks and counter-checks it is estimated that total attendance in the villages ranges between 75 and 90 % of all children between 1 and 4 years, highest in the lower age groups. A total of 1153 children aged 1-3 years attended in the six villages. In Limamu all children aged 0-59 months were examined, but the 146 children below 12 months or above 48 months of age were not included in the analysis.

11.2.2 Child examination

At the child examination each child was provided with a card, figure 11.2 on which its data were recorded as the mother with her child/children passed through 6 "stations". At these stations the survey staff performed the operations shown in figure 11.1 below.

In general the card performed its function well, but for repetition of the survey it should be organized in a more orderly way as particular subquestions, or answer-possibilities, could easily slip the attention of the interviewer/examiner.

Some questions were not immediately intelligible for the survey staff, and were perhaps not discussed carefully enough, so that e.g. information on "longstanding complaints" and "when do you usually wash your hands" were registered differently by different interviewers.

	Examiner's qualifications	Operations performed
1.	High school, training in interview techniques	Checking mortality questionnaires returned by barozis. Recording answers from mothers to questions on hygiene and sanitation
2.	Registered nurse/midwife	Recording age, height and weight and answers to morbidity and nutritional questions.
	Mother/child health aid (rural)	Measured weight and height
3.	Physician (experienced)	Physical examination of the naked child, including lung stethoscopy, with distinct attention to skin and eye infections and palpation of spleen (standing position). Rectal washing with pipette for parasitological stool examination. Supervision of station 2 to 5
4.	Laboratory aid	Microscopical examination of stool specimen for intestinal helminth eggs/larvae
5.	Laboratory assistant	Blood from finger prick 1. Packed red cell volumen 2. Salmonella typhii H antibodies 3. Thick blood film for malaria parasites
6.	Socio-economic researcher	General supervision (particularly of station 1 above) Checking attendance and securing continuous flow of children. Collecting missing groups. Correcting mistakes. Assisting congested stations. Telling mothers doctor's interpretation of medical examination and referring sick children to person i/c of the dispensary/health centre

Figure 11.1 Operations performed by child health survey staff.

VILLAGE NAME: _____ NO. _____ (col 1-3) CHILD _____ (col 4-7)

MOTHER: _____ sex: M ☐ 1 F ☐ 2 (col 8) AGE MONTHS ____ (col 9-10)

ACUTE MORBIDITY: Has the child been ill within the last 7 days ? no ☐ 0

fever ☐ 1 diarrhoea ☐ 2 cough ☐ 3 vomiting ☐ 4 convulsions ☐ 5 other ☐ 6

symptoms: _____ n.a. __ 9 (col 11-13) code the 3 first

LONGSTANDING COMPLAINTS: Has the child any suffering which has lasted for a long time ?

no ☐ 0 yes ☐ 1 (col 14) What ? _____

DID THE CHILD HAVE DIARRHOEA YESTERDAY ? no ☐ 0 yes ☐ 1 (col 15)
How many evacuations ? 0 ☐ 0 1-2 ☐ 1 3-5 ☐ 2 >6 ☐ 3 n.a. ☐ 9 (col 16)
Diarrhoea in the last 7 days ? no ☐ 0 yes ☐ 1 n.a. ☐ 9 (col 17)
Blood in diarrhoea ? no ☐ 0 yes ☐ 1 n.a. ☐ 9 (col 18)

FEEDING: Breast alone ☐ 1 mixed ☐ 2 no breast ☐ 3 (col 19)
Appetite: Normal ☐ 1 bad ☐ 2 (col 20)

HEIGHT: ____ cm (col 21-22) WEIGHT: ___,___ kg (col 23-25)

PHYSICAL EXAMINATION: Hydration: normal ☐ 1 dehydration ☐ 2 oedema ☐ 3 (col 26)
Skin: normal ☐ 1 pyodermia ☐ 2 scabies ☐ 3 pyodermia+scabies ☐ 4 (col 27)
Conjunctivitis: no ☐ 0 yes ☐ 1 (col 28)
Lung stethoscopy: normal ☐ 1 abnormal ☐ 2 (col 29)
Spleen: not palp. ☐ 0 just palp. ☐ 1 large ☐ 2 (col 30)

EGGS IN STOOLS: none ☐ 0 ascaris ☐ 1 hook worms ☐ 2 trichuris ☐ 3 asc+h.w. ☐ 4
asc+trich ☐ 5 h.w.+trich ☐ 6 asc+h.w.+trich ☐ 7 others ☐ 8
n.d. ☐ 9 (col 31)

WIDAL: negative ☐ 0 positive ☐ 1 (col 32) Hct ___ (col 33-34)

HAS THE CHILD BEEN TREATED FOR ANY DISEASES IN DISPENSARY, OPD OR HOSPITAL WITHIN THE LAST 7 DAYS?: no ☐ 0 yes ☐ 1 For what: _____ (col 35)

HAS THE CHILD EVER ATTENDED CHILD HEALTH CLINIC ?: no ☐ 0 yes ☐ 1 (col 36)

Comments: _____

WHERE DO YOU COLLECT WATER: tap ☐ 1 dug hole ☐ 2 river, stream ☐ 3 lake ☐ 4
channel ☐ 5 other ☐ 6 (col. 45)

WHERE DO YOU USUALLY TAKE A BATH: at tap ☐ 1 dug hole ☐ 2 river, stream ☐ 3 lake ☐ 4
channel ☐ 5 at home ☐ 6 other ☐ 7 n.a. ☐ 9 (col. 46)

HOW OFTEN: every day (almost) ☐ 1 every second day ☐ 2 once or twice a week ☐ 3
less than every week ☐ 4 n.a. ☐ 9 (col. 47)

WHERE DO YOU USUALLY BATHE YOUR CHILD: at tap ☐ 1 dug hole ☐ 2 river, stream ☐ 3
lake ☐ 4 channel ☐ 5 at home ☐ 6 other ☐ 7 n.a. ☐ 9 (col. 48)

HOW OFTEN: every day (almost) ☐ 1 every second day ☐ 2 once or twice a week ☐ 3
less than every week ☐ 4 n.a. ☐ 9 (col. 49)

IS SOAP AVAILABLE THESE DAYS: no ☐ 0 yes ☐ 1 (col. 50)
DO YOU HAVE ANY SOAP AT HOME NOW: no ☐ 0 yes ☐ 1 (col. 51)

WHAT DO YOU USE SOAP FOR IF YOU CAN GET IT: (interviewer, do not specify !)
Washing clothes: no ☐ 0 yes ☐ 1 (col. 52) Bathing: no ☐ 0 yes ☐ 1 (col. 53)
Bathing child: no ☐ 0 yes ☐ 1 (col. 54) Washing hands: no ☐ 0 yes ☐ 1 (col. 55)
Washing utensils: no ☐ 0 yes ☐ 1 (col. 56)

WHEN DO YOU USUALLY WASH YOUR HANDS: In the morning after waking up no ☐ 0
yes ☐ 1 (col. 57) Before preparing food: no ☐ 0 yes ☐ 1 (col. 58) After preparing food: no ☐ 0 yes ☐ 1 (col. 59) Before eating: no ☐ 0 yes ☐ 1 (col. 60)
After eating: no ☐ 0 yes ☐ 1 (col. 61) After shamba work: no ☐ 0 yes ☐ 1 (col. 62)
After defecating: no ☐ 0 yes ☐ 1 (col. 63) When collecting water: no ☐ 0 yes ☐ 1 (col.64)
Before handling the child: no ☐ 0 yes ☐ 1 (col. 65) Other: no ☐ 0 yes ☐ 1 (col. 66)

WHERE DOES THE CHILD DEFECATE.....

DO YOU CLEAN IT AFTERWARDS: no ☐ 0 yes ☐ 1 (col. 67) (if yes) WITH WHAT: Your hands:
no ☐ 0 yes ☐ 1 (col. 68) Cloth, towel: no ☐ 0 yes ☐ 1 (col. 69) Grass, leaves: no ☐ 0
yes ☐ 1 (col. 70) Water: no ☐ 0 yes ☐ 1 (col. 71) Paper: no ☐ 0 yes ☐ 1 (col. 72)
Other: no ☐ 0 yes ☐ 1 (col. 73)

DO YOU HAVE A LATRINE AT HOME: no ☐ 0 yes ☐ 1 (col. 74)

Figure 11.2 - Child registration card.

Questions on "how often" do you take a bath, "how often" do you bathe your child, and "when do you usually wash your hands" are apparently so sensitive that mothers prefer to tell how they think they "ought to" behave rather than their actual behaviour. At least we got frequencies of handwashing and bathing, which we believe are much too high compared with our general experiences.

Finally it may be noted, that "spring" is missing as a source of water. In one village where springs are important, but no other "other" source, other was therefore recorded as spring during processing.

11. 2.3 Anthropometric techniques

Age estimation

Most children brought a growth chart (road to health chart) which was used as a guidance if it seemed to be filled in correctly which was not always the case. By thoroughly questioning mothers or neighbouring women, a satisfactory estimation of the child's age in months was achieved. A table with calender months against monthly age from October 78 to October 81 facilitated the procedure. Only very few mothers were not able to reconstruct their under 4 year old children's month of birth.

Weight estimation

A salter spring balance taking up to 25 kg with 100 g partitions was hooked to the children suspended in plastic shorts or a home made wooden swing. Most children expressed loud disapprovals. Plastic shorts with suspenders and salter spring balances were available in all the dispensaries but not always used by the staff, who sometimes in the MCH clinic sessions used the mother-baby minus mother method instead.

Height estimation

A tailor centimeter measuring tape was stuck to a wall and a standing height was taken at a moment when the child was pushed straight against the wall. Heights were expressed in full centimetres.

11.2.4 Laboratory tests

Packed cell volumen (microhematocrit)

Blood from a stab wound on a fingertip was filled in a 9 micro-liter heparinized capillary tube and spun six at a time in a mini-centrifuge (Compur M 1100^{R}) at 11500 revolutions per minute in 3 1/3 minutes and the PCV was read directly on a scale on the rotation plate with partitions on 2 %.

Widal - S.typhi H (Antigen d from flagellae)

After reading the PCV the tube was broken at the middle with the fingers, the red cells thrown away, the plasma (ca. 5 micro-liter) was blown out onto a glass slide by a rubber pipette holder and afterwards mixed with 5 micro-liters Salmonella typhi H antigen and rotated by hand for 2 minutes as a rapid slide test for agglutination.

The test reagents were measured with a Finnpipette from bottles supplied by Oxoid and Wellcome and they showed equal agglutination capabilities by systematic comparisons on test sera.

Agglutination was always clearly positive or negative. The test reagents were tested against titrated sera from The Diagnostic Department of The State Serum Institute, Copenhagen, before the survey and every week during the survey. The test sera were a negative and several positive S.typhi H positive dilution (from 1/50 to 1/200) which always gave agglutination, whereas a S.typhi O positive and several parathyphoid sera all gave negative reaction. All the test reagents and test sera reacted in the same way during 4 weeks despite the fact that none of the fluids were kept in refrigerator as recommended by the suppliers and despite heavy bacterial overgrowth in the test sera.

Malaria examination

A thick film on a glass slide was prepared from each child by conventional method and all the slides were kept away from flies until they were stained simultaneously after six weeks by 2 % Giemsa stain in phosphate buffer pH 7.2. All slides were examined by the same examiner and 100 fields of vision under magnification 1000 were seen. Number of trophozoites and gametocytes were recorded.

Helminthological stool microscopy

The tip of a polyethylene pipette (Movette^{R},Nunc) was inserted into the rectum 8-10 cm from anus and 5 ml water was washed in and out until the water contained fecal matter sufficient for microscopical examination. If the fecal solution was diluted more than necessary the pipette was placed vertically in a tube for some minutes. The fecal matter was then placed on a glass slide and examined under a cover slide by a laboratory aid and eggs and larvae were identified. Microscope (Wickers^{R}) with mirrors for sunlight were used.

The pipette, which had a compressible and auto-expandible handle, could be used many times if desinfected between use. The edge of the tip, which could be a little sharp from the hand of the manufacturer, was held in a flame for a few seconds so it became rounded. By 10 % of the children, the rectum was found empty for stools.

11.3 Description of the areas surveyed

11.3.1 Introduction

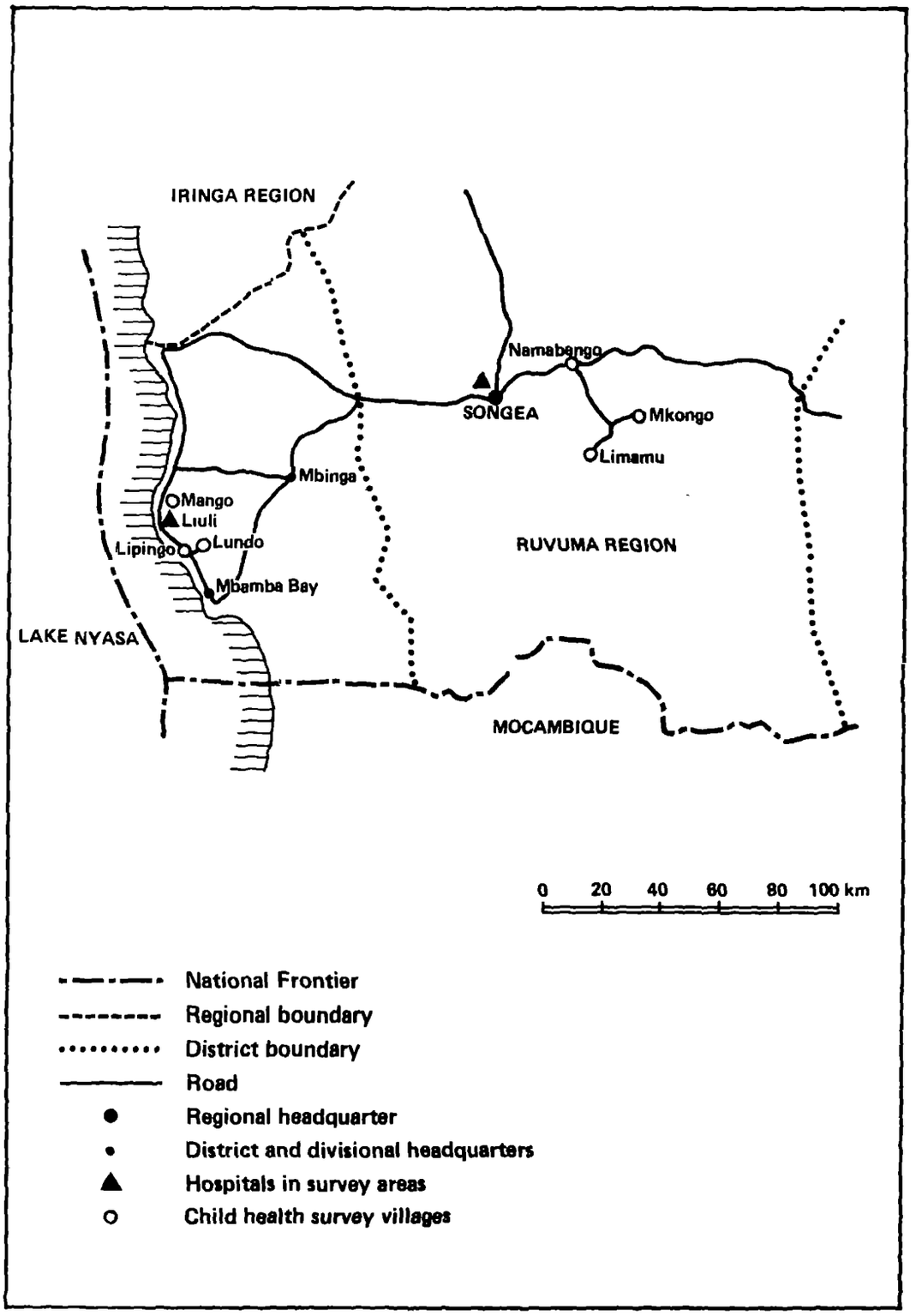
Six villages were selected, two with functioning piped gravity water supply, (Namabengo and Lundo) two with a similar water supply being installed (Mkongo and Mango) and two without supply (Limamu and Lipingo). Three (i.e. one of each type) are in Songea District, which is in the intermediate agro-ecological zone and three in Mbinga District in the lake shore agro-ecological zone (see map 11.1).

11.3 Geography, demography, economy

Mbinga District

The chosen area is situated in the Ruhekei Division on the flat land along the lake shore.

Altitude: 5-600 metres above sea level. The water level of the lake is about 475 metres above sea level, it varies regularly during the year about 80 cm which facilitates cultivation of rice near the lake shore. (In 1980 there was a considerable, permanent rise in the water level causing flooding of some villages).



Map 11.1 - Location of child health survey villages in Ruvuma region.

Climate: Humid, annual mean temp. 22 - 27°. Dry season June to November when temp. goes down to min. 18°. Mean annual rainfall about 2500 mm.

Roads: No all weather roads. The roads within the area as well as those leading to and from it are poor and mostly impassable during the rainy season. Transport is very restricted and there are no busses.

The population: belongs to the Wampoto tribe, originating from the Wamatengo in the mountains. Most are christians. The main crop is cassava. Rice is common, and a little maize and finger millet is grown. Fresh fish is available from the lake, but fishing methods are primitive with small yields (as compared with those of Malawi and Moçambique). Although maize and millets are grown, the people prefer to eat cassava. They have very few cattle.

Songea District

The three villages are situated in Mputa Division (Namabengo) and Mkongo Division (Mkongo and Limamu). All in the intermediate agro-ecological zone. They are located at a distance of 35 - 70 km east and southeast of Songea, Namabengo near the all weather mainroad from Songea to Tunduru and Mkongo and Limamu at smaller roads passable only in dry weather. Namabengo has daily bus connection to Songea, Mkongo and Limamu - no buses.

Altitude: 860 - 900 meters above sea level in an area of low hills, separated by small streams.

Climate: Annual rainfall about 1100 mm. The rainy season from December to April is wet and hot, the dry season dry and cool.

The population: is mixed in most villages, mainly of Ndemdeule, Ngoni, Yao, and Nindi tribal origins. Religions are also mixed, with a relatively high concentration of Muslims in Mkongo. The main crop is maize, which is grown both for food and cash. Beans and finger millet supplement the maize. Tobacco is the dominant export crop. Due to tsetse flies there are few cattle in the area.

Table 11.1 summarizes some important socio-economic indicators for the six survey villages. While the three villages in each area are somewhat similar (climate, geography, agriculture, etc.) there are also differences, which could not be avoided with water supply as the main selection criterion.

	Songea District			Mbinga District		
	Namabengo	Mkongo	Limamu	Lundo	Mango	Lipingo
Population (1980 or 81)	3144	2519	2035	1761	2268[x)]	1326
Households	467	384	365	319	470	250
Pop./household	6.7	6.6	5.6	5.5	4.8	5.3
Main crops	maize tobacco millet	maize tobacco beans	maize tobacco beans	cassava maize rice	cassava millet rice	cassava rice millet
Main food	maize	maize	maize	cassava (fish)	cassava (fish)	cassava (fish)
No. of livestock units/household	0.6	0.6	0.1	0.4	0.7	0.7
No. of shops	8	2	4	4	4	3
No. of tradesmen	36	50	21	17	57	23
Milling machine	yes	yes	yes	no	yes	yes
Bus service	yes	no	no	no	no	no

x) Because of immigration from other villages due to floods, population increased from 1166 in 1978 to 2268 in 1980, but has subsequently decreased considerably.

xx) One livestock unit is one cow or 10 goats/sheep/pigs.

Source: WMP village inventory.

Table 11.1 - Socio-economic indicators for health survey villages.

Namabengo, and to a lesser extent Mkongo and Mango, are old trading centres, rather densely settled in the central parts of the villages, around the shops, tea-rooms, beer clubs, offices, stores, dispensary or health centre, and missions (Namabengo and Mango) or mosque (Mkongo). Limamu, Lundo and Lipingo are more purely rural, but Lundo is a completely new settlement, first established as a refugee camp, and turned into a Tanzanian village after Moçambique's independence in 1976. Thus some of the households live in modern, former staff houses, with water inside the house etc. (see table 11.2).

11.3.3 Health services in the survey villages

The general health service situation in the villages is summarized in table 11.2.

All villages except Lipingo have health service facilities. Namabengo and Mango have old bedded mission dispensaries. The rural health centre in Mkongo had replaced an older dispensary a few months before the survey.

In general the drug supply was relatively good, although all government institutions had some shortages. There is full coverage of MCH clinics, apparently with a rather high attendancy (though not very regular). Apart from some health advice given during attendance at dispensaries, health centre, and clinics, no regular health education had been organized in any of the villages since the Mtu-ni-afya campaign in the early seventies. Presently this is being done on an experimental basis in Mkongo (see chapter 9).

Malaria, diarrhoea, and pneumonia, are mentioned by health staff as the main diseases in all villages, but in differing order of importance. In addition to the water related diseases included in the present survey, health institutions in the lake area (Liuli Hospital and Mango Dispensary) reported frequent findings of Bilharzia hematobium eggs in urine and onchocercia microfilariae in the skin (may cause river blindness).

	Songea District			Mbinga District		
	Namabengo	Mkongo	Limamu	Lundo	Mango	Lipingo
Medical facilities	Dispensary (M)	RHC (G)	Disp. (G)	Disp. (G)	Disp. (M)	At Lundo (3 km)
General beds	30	15	0	0	41	-
Maternity beds	70	5	0	4	14	-
MCH clinic	yes	yes	yes	yes	yes	At Lundo
Attendance[x]	100	78	92	96	99	99
Qualified staff	11	14	3	4	6	-
Distance to hospital	35 km	55 km	70 km	20 km	12 km	17 km
Drug supply	No shortage	Shortage of certain drugs	Shortage of certain drugs	Shortage of certain drugs	No shortage	-
Immunization programme	yes	no	no	yes	yes	At Lundo
Main diseases	Malaria diarrhoea	Malaria diarrhoea obeynibua	Malaria diarrhoea pneumonia	Pneumonia Malaria diarrhoea	Malaria diarrhoea pneumonia	Pneumonia malaria diarrhoea

RHC: Rural Health Centre

(M): Mission

(G): Government

x) Percentages of children in health survey ever attending clinic

Table 11.2 - Health services indicators for health survey villages

11.4 Water use, hygiene, and sanitation

11.4.1 Water supply

Two of the six survey villages are supplied with piped water from gravity schemes, in two villages similar schemes are under construction, while the last two are not expected to get water supply in the near future. Details of water schemes are given in table 11.3.

	Songea District			Mbinga District		
	Namabengo	Mkongo	Limamu	Lundo	Mango	Lipingo
Year of construction	1980/81	1982/83	-	before 1976	1982/83	-
No. of domestic points (DPs)	17	xx)	-	25	1[x)]	-
No. of private connections	6	0	-	19	0	-

x) In Mango there was an old, piped water supply for mission and dispensary with one public DP. No DPs on the new scheme were in operation yet.

xx) In Mkongo there were a few recently installed DPs in irregular operation.

Table 11.3 - Details of water schemes in health survey villages.

11.4.2 Water sources used

Even in villages with a piped water scheme not all women collect water for household use at the tap. Our studies (vol. 12 chapter 8.7.2) indicate that if the distance to the tap is longer than to the nearest traditional source, the latter is usually preferred.

Table 11.4 shows that 25 - 30 % of the mothers interviewed in Namabengo and Lundo did not collect tap water for household use. 43 % in Mkongo indicated that they did collect water from the scheme, which was still under construction. However, this had only been the case for a short while, and supply was still frequently interrupted so that they had to revert to their traditional sources. Unfortunately we do not have detailed information on these traditional sources but we know that both dug holes and rivers/streams were used.

In Mango 9 % of mothers benefitted from the missions' water supply while a similar figure in Lipingo collected water from taps in neighbouring Lundo village.

Sources	Songea District			Mbinga District		
	Namabengo	Mkongo	Limamu	Lundo	Mango	Lipingo
Tap water	70	43	-	76	9	9
Dug hole	23	57	82	12	42	53
River/stream	7	-	2	12	47	34
Lake	-	-	-	-	-	5
Canal	-	-	-	-	2	-
Spring	-	-	16	-	-	-

Table 11.4 - Percentages of mothers using different water sources for collection of water for household use.

When it comes to their personal bathing, the general tendency was, that mothers who collected water from taps, dug holes or springs preferred to do it at home, in a river/stream, or lake, most likely because of the lack of privacy at the tap, dug hole or spring. Whether they decide alternatively to do the bathing at home or in a river/stream or lake is probably a matter of convenience (e.g. distance). At least there are no discernable trends in the figures (table 11.5). It seems however that the choice may have some implications in terms of the risks of bilharzia infestation (11.3.2).

Sources	Songea District			Mbinga District		
	Namabengo	Mkongo	Limamu	Lundo	Mango	Lipingo
Tap water	-	1	-	24	1	6
Dug hole	3	-	-	10	28	17
River/stream	6	2	50	27	32	33
Lake	-	-	-	-	-	24
Canal	-	-	-	-	1	-
Spring	-	-	8	-	-	-
Bathing at home	90	92	42	39	37	20
In other places	2	5	-	-	-	-

Table 11.5 - Percentages of mothers showing the different places where they do their personal bathing.

Irrespective of water source, the large majority of women did the bathing of their small children at home. In five of the survey villages over 90 % of the mothers gave this answer. Only in Lipingo was the percentage lower (83 %), while 11 % indicated that bathing the child took place in the nearby lake (Lake Nyasa).

11.4.3 Contamination of water sources

In each of the six villages one sample of water was taken from each of the three water sources, which were pointed out as being among those most frequently used. Each sample was tested for content of fecal coli from 100 ml water, using the membrane filtration method (millipore) described in chapter 10.

Table 11.6 below, showing the results, gives only a rough indication of the relative contamination problems of different sources, since only three sources were tested, and only one sample taken from each.

	Songea District			Mbingo District		
Source	Namabengo	Mkongo	Limamu	Lundo	Mango	Lipingo
Tap	40	-	-	75	800	-
Dug hole	5	4 and 10	36	-	0	0
River/stream	> 1000	> 1000	45	550	650	500
Lake	-	-	-	-	-	0
Spring	-	-	0	-	-	-

Table 11.6 - Contamination of water sources in health survey villages, measured as number of fecal coli from 100 ml of water in one Millipore test per source.

Mothers and children attending the health survey can in no way be related to any one particular tested source, but only to the source type where mothers collect water.

11.4.4 Hygiene and sanitation

During the survey, mothers were asked about their bathing and hand washing habits.

96 % claimed that they take a bath every day and 98 % that they bathe their children at least once a day. While we do consider this as an expression of a rather high frequency, we also believe that the figures have been pushed upwards by the mothers' opinion of what they "ought to" do, rather that what they actually do.

The same is probably the case with answers to the question about when mothers usually wash their hands. Unfortunately the two survey terms were instructed differently, so that the question was asked openly in one area, while in the other, possibilities were specified for mothers to confirm or reject, resulting in extremely high frequencies of hand washing in the latter. In the area where the question was open, answers seem somewhat closer to reality. Here relatively large proportions claimed usually to wash hands in the morning, before and especially after eating (90 - 100 %) while much fewer said they washed hands after defecating or before and after preparing food.

Table 11.7 below shows that nearly all women use soap (if available) for bathing and washing clothes, whereas its use is rather infrequent for dishing and especially hand washing where it is perhaps most important in terms of health.

Child's bathing	89 %
Mother's bathing	89 %
Washing clothes	90 %
Dishing	22 %
Hand washing	9 %
(81 % had soap when questioned)	

Table 11.7 - Frequencies of housework washing procedures in which mothers habitually use soap if at hand.

99 % of respondents claimed to have a latrine at home, which corresponds with other results on this question during the Water Master Plan studies. Table 11.8 below shows that while the smaller children cannot use the latrine, about 2/3 use it from the age of 2 years and upwards and after 3 years there is - according to the mothers - the same almost universal usage as found among adults in other studies made by this project.

Age months	Using latrine	n
12 - 17	16	216
18 - 23	40	181
24 - 29	72	202
30 - 35	82	205
36 - 41	95	178
42 - 47	96	167

Table 11.8 - Percentage of children using latrine, by age group.

96 % of mothers claim to clean their 1 - 3 year old child after it has defecated, using water, cloth, paper, grass, leaves etc.

11.5 Child health

11.5.1 Growth and disease in the six villages

The results of the child health survey are summarized by villages in table 11.9.

The table demonstrates wide variations in disease frequencies between the different villages according to information given by mothers, which indicate that differences, while very pronounced even between apparently similar villages, can have many causes and must be interpreted very carefully.

A large proportion of the children - between 13 and 54 percent - had illnesses in the past week before the survey. These figures may be influenced by different interviewers, but they are supported by corresponding rates of treatment at dispensary health centre.

Growth expressed as weights and heights for age also showed big variations between villages, but was generally better in the lake shore zone villages in Mbinga District, where cassava as the main food is supplemented with fish, where malaria and anemia are more frequent, but where morbidity frequencies are generally lower than for the villages in Songea District.

Growth and morbidity[x]	Songea District				Mbinga District		
	Namabengo	Mkongo	Limamu		Lundo	Mango	Lipingo
n =	308	234	218		114	163	115
Growth indices							
Underweight	53	51	56	>	43	32	31
Stunting	40	33	38	>	16	26	29
Wasting	1	7	2	=	3	2	0
Morbidity last week							
Diarrhoea	7	33	20	>	6	18	9
- yesterday	3	11	10	=	4	9	6
2 motions daily	2	15	32	=	18	14	11
Bloody diarrhoea	1	2	1	>	0	0	1
Fever	11	16	16	=	9	27	10
Cough	6	14	19	>	4	14	4
Other illness	9	23	20	>	2	6	1
Total ill	22	54	49	>	13	42	17
Treated at dispensary	15	37	42	>	10	23	10
Physical examination							
Pyodermia/scabies	6	19	8	=	3	9	13
Conjunctivitis	0	4	1	>	0	0	0
Spleen palp.	3	19	13	<	11	12	26
Laboratory examination							
Anemia	44	56	61	<	61	46	70
Malaria, considerable parasitemia	12	27	18	<	52	26	31
Helminths in stools	29	10	16	>	7	7	10
Widal (S.typhi H pos.)	2	8	10	=	3	12	3

Probable differences between districts calculated with X^2 test are indicated with: = means p greater than .05; < and > P less than .05, and the indicated direction of the relationship.

Note on definitions:

Underweight = less than 80 % standard weight for age (Tanzania "Road to health" chart)

Stunting = less than 90 % standard height for age (WHO, Jeliffe, 1964)

Wasting = less than 80 % weight for height

Anemia = less than 32 % PCV (hematocrit)

Scabies = visible skin lesion characteristic for scabies

Malaria = one or more plasmodia per vision field in a stained thick film.

Conjunctivitis = visible inflammation and pus in the eye

Diarrhoea = either the mother's spontaneous answer of diarrhoea to a question about diseases in general in the past week, or positive response to direct question about presence of diarrhoea in the last week, or positive response on direct question about presence of diarrhoea yesterday.

Table 11.9 - Infant growth and morbidity in children 12-47 months old (in percentages of children examined).

Diarrhoea, cough and "other diseases" were most frequent in Songea, where also eye infections and helminths in stools were most often found.

No cases of kwashiorkor and very few cases of marasmus were seen. Less than one percent had visible congenital abnormalities. Surviving twins were rather common. Pneumonia was very rare. In summary the health was generally good compared to earlier findings from other places in Tanzania.

11.5.2 "Under-five" mortality rates

The total numbers of delivering women, their number of offspring and deaths between these, all in the last five years (1978-1982) are shown in table 11.10.

The under-five mortality rates of the present under-five population ("present under-fives" mortality rates) are calculated for the villages in the two districts. While they are much lower than expected in a developing country it is interesting that they do not vary very much between the villages in the same district. The difference between the districts is highly significant ($P < 0.001, X^2$ test), which fits with the overall impression that the children in Mbinga district along Lake Nyasa were better off nutritionally, and as they probably have easier access to hospital.

	Women giving birth last 5 years No.	Children born last 5 years No.	Deaths of these children No.	"Present under-five" mortality rate %
Namabengo	252	424	44	10.4
Mkongo	331	606	61	10.1
Limamu	249	429	33	7.6
Songea District	832	1459	138	9.5
Lundo	128	193	13	6.7
Mango	247	403	19	4.7
Lipingo	165	249	13	5.2
Mbinga District	5040	845	45	5.3

Table 11.10 - Calculation of "present under-fives" mortality rates in the survey villages.

Table 11.11 shows the number of deaths among children born in the last five years by age at death in the six survey villages. On this basis we have tentatively extrapolated the expected mortality between birth and 5 years of age of all children born within the last five years (taking into account that statistically none have yet lived for five years, only 20 % for four years, etc.).

	Age at death						
	Birth - 1 month	1 month - 1 year	1 - 2 years	2 - 3 years	3 - 4 years	4 - 5 years	Total
Actual deaths in survey population	21	51	58	29	17	7	183
Mean age at death	½ month	½ year	1½ year	2½ year	3½ year	4½ year	-
Expected mortality between birth and 5 years of age per 1000 born	(x1) 21	(x5/4½) 57	(x5/3½) 83	(x5/2½) 58	(x5/1½) 57	(x5/½) 70	346
Expected mortality between birth and 5 years of age per 1000 born							(/2.304) 150

Table 11.11 - Expected mortality between birth and five years of age.

An under-five mortality rate of 150 per 1000 children born is rather low for developing countries, but the villages in this survey are all characterized by relatively easy access to health facilities, and they have a recent history of good to abundant harvests.

If, however, our method of collecting the data through the barozis gives too low overall figures, which have to be studied further, it seems that the error is fairly constant, and it is therefore reasonable to use the figures in a closer evaluation of the distribution between the causes of death given, as these are rather constant too from village to village.

Table 11.12 lists the main causes of death registered by the barozis, and these are summarized in table 11.13.

The total diarrhoea mortality of less than 1 % is surprisingly low and indicates that diarrhoea is not the most important health problem in the areas studied, whereas measels (despite immunization) and cerebral malaria are the big killers.

From table 11.13 it can be concluded that less than 10 % of the total deaths among children are caused by diarrhoea and that the diarrhoea mortality in villages with improved water supply is the same as in other villages in the same region.

Cases of death	Age at death: Birth - 1 month	1 month 1 year	1 - 2 years	2 - 3 years	3 - 4 years	4 - 5 years	Total	Percentage of all 2304 born in last 5 years
Diarrhoea	0	3	6	4	1	0	14	0.6 %
Measles	0	6	22	8	7	3	46	2.0 %
Cough	0	3	3	1	0	0	7	0.3 %
Fever	2	6	16	1	1	0	26	1.1 %
Convulsions	5	11	9	9	5	2	41	1.8 %
Prematurity	5	-	-	-	-	-	-	0.2 %
Other symptoms x)	1	10	0	4	3	2	20	0.9 %
Not known	8	12	2	2	0	0	24	1.0 %
Total	21	51	58	29	17	7	183	7.9 %

x) Stomach troubles 5, whooping cough 3, jaundice 2, hookworm 2, asthma 1, malaria 2, swelling 3, head 1, mound 2.

Table 11.12 - Causes of death by zero to five years age groups and in percentage of all children born in last five years.

	Total deaths	Relative "under-five" mortality cases in percentages: Diarrhoea	Measles	Fever 1 Convulsions	Less than 1 month old	Other + unknown
Songea district	138	8 %	25 %	30 %	11 %	27 %
Mbinga	45	7 %	27 %	42 %	13 %	13 %
Villages with tap-water:						
Namabengo and Lundo	57	9 %	33 %	42 %	2 %	14 %
Other villages	126	7 %	21 %	29 %	16 %	26 %

Table 11.13 - Relation in percentage between the most common causes of death in the present under five population in districts and in villages with and without piped water supply.

11.5.3 Diarrhoea

The information from mothers about the child having diarrhoea in the previous week confirmed our assumption that diarrhoea is most frequent around the age of one year (see table 11.14).

	Age in months						
	12-17	18-23	24-29	30-35	36-41	42-47	12-47
Diarrhoea %	24	18	17	13	12	11	16
Breast fed %	96	84	55	51	38	41	

Table 11.14 - Prevalences of diarrhoea and supplementary breast feeding in age groups.

Breast feeding as a supplement to the children's food did not seem to prevent diarrhoea, but it could have an influence on child diarrhoea mortality. This cannot be shown in this study as the diarrhoea mortality is very low (see 11.5.2). No children with severe dehydration were observed during the survey.

Table 11.15 accounts for the frequencies of diarrhoea in the different villages related to drinking water sources, but as there are several different types of traditional water sources in each village, nothing decisive can be said about the variation in diarrhoea frequencies between the different traditional sources, due to the small number of users of certain categories.

Comparing children who received water collected from a tap with those who get water from any other source did, however, show a lower diarrhoea frequency among the tap users.

Table 11.16 shows that especially if only those who receive water collected from a well established piped water scheme are included among tap users, is the difference highly significant, with a diarrhoea frequency of only 6 % among users of tap water as compared to 20 % for users of other sources. This difference can be seen in both districts and it is therefore not likely to be an accidental coincidence.

It seems therefore that installation of piped drinking water of a reasonably good microbiological quality can reduce the frequency of infantile diarrhoea in Tanzanian villages, with the present knowledge about water hygiene in the rural population in Ruvuma Region.

Villages	Drinking water source						
	Piped water	Dug hole	Stream	Lake	Canal	Spring	All sources
Songea							
Namabengo	7 (216)	7 (70)	9 (22)	-	-	-	7 (308)
Mkongo	37 (100)[x]	29 (134)	-	-	-	-	33 (234)
Limamu	-	20 (178)	60 (5)	-	-	12 (34)	20 (217)
Mbinga							
Lundo	5 (86)	23 (13)	0 (14)	-	-	-	6 (113)
Mango	0 (14)	19 (69)	22 (77)	-	0 (4)	-	18 (164)
Lipingo	0 (10)	8 (61)	13 (39)	0 (6)	-	-	9 (116)
Total[xx]	13 (426)	19 (525)	17 (157)	0 (6)	0 (4)	12 (34)	16 (1152)

Note: The figures in brackets show absolute numbers of children using each source.

x Piped water installed in weeks before the survey, water flow was frequently disrupted.

xx Differences $p = 0.120$ with X^2 test.

Table 11.15 - Children with history of diarrhoea in the week before the survey as percentage of all children using each drinking water source in each village.

Area	Tap water	Other sources	All sources	Differences p values[x]
Songea				
Mkongo tap water included in tap water (n = 759)	16	20	18	0.220
Mkongo excluded (n = 526)	7	16	12	0.003
Mkongo tap water included in other sources (n = 759)	7	23	18	0.000
Mbinga (n = 394)	4	15	12	0.003
All villages				
Mkongo tap water included in tap water (n = 1154)	13	18	16	0.030
Mkongo excluded (n = 920)	6	16	12	0.000
Mkongo tap water included in other sources (n = 1154)	6	20	16	0.000

x Corrected X^2 test

Table 11.16 - Children with history of diarrhoea in the week before the survey as percentage of all children using tap water and of those using other sources.

In accordance with textbooks in tropical medicine it was found that diarrhoea is more frequent in children with malaria parasitemia (table 11.17). Whether malaria causes diarrhoea, makes the host more susceptible to other causes of diarrhoea, or diarrhoea may provoke outbreak of latent malaria, is uncertain and goes to indicate that a single symptom as diarrhoea may have many simultaneous causes and that results have to be interpreted very carefully.

Those children with a history if diarrhoea also had significantly lower body weights than those without diarrhoea in the total population as demonstrated in table 11.22. It is interesting that weight for age is a slightly more sensitive indicator for diarrhoea than weight for height. A valid explanation cannot be given in this prevalence study, but it indicate that the road to health charts can be used in studies of the epidimology of diarrhoea.

	Percentage children with diarrhoea	Percentage children without diarrhoea	(n)
Children with 1 or more malaria parasite per field of vision	22	78	(279)
Children with less than 1 malaria parasite per field of vision	14	86	(875)
(n)	(187)	(967)	

P = 0.002 with X^2 test

Table 11.17 - Correlation between diarrhoea and malaria parasitemia.

11.5.4 Widal test (typhoid fever)

The Widal test, a test which - when positive - demonstrates circulating antibodies against Salmonella typhi in the blood of formerly infected persons, was chosen as a possible parameter to measure the influence of water quality on the children's health. S.typhi causes thyphoid fever, a serious, often fatal infection, which is prevalent in most tropical countries and not rarely found in the survey area.

Transmission is mostly through contaminated drinking water or food and as man is the only known host he is therefore capable of stopping transmission by hygienic precautions. Contamination by animals has no influence on the findings.

After infection with S.typhi, the patient has agglutinating antibodies in the blood for several years, which means that the prevalence rates found in children between 12 and 47 momths old are also an indication of the incidence rates of S.typhi infections in the same population.

As expected there were some signs of accumulated positive Widal prevalence with increasing age (table 11.18).

	Age in months						
	12-17	18-23	24-29	30-35	36-41	42-47	12-47
Widal pos. %	4.6	3.9	8.4	7.8	6.8	6.0	6.3

Table 11.18 - Prevalence rates of positive Widal tests in age groups.

Some children receive maternal antibodies during foetal life as we found in a pilot test in a neonate, but it is not clear to what extent this has an influence on the epidimiological findings.

Area	Tap water	Other sources	All sources	Differences p values[x]
Songea (n = 757)[xx]	1.9	7.7	6.1	0.004
Mbinga (n = 391)	3.7	7.8	6.6	0.214
All villages (n = 1148)	2.5	7.8	6.3	0.001

x Corrected X^2 test

xx Tap water users in Mkongo included under other sources

Table 11.19 - Children with positive Widal test in percentage of all children using tap water and of those using other sources.

Table 11.20 and the summary in table 11.19 show that the positive Widal prevalence is lower in villages with well established piped water schemes, and that actual users of water from such schemes have significantly lower positive Widal prevalence in both Songea and in the survey population as a whole. The growth (weight and height for age) of the group of children with positive Widal test did not differ significantly from children with negative test.

In this survey we can therefore not demonstrate that the former S.typhi infected children are less healthy, but our findings do seem to indicate that children receiving drinking water from a piped water scheme are less exposed to water-borne bacterial infections than those using other sources.

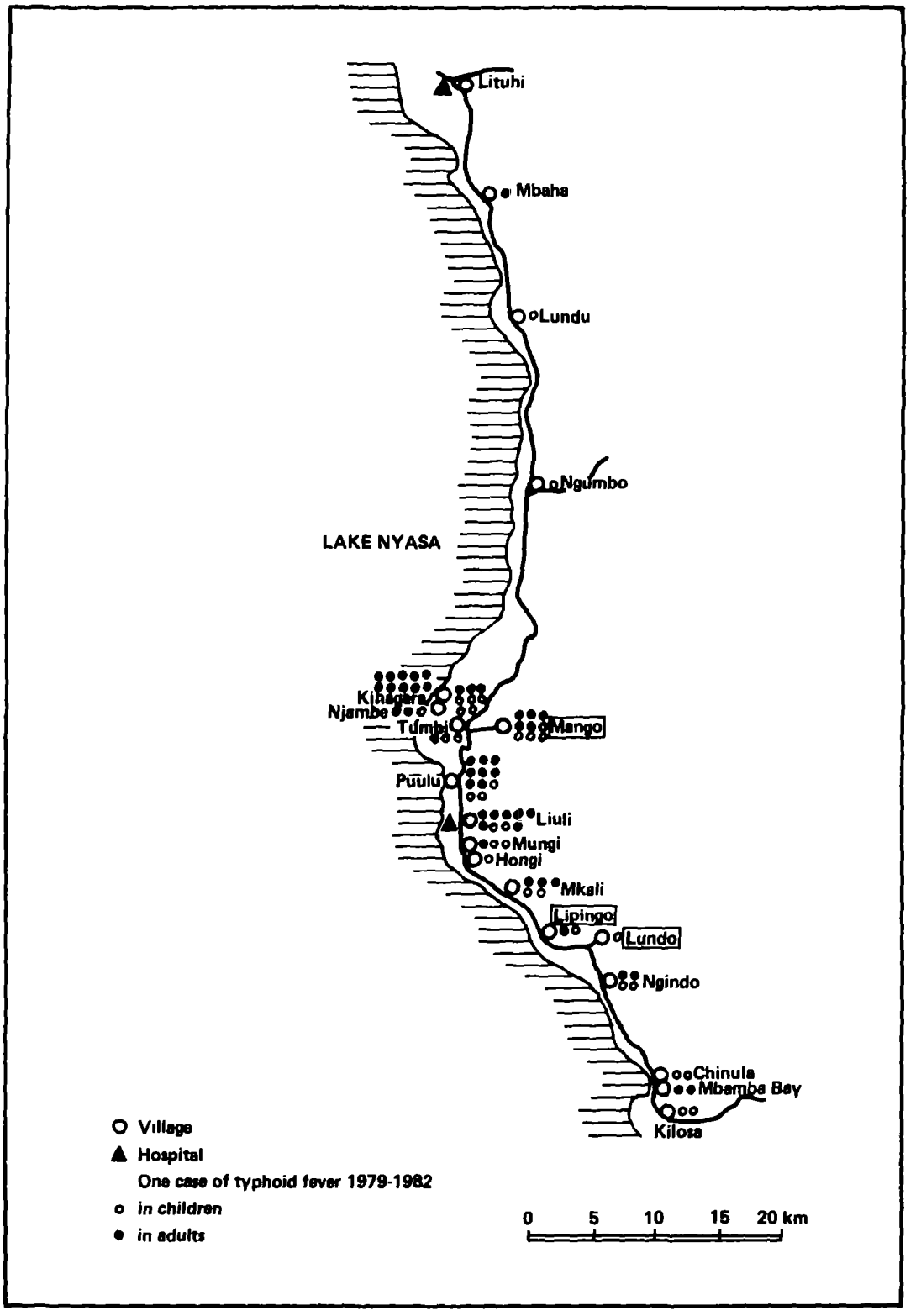
Villages	Drinking water source						
	Piped water	Dug hole	Stream	Lake	Canal	Spring	All sources
Songea							
Namabengo	1.9 (214)	1.4 (70)	4.5 (22)				2.0 (306)
Mkongo	7.0 (100)[x]	9.0 (133)					8.2 (233)
Limamu	-	8.5 (178)	0 (5)			17.6 (34)	9.7 (217)
Mbinga							
Lundo	3.5 (85)	0 (12)	0 (13)				2.7 (110)
Mango	7.1 (14)	13.0 (69)	11.7 (77)		0 (4)		11.6 (164)
Lipingo	0 (10)	4.9 (61)	2.9 (39)	0 (6)			3.4 (116)
Total[xx]	3.5 (424)	7.7 (523)	7.1 (156)	0 (6)	0 (4)	17.6 (34)	6.3 (1146)

Note: The figures in brackets show absolute numbers of children using each source.

x Piped water installed just before survey done

xx Differences $p = 0.009$ with X^2 test

Table 11.20 - Children with positive Widal (S.typhi H.antigen) tests in percentage of all children using each drinking water source in each village.



Map 11.2 - Cases of typhoid fever diagnosed in hospitals, Jan. 79 to Oct. 82, by residence of patients.
Lake shore area, Ruvuma region.

There are more than 100 different Salmonella species with the same antigenic characteristics as S.typhi, but they have very rarely been described as causes of substantial diseases in man.

To demonstrate that our positive Widal tests most likely are caused by infection with S.typhi a survey of hospital admitted patients from all lake shore villages in Mbinga district was performed by analysing the hospital records in Liuli and information from Lituhi hospital from January 1979 to October 1982.

Of 78 patients with diagnosed typhoid fever 36 were children. Map 11.2 seems to indicate a particularly high prevalence of typhoid fever in the area between, and including, Mango and Liuli, that is within a range of 10 - 15 km, compared to the total length of the lake shore zone of 100 km.

The geographical distribution of the patients' residences indicates that clinically diagnosed typhoid fever was prevalent in the survey villages in the same relation as we found the positive Widal prevalences, i.e. both were much higher in Mango than in Lundo and Lipingo.

11.5.5 Malaria and anemia

As shown in table 11.9, malaria was more common along Lake Nyasa than in the drier inland zone, and malaria probably causes anemia which was also most common at the lake shore. The higher rate of palpable spleen in the same area is most likely also caused by malaria, although also infection with Schistosoma haematobium (Bilharzia in the urinary tract) prevalent at the lake, may influence the findings.

It is interesting to note that malaria, anemia and enlarged spleen were least common in Namabengo where prophylactic chloroquine is distributed in the under five clinic.

If convulsions (degedege) are caused by malaria in the childhood, then malaria is one of the most important causes of the under-five mortality in the area, where it must probably be considered mesoendemic.

Considerable malaria parasitemia did not seem to have a clear reverse relation to the growth of the surviving children (table 11.22) in the survey population taken as a whole. In Songea alone, however, where malaria was less widespread, it did seem to affect both weight and height for age significantly when it occurred.

Helminth spp.		Hookworm eggs	Strongyloides larvae	Ascaris eggs	Enterobia eggs	Bilharzia eggs
Namabengo	n = 292	19 (13)	3 (1)	4 (1)	37 (1)	1 (0)
Mkongo	n = 181	10 (6)	2 (1)	0 (-)	2 (1)	2 (1)
Limamu	n = 179	15 (8)	4 (2)	1 (1)	1 (1)	3 (2)
Lundo	n = 111	5 (5)	1 (1)	1 (1)	0 (-)	0 (-)
Mango	n = 155	10 (7)	0 (-)	0 (-)	0 (-)	0 (-)
Lipingo	n = 109	2 (2)	4 (4)	3 (3)	0 (-)	0 (-)
Total	n = 1027	61 (6)	14 (1)	9 (1)	40 (4)	6 (1)

Only few parasites were seen in each stool specimen.

Table 11.21 - Helminths found in stools of 1027 children examined (percentages in brackets).

11.5.6 Intestinal worm load

Table 11.21 demonstrates the helminthological findings with the rather crude investigation method used which can probably be compared to the saline smear method. It seems that the rate of hookworm infestation was rather low, which is in accordance with the claimed common use of latrine. The infection with Strongyloides stercoralis is probably more important for the health situation, but it is out of reach for this study to penetrate into that. The aim of the stool examination was to discover if there were any significant differences in hookworm prevalences between villages, which was not the case.

11.5.7 Growth and health

In table 11.22 various groups of children are compared for differences in the growth indices' weight for age, (used in the Tanzanian road to health chart), weight for height, and height for age, expressed as percentage of a standard for the single individual before comparisons between different groups.

The median values for all three parameters for the different groups did not differ more than 2 - 3 % from the overall medians shown in the table. Both weight and height for age showed highly significant differences between the two geographical survey areas, while any differences in weight for height were not significant, indicating that the important factor is that the children at the same age were generally smaller in Songea than in Mbinga.

The parameter most sensitive to differences between children with and without diarrhoea in the week before the survey was weight for age and to a lesser extent weight for height, while height for age showed no correlation at all, thus registering a loss of weight from recent diarrhoea, which could not yet have had any long-term effect on height. If earlier diarrhoea attacks have had any effect on growth in terms of height, they have not been particularly concentrated to those children with diarrhoea just before the survey.

The distribution of weight for height confirms the general clinical impression that only very little acute dehydration or malnutrition were present among the children in the survey villages.

Categories compared	Probability of differences in child growth rankings (Mann Whitney's rank sum test) Weight/age P value	Weight/height P value	Weight/age P value	n
Districts				
Songea (vs. Mbinga)	0.001(neg.)	0.524(neg.)	0.001(neg.)	760/394
Diarrh. last week				
All	0.013(neg.)	0.050(neg.)	0.710(neg.)	967/187 (absent/present)
Songea	0.066(neg.)	0.093(neg.)	0.786(neg.)	620/140 (absent/present)
Mbinga	0.199(neg.)	0.340(neg.)	0.769(neg.)	347/47 (absent/present)
Malaria parasitemia: more than one parasite per field version				
All	0.131(neg.)	0.298(neg.)	0.087(neg.)	875/279(<1/>1)
Songea	0.052(neg.)	0.689(neg.)	0.001(neg.)	619/141(")
Mbinga	0.207(neg.)	0.023(neg.)	0.592(neg.)	256/138(")
Piped drinking water				
All	0.403(neg.)	0.152(neg.)	0.510(neg.)	327/827(yes/no)
Songea	0.590(neg.)	0.804(pos.)	0.536(pos.)	217/543(")
Mbinga	0.004(neg.)	0.004(neg.)	0.072(pos.)	110/284(")
Distribution for all in percent of standard				
Median	82	98	91	
5-95 percentiles	65-101	83-116	83-100	1154
Range	51-131	50-150	61-132	

Note: The smaller the P value is, the more significant is the difference in rankings. Neg. and pos. indicate whether the parameter in question has a negative or positive influence on the growth indicator. Child growth is measured as percentages of standard weight for age (Tanzania "road to health" chart); weight for height; and height for age (WHO, Jeliffe, 1964), in comparable groups of 1 - 3 year old children.

Table 11.22 - Relations between child growth and village location, incidence of diarrhoea, malaria parasitemia and use of piped drinking water.

A final, puzzling observation: Why use of piped water seemed significantly negatively correlated with weight in Mbinga is difficult to explain - except that it goes to show that any apparent statistical correlation between two factors under investigation may actually be caused by some unknown factor which is only by coincidence correlated with one of them, e.g. better nutrition in the villages without piped water may result in better child growth, which may not have anything to do with the type of water supply. Although all the survey villages were said to have had a favourable food situation for some years, this is something which should be taken more into account in a future follow-up.

11.6 Domestic water sources and child health - conclusions

If we consider normal physical growth as an indicator of the general health of children we found no significant difference between children served by piped water or not, despite pronounced differences when it comes to diarrhoea morbidity, scabies and conjunctivitis.

Lower incidences of positive Widal test in children served by piped water support that these children are less exposed to microbes causing water borne disease.

The diarrhoea mortality is however very small, and is the same in both districts and in children with and without piped water. The number of children who died from diarrhoea was too small, however, to give any significant evidence of possible differences in mortality, which makes under-five diarrhoea mortality impossible to use as an indicator of improved water realted health in this part of Tanzania.

Diarrhoea morbidity therefore seems to be the more useful parameter.

According to our findings malaria related health indicators like hemoglobin level, fever and enlarged spleen are also better for children receiving tap water versus others. This might be caused by a more close relation between malaria and diarrhoea than expected, or be a coincidence. In some villages, for example Namabengo, prophylactic chloroquine tablets were given to the under-fives but we do not know to what extent these drugs were actually used.

Our methodologies seemed to be useful and appropriate with slight modifications. Especially the community dependent parts (i.e. those demanding the cooperation of local authorities, institutions , barozis and mothers) worked better than expected.

The results suggest that it is very useful to make such a child health survey in close cooperation with all local authorities and medical institutions. It is, however, our conclusions that it is necessary to examine all children between 0 to 60 month old to be sure that most children between 12 and 48 months are included in such a survey. Therefore we suggest that all children in the under-five clinics should be included in the next survey 2 - 3 years after the present.

The physical anthropological parts of the survey were carried out smoothly and without any disturbing problems and as the methods are rather quick and inexpensive they can be recommended also for other similar surveys. Improved information on water use and hygiene would probably demand direct observations, as such data are difficult to obtain through interviews.

Finally it must be expected that the significance of the results will be vastly improved when longitudinal comparisons are made possible through a repetition of the survey in the same villages after 2 - 3 years.

12. WOMEN'S TIME USE

12.1 Introduction

One of the main objectives of providing villages with improved water supply is to reduce the time women use to collect water.

In our household survey the mean time used per water collection trip varied between zones from 20 to 80 minutes, which for a family of 6 using 10 litres each on average per day, would mean that 1 to 4 hours per day is used for fetching water (if a 20 litre bucket is used).

If some of this time could be saved, it is of course of great interest to know what it is likely to be used for, whether for productive purposes, for improved home and child care, or for more rest for the already overburdened women.

It was decided therefore to undertake a preliminary study of the time women - who are the principal drawers of water - use for different purposes over the day, in order to try to ascertain what alternative use may be made of time saved in collection of water.

12.2 Survey methodology

Experience shows that time use studies in peasant households are either extremely resource consuming or of extremely doubtful quality - the first being the case if an enumerator has to follow each single household almost continuously each day, and maybe throughout the day, the second if memory is relied upon and data acquired simply through interviews.

In this study, which is concerned with individual women's time use, and not that of the whole household, it was decided to experiment with a different method of data collection.

In the survey villages we cooperated with the primary schools, asking the students in standard 6 to act as enumerators. Each student was given an exercise book and a pen, and was asked each day, at the end of their mothers' working day to discuss with her all the different things she had been doing since she woke up in the morning and note it down in the exercise book together with the approximate time she started and finished each particular task.

On the first page the students were asked to give brief information about their household, such as number of males, females and children (below the age of the student him/herself), water source used by the household, distance to water source (the students were asked to walk from the house to the source and count the steps), and the main collectors of water in the household.

In each school, which was included in the survey, the researcher started on the first day explaining in the class the purpose of the survey and how the students should "interview" their mothers at the end of each day. The recording of the answers were demonstrated on the blackboard and questions answered. This session took about two hours.

The following day the recordings from the previous evening were checked, and mistakes and shortcomings explained.

Two or three days later a third session took place in the classroom, where recordings so far were controlled and mistakes explained.

After 7 weekdays had been recorded (Sundays were left out) the exercise books were then collected for processing.

The survey was carried out in four villages in Iringa District. In two neighbouring villages in the dry northern zone, one (Igula) with a functioning water scheme, the other (Usolanga) without, it was done in the end of November/beginning of December, i.e. at the beginning of the rainy season. Two villages in the medium dry intermediate zone, Kilala/Kidewa with water supply and Wenda without, were surveyed in May - June, i.e. the beginning of the dry season.

The students work was of extremely varying quality, and approximately half of the exercise books were not included in the data processing, mainly because the student could not account properly for time, or because too many and too long periods during the day were not accounted for. In cases where up to 30 minutes were left open between two registered tasks, these were divided between those two tasks in proportion to the time used for each of them. Cases of few, and not <u>too</u> long, uncovered periods during a day were processed as "no information".

In total 22, 17, 19 and 24 cases have been processed for the four villages. Of course this is not a representative sample of women in the four villages. But for each village it is all the women with children in standard 6, who know time properly, which should give a reasonably good basis for comparing across villages. Furthermore there is little reason to believe that these women behave much differently from the average married village women with 2 - 3 children.

12.3 Women's time use

The registered use of time was grouped as shown in table 12.1.

Shamba work includes all hoeing, planting, weeding, harvesting, collection of vegetables etc., including also the time used in going to and from fields.

Processing of crops is threshing, shelling, grinding (including travelling time to and from and waiting time at the mill), etc.

Basketry covers also matmaking.

Other "production" includes milking and other caretaking of livestock, pottery, baking cakes for sale, house repair and sewing clothes.

Business consists mainly of buying pombe (beer) and selling it at the local pombe club, but also one or two cases of selling vegetables.

Shopping means going to buy things at the shop or market. Especially the market may take time, as going to the weekly or biweekly market does not just entail going to buy things.

Cooking includes all food and beverage preparations (from lighting the fire) except pombe brewing. Picking of vegetables or grinding of maize is not included although it may be done in preparation of a particular meal. Time used for consuming the food/beverage is also included, as it seemed difficult for the students to separate preparation and consumption.

Cleaning means cleaning of utensils, the house, and the surroundings of the house.

Child care consists mainly of feeding and bathing children and taking them to the clinic/dispensary.

Visiting is mostly going to visit sick people, but we have also included meetings, burials and similar occasions, which are done under a certain social obligation, whereas seeing neighbours or friends for a chat has been grouped under resting.

Resting also includes talking with others at home as well as visits to the pombe club. Only resting in between other tasks has been included, not resting at the end of the day after finishing all work, except in a few cases when the evening rest started before 6 p.m. and the resting time up to 6 p.m. was included in data processing. So a day is counted as lasting from the woman wakes up in the morning until she finishes the last piece of work of that day or until 6 p.m. if work is finished before that.

In table 12.1 we have, for each survey village, computed the mean time used per woman day for each of these categories of time use. It is the mean for all women and all registered days, irrespective of the fact that many things were not done by all women or every day.

Table 12.2 shows the days the women actually did one of the things listed, as percentage of all the registered woman days, and the mean time use for that task on those days when it was actually performed.

In all three villages the mean working day for the women is $12\frac{1}{2}$ to 13 hours, the three most frequent and time-consuming categories of time use being shamba work, cooking and resting. Collection of water and cleaning are also done on most days, but are less time-consuming (except in Usolanga in the case of water).

All remaining things are done less than one day in three, but some which only occur very seldom takes a lot of time <u>when</u> they do, such as travelling and illness and to some extent pombe brewing.

	Mean time used per woman day for different tasks			
	Wenda (dry season; no w.s.)	Kilala/Kidewa (dry season, w.s.)	Usolanga (wet season; no w.s.)	Igula (wet season; w.s.)
Shamba work	3h15	2h40	4h45	3h30
Processing crop	0h25	0h30	0h05	0h35
Make pombe (beer)	0h25	0h00	0h10	0h05
Basketry	0h05	0h15	-	0h00
Other "production"	0h05	0h10	0h05	0h10
Collect water	0h35	0h25	1h45	0h25
Collect firewood	0h25	0h40	0h20	0h25
Business	0h00	0h15	-	0h20
Shopping	0h15	0h15	0h20	0h05
Travelling	0h20	0h20	-	0h25
Cooking	2h25	2h30	2h40	2h45
Cleaning	0h45	0h50	0h15	0h45
Child care	0h20	0h10	0h05	0h20
Washing clothes	0h10	0h15	0h05	0h15
Bathing	0h10	0h05	0h10	0h10
Visiting	0h25	0h30	0h20	0h25
Resting	1h50	2h10	1h45	2h25
Illness	0h05	0h20	0h00	0h10
No information	0h30	1h00	0h20	0h05
Total working day	12h30	13h10	13h10	13h20

Note: 2h25 means 2 hours 25 minutes; all figures are rounded to nearest 5 minutes.

Table 12.1 - Mean time used per woman day for different tasks.

Time use categories	Percentage of women days when different tasks are actually performed, and mean time (m.t.) used on these days							
	Wenda		Kilala/Kidewa		Usolanga		Igula	
	%	m.t.	%	m.t.	%	m.t.	%	m.t.
Shamba work	77	4h15	77	3h30	88	5h25	86	4h05
Processing	20	2h05	21	2h25	7	1h30	27	2h10
Make pombe	15	2h40	1	5h30	2	6h30	4	2h05
Basketry	4	1h35	10	2h35	0	-	1	0h30
Other production	11	1h00	11	1h35	7	1h30	15	1h45
Collect water	70	0h50	70	0h40	76	2h10	66	0h40
Collect firewood	31	1h25	35	2h00	22	1h30	24	1h55
Business	3	1h30	8	2h25	0	-	8	4h05
Shopping	10	2h20	7	1h25	19	1h55	8	0h40
Travelling	6	5h30	2	12h30	0	-	4	10h00
Cooking	100	2h25	94	2h40	98	2h40	99	2h50
Cleaning	76	1h00	88	1h15	31	0h45	65	1h05
Child care	31	1h00	10	2h00	15	0h40	31	0h50
Washing	9	1h30	28	1h25	5	1h40	22	1h20
Bathing	29	0h45	13	0h50	32	0h30	25	0h35
Visiting	23	1h50	22	2h05	10	3h10	14	2h40
Illness	1	8h30	5	7h35	1	3h30	5	2h45

Table 12.2 - Days when different tasks are actually performed as percentage of all registered woman days, and mean time used for different tasks on those days when they are actually performed.

12.4 Comparison between villages and seasons

Table 12.3 summarizes the women's labour hours per day, that is the working days shown in table 12.1 less the time used for bathing, visiting, resting and illness, as well as that for which we have no information.

Processing of crops, pombe brewing, basketry and other "production" have been grouped together in this table as all other "production" (i.e. all other than shamba work). Likewise business, shopping and travelling and cleaning, child care and washing clothes have been added together in two groups.

Table 12.3 also shows the approximate mean distance to water (in metres, calculated as 2/3 of the steps measured by the students), the number of adult females per houlehold, and the number of males and of dependants (males + children) per female in the household.

From our knowledge of the villages we believe, however, that the 700 metres mean distance to water in Usolanga is an underestimation, which is also supported by the much longer time used to collect water there than in the other three villages.

	Villages			
	Wenda (dry season; no w.s.)	Kilala/Kidewa (dry season; w.s.)	Usolanga (wet season, no w.s.)	Igula (wet season, w.s.)
	Mean labour hours per woman day			
Shamba work	3h15	2h40	4h45	3h30
All other "production"	1h00	0h55	0h20	0h50
Business, shopping, trav.	0h35	0h40	0h20	0h50
All "economic" activities	4h50	4h15	5h25	5h10
Collect water	0h35	0h25	1h45	0h25
Collect firewood	0h25	0h40	0h20	0h25
Cooking	2h25	2h30	2h40	2h45
Other household work	1h15	1h15	0h25	1h20
All household work	4h40	4h50	5h10	4h55
Labour hours/day	9h30	9h05	10h35	10h05
	Distance to water and family composition			
Distance to water (m)	400	200	700	200
Females/household	1.7	2.7	2.2	1.6
Males/female	1.0	0.8	0.7	0.9
Dependants/female	3.2	3.4	3.4	4.0

Table 12.3 - Mean labour hours per woman day for different tasks, distance to water and family composition.

Table 12.3 shows that the women in the two wet season villages use more time in shamba work than in the dry season villages, which is as expected. The difference is, however, less than one might perhaps have anticipated.

The relatively high figure for Wenda is due to dry season cultivation in a valley nearby. The very high figure for shamba work in Usolanga (wet season) should be related to the low figures for other production and business etc. since a bridge, which was washed away, prevented people from travelling, business, and milling maize in the neighbouring village during the survey period. The time saved seems to have been used for extra shamba work.

Apart from Usolanga other "production" and business etc. take up almost the same amount of time in different villages, so that all "economic" activities together consume more labour time in the wet season villages than in the dry season villages - but not very much more.

Apparently there is no direct relation between the time used on "economic" activities and the hours of household work, in the sense that more of one leaves less for the other. On the contrary the villages with more labour used for "economic" activities also spend slightly more on household work, resulting in more labour hours in total per day.

The differences in total household work between villages are, however, very small. The one major difference between the villages in this respect is that the women in Usolanga have much further to walk, and use much more time for water collection than in any of the other villages. But they save almost as much labour in other household work, i.e. cleaning, washing and child care.

12.5 Conclusions

Due to the small size of the survey the conclusions drawn can only be very tentative.

The results seem, however, to indicate the following tendencies in women's time use:-

- There is no converse correlation - as might have been expected - between the time used in "economic" activities and that spent on household work, i.e. more time used on either category does not reduce the other, but increases the total work burden of the women
- Within each of these broad categories, i.e. "economic" activities and household work, a very high labour use in one type of work does seem to be correlated with less time for other purposes - or time saved on one task may be used for another - but not fully, that is, more time used in one task cuts into the others, but also into the women's scarce leisure time
- In terms of water supply this means that long distances and time-consuming water collection reduce the time left for other household work, primarily hygiene and child care, while hardly affecting labour use on "economic" activities. It also augments the total number of labour hours per day for the women. Consequently time saved in water collection cannot in itself be expected to lead to increased "economic" activity, but is likely to result in improved family care and shorter working hours.

On the basis of this survey it may therefore be hypothesized that one should not expect major direct economic benefits as a result of investments in improved water supply.

The direct benefits, in terms of women's time use, are rather to be found in improved family care and more leisure time for the already overburdened women. These latter should therefore be stressed as equally valuable objectives of water supply improvement as the more commonly mentioned increase in "economic" activities.

13. PROPOSAL FOR MONITORING AND EVALUATION OF IMPLEMENTATION OF WATER MASTER PLANS FOR MBEYA, IRINGA, AND RUVUMA REGIONS

13.1 The monitoring and evaluation system

The following is an outline proposal for monitoring and evaluation of implementation of Water Master Plans for Mbeya, Iringa and Ruvuma Regions. Since the monitoring and evaluation system is expected eventually to be incorporated into the actual implementation plan, which is yet to be worked out, what is proposed here is a set of principles and guidelines, that will have to be adapted to and elaborated in the concrete contents of the implementation plan.

The monitoring and evaluation system may be divided into three distinct parts according to their different purposes and "levels" of project performance:-

- To follow the implementation processes and their current outputs as compared to directives laid down in Water Master Plans and implementation plan, i.e. monitoring and ongoing evaluation of implementation processes and outputs
- To study the impact of Water Master Plan implementation as compared with the aims and objectives of the plans, i.e. impact evaluation
- In the light of the outcome of two preceding parts as well as of general development trends in the regions to analyse the continued appropriateness of aims, priorities and criteria as laid down in the Water Master Plans, i.e. evaluation of water sector objectives in the regions.

Each part must by its nature be done differently - and by different people and institutions.

13.2 Monitoring and ongoing evaluation of implementation processes and outputs

13.2.1 Purpose

The Water Master Plans for Iringa, Mbeya, Ruvuma spell out proposals for strengthening the MAJI organization; for involving MAENDELEO and AFYA in waterrelated activities; for project level procedures during planning and

construction; for operation and maintenance; for applying certain priority and design criteria; for village participation; etc.; i.e. the processes through which the rural water supply programme is implemented.

These implementation processes and their current outputs can best be studied through continuous monitoring and ongoing evaluation throughout the implementation period. Only in this way can they be followed closely enough, so that deviations from the Water Master Plans are immediately identified, and speedy corrective action ensured whenever needed.

Of course the purpose is not always to insist on strict, inflexible adherence to everything laid down in Water Master Plans and implementation agreements, but rather to ensure that deviations are notified, their reasons properly analysed, and corrective action taken if necessary, either to redress the concrete deviation or to raise the question whether it - and the reasons behind - point to a general need for changing the plans or organizational set-up accordingly.

13.2.2 Objects for monitoring and ongoing evaluation

Aspects which should be objects for monitoring/ongoing evaluation include:-

- The functioning of the implementation organization - are the agreed organizational changes achieved and do they lead to the expected improved efficiency in terms of distribution of responsibilities, procurement and distribution of inputs, use of manpower, financial and material controls, etc.
- Selection of schemes - is this done according to approved procedures and criteria
- Surveying, design and construction - are these up to approved standards
- Village participation - do the required processes take place with involvement of the appropriate parties in the different stages of implementation
- Operation and maintenance - is the planned operation and maintenance system effectuated and does it ensure a reasonable level of scheme performance
- Health and sanitation - are the agreed programmes, particularly health education, carried out in proper coordination with water scheme implementation

- Training - are training programmes planned and carried out as stipulated
- Cost effectiveness - in relation to all previously mentioned aspects, the cost effectiveness must be taken into consideration.

13.2.3 The organization of monitoring/ongoing evaluation

Regional Steering Committee

The central institution for monitoring/ongoing evaluation of Water Master Plan implementation should be the Regional Steering Committee which already exists within the setup of the DANIDA supported water supply programme.

These committees should continue to hold bimonthly or quarterly meetings, chaired by the Regional Planning Officer and with members from MAJI (region and HQ), MAENDELEO, AFYA, and the DANIDA Steering Unit for Water Project.

At each of these meetings all members must be obliged to submit progress reports concerning the aspects mentioned above, the coordination between all parties involved, the problems encountered, and the measures taken to solve these.

Also non-members, e.g. politicians, villages, or districts must be encouraged to report problems, complaints, etc. to the regional steering committee.

On this basis the regional steering committee will be able to decide straight away on action to be taken, changes in procedures, or decisions to be referred to appropriate authorities.

If the committee is to fulfil this role it is of utmost importance, that careful minutes are kept for each meeting, including the progress reports from the members, and that these are distributed to all parties concerned, especially MAJI HQ and DANIDA soon after each meeting.

Annual review mission

To carry out an annual summing up of the monitoring/ongoing evaluation it is proposed that an annual review mission is appointed by MAJI (ministry) and DANIDA.

The tasks of the annual review mission would be:-

- To summarize and analyse minutes, progress reports, etc. from regional steering committees and the monitoring/ongoing evaluation taking place there
- To have discussions with MAJI HQ , DANIDA Steering Unit and regional steering committees on overall project performance, problems encountered, and revised implementation plans
- To make spot checks of selected water schemes and sections within the implementing organization covering the aspects mentioned above (13.2.2), including also meetings with village water committees
- To report to MAJI (ministry) and DANIDA on Water Master Plan implementation processes and outputs, particularly those specified in section 13.2.2.

13.3 Impact evaluation

13.3.1 Purpose

The purpose of impact evaluation is to evaluate whether the impact in the villages of Water Master Plan implementation processes (organization and procedures) and outputs (e.g. transportation, constructed schemes, and improved maintenance) is actually in accordance with the objectives to which they were supposed to contribute.

If impact evaluation shows that the objectives as set out in the Water Master Plans are not achieved this may lead to three different conclusions:-

- The proposed changes in implementation processes and improvement in outputs have not been achieved, and therefore the desired impact not either, so corrective action must be taken to ensure adherence to the WMP
- The Water Master Plan proposals, despite proper implementation, does not have the desired impact, and should therefore be revised
- There are discrepancies or contradictions between Water Master Plan objectives and other developments in the regions so that the objectives may have to be changed (see below 13.4).

13.3.2 Impacts to be evaluated

The impact evaluation should include the following aspects:-

- Service level - Do the schemes actually supply water at a reasonable quality, quantity, distance, and reliability to a sufficient proportion of the scheme population
- Increase in water consumption and/or reduced work load - What have been the actual achievements in terms of increased water consumption, as desirable for health purposes, and/or reduced work load for the women in water collection
- Health impacts - any discernible health improvements that can be traced back to water supply, sanitation and/or health education
- Socio-economic impacts - any direct economic effects, positive, e.g. productive use of water, or negative, e.g. village resources swallowed up by maintenance costs; or social effects, e.g. participatory improvements or increased social conflicts
- Villagers' perceptions and attitudes - What are the villagers' perceptions and attitudes towards water supply, operation and maintenance, water use, hygienic patterns etc.

These aspects would have to be analysed in relation to the implementation processes and outputs (largely as documented through monitoring and ongoing evaluation) in order to ascertain if eventual deficiencies in impacts are caused by faulty implementation.

13.3.3 Organization and methods of impact evaluation

Evaluation of the impact of Water Master Plan implementation in the rural areas demands that some time is allowed for the impacts to materialize. It also needs more thorough studies in the project villages than can reasonably be expected from a monitoring/ongoing evaluation system.

It is therefore proposed that an impact evaluation study is carried out $2\frac{1}{2}$ - 3 years after the start of plan implementation. The impact evaluation must be carried out through village and household surveys, as well as qualitative observation and participation in project meetings at different levels.

The raw data from the socio-economic household survey as well as the studies and analyses presented in Vol. 12 and this volume are available as base line

data, and the material from monitoring/ongoing evaluation should document the intervening processes, in relation to which impact data can be analysed.

The health impact evaluation should specifically include a repetition of the child health study in 6 villages in Ruvuma as reported on in chapter 11. Also the experimental health education projects in Ruvuma and Mbeya should be followed up (see chapter 9).

It would probably strengthen the impact evaluation further if a more thorough and longer term study of water supply and women's time use, than the one referred to in chapter 12, is included.

The impact evaluation, therefore, is primarily a major socio-economic study, which can best be carried out by persons experienced in socio-economic research. Institutionally it should be independent of the implementing agencies, i.e. MAJI (region), regional administration, regional steering committees and DANIDA steering unit, and preferably, while reporting to MAJI (ministry) and DANIDA, it should come from outside these organizations.

This is in order to enable those, who carrry out the impact evaluation, independently to solicit the views of all concerned parties, in particular those of the villagers, who are supposed to be the beneficiaries of improved water supply.

13.4 Evaluation of water sector objectives in the regions

It is important that an evaluation is not only used to see whether things are moving along according to the planned objectives, but also to reopen a discussion of the objectives themselves with a view of possible revision of these.

In the case of the Water Master Plan implementation the results of the monitoring/ongoing evaluation and impact evaluation proposed above, together with and related to an overview of general development trends should form the basis for such a (re-)evaluation of water sector objectives in the regions. This would be concerned with such things as design and priority criteria, the participatory approach, the public sector character of the water supply organization, etc., but also the emphasis given to the sector as such relative to other economic and social sectors in the regions.

Such an evaluation, therefore, would have to be a joint effort between experts and policy makers from the water sector as well as other sectors, including a.o. the donor agency.