CHAPTER FOUR: OPERATION AND MAINTENANCE PLAN

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4.1 Introduction

Many of the completed rural water supply schemes in the Study area are either operating below their design capacities or not functioning at all. According to the inventories of existing water facilities, there are 170 water supply systems with boreholes; however, 68 systems are out of operation due to breakdown of engines and pumps. The major reason of malfunctioning of the completed projects is lack of periodical and preventive maintenance, particularly as the project begin to age. Lack of routine maintenance of water supply facilities, among many, results from:

(i) Irresponsible attitude of communities and organisations charged with the task of maintaining water supply projects.
(ii) Reluctance to contribute or inadequate contribution by the villagers.
(iii) Inadequate recurrent budget.
(iv) In adequate technical personnel with adequate qualifications and expertise.
(v) Lack of service systems for supply of equipment and spare parts.

4.2 Involvement of Communities

4.2.1 Community Involvement

It is impossible to have a sustainable rural water supply scheme without full participation of the villagers. The most appropriate approach to be adopted should be centred on action by the end-users, the villagers. The approach is that the villagers are responsible for planning and implementation of schemes aimed at improving their own standards of living, as well as operation and maintenance of their water supply project. This is important due to the fact that the ownership of the rural water supplies is in the hand of the villagers themselves. Genuine ownership lays the foundation for community-based management and acceptance of payment for operation and maintenance, and so contributing to sustainability.

(1) Village Water Committees

For sustainable operation and maintenance (O&M) of the proposed rural water supply projects, the responsibilities of the villages include:

- To meet operation and maintenance costs of small schemes that are already completed

and handed over to the village government.

- To establish water committees and establish village water funds.
- To collaborate with the District Water Engineer's Office on issues pertaining to maintenance of village water supplies.

The village water committee is the administrative machinery responsible for O&M of the water supply facilities and management of the rural water supply projects. To this end, the village water committee is to provide the villagers with full responsibilities of supervising their water supply facilities and other related services.

The village water committees shall be strengthened so as to assume full responsibilities with regard to the provision of water services. The leaders of the village governments and the village water committees should assume the role of guardians and linkage to district officials. All decisions related to water affairs should be left in the hands of the village water committees.

The village water committee shall have at least six elected members including a chairperson, a secretary, a treasurer and other three members. The chairperson and secretary are the chief executives. The village water committee shall include at least three women in its members (Ministry of Water). Women are the main bearers of the burden for searching water and are the ones affected most by the problems of shortage of water in rural areas.

Out of 284 target villages, six villages have not formed a village water committee: four villages in Singida Rural district; and two villages in Igunga district. Furthermore, 77 village water committees have women members of less than three: four villages at Hanang district; 52 villages at Singida Rural district; 11 villages at Manyoni district; and 10 villages in Igunga district. Under the situation above, it is urgently required for such villages to form a village water committee and establish a water fund in conformity with the provision of the Water Policy and the guideline of the Ministry of Water.

(2) Village Water Fund

All villages with water supply schemes or intending to have a water supply scheme shall establish a village water fund which shall be kept in special and separate bank accounts (Water Policy). The intended benefits of such a such fund are:

- creation of an understanding that water supply is not a free service.
- to enable the beneficiaries to adequately contribute materials, cash and in kind in

national building activities towards construction, operation and maintenance of their water supply schemes.

- to enable the beneficiaries to own, operate and maintain water supply schemes in their respective villages.

The village survey has revealed that 241 villages established a village water fund; however, 43 villages have not established a village water fund so far: two villages in Hanang district; eight villages in Singida Rural district; 10 villages in Manyoni district; and 23 village in Igunga district. Total amount of village water funds provided by 241 villages comes out at Tsh 31,732 thousand, ranging from Tsh 9,000 at a village in Manyoni district to Tsh 1,685,000 at a village in Singida Rural district with an average of Tsh 131,700 per village.

In many villages, water funds are provided by the villagers through collection of money on a flat rate basis. The average village water fund of Tsh 131,700 above seems to be too small to sustain a rural water supply project. The above low level of water funds may be attributed to malfunctioning of their water supply facilities and or irresponsible attitudes of village water committees.

Under the situation, the District Water Engineer should embark on a programme to revitalise the village water committees in their respective districts to motivate villagers on making contribution to the village water funds through collection of water fees.

(3) Establishment of Water Users' Groups

For sustainable management of the rural water supply schemes, it is proposed to establish water users' groups for each water supply system in order to be closer to the water supply facilities and also able to mount maximum security. Nevertheless, these water users' groups will be directly accountable to the village water committees which in turn will operate as an umbrella organisation.

The proposed water users' groups will be formed on the basis of sub-village, since the sub-village has factual information on local condition and is well informed of desire the people relative to specific problems. Decision-making will be effectively made by the water users' groups which have knowledge of local culture and customs such as existing informal forms of cooperation and organisations.

The water users' groups will perform functions which allow the members of the groups to fully utilise water by providing the following services:

- administering the water supply systems under the authority to be vested.
- providing a mechanism regarding operation and maintenance of the water supply facilities.
- collecting water fees from the beneficiaries.
- providing a mean whereby the members of the water users' group can make decisions concerning problems of water supplies.

The water users' group will have a chairperson, a secretary and an accountant to be elected by the members of the group. The responsibilities are to fulfil the above services effectively. The chairperson will appoint caretakers among the members of the groups to undertake the daily activities for operation and maintenance of the water supply facilities. Depending on the types for water supply facilities, the caretakers will consist, but not limited, of as follows:

Borehole with handpump or solar-pump (L-1 system)
- pump attendants

Borehole with engine-pump and public taps (L-2 system)
- pump attendants
- tap keepers
- accountant

The duty of the pump attendant involves daily operation and other prescribed maintenance work that covers all the work necessary to ensure that the water pump continues to function in a satisfactory manner. In case that special maintenance including repairs of damage caused by major disasters is required, the pump attendant shall inform to the chairperson of the water users' group for repairs by technicians from the district water engineer's office or local mechanics. Cleanliness is of primary importance in preventive maintenance. Do not allow dust, moisture, oil or other substances to remain in or on the equipment.

(4) Local Mechanic Services Programme

In the Study area, no systematic services for repairing of water pumps and provision of spare parts exists, thus resulting in failure to maintain the rural water schemes in many villages as mentioned above. The district water engineer's offices are responsible for such services in order

to maintain the rural water supply schemes; however, their services are not active at present though they have technicians in charge of technical services to the village water committees. This is mainly due to lack of vehicles, equipment and tools as well as financial constraints involved in the offices and insufficient provision of village water funds.

The optimum system of local mechanic services and its management depends on the tasks it has to perform and the environment in which it operates. With the implementation of this proposed rural water supply project in the Study area, more than one thousand of borcholes with handpumps are scheduled to be constructed. The government is carrying out structural reforms aimed at reducing and gradually removing the dependence of communities on the government to run their water supply schemes.

Under such environment, it has been proposed to implement a local mechanic services programme under the control of the district water engineers. The purpose of the local technical services programme is to provide the periodical preventative maintenance of handpumps and to repair handpumps, when necessity arise, on a commercial basis by local handpump mechanics to be qualified by the district water engineers and be appointed by the village water committees.

The assignment of the local mechanics is to perform periodical visits to the rural water supply facilities for preventative maintenance services; the services include the following:

- minor maintenance : three times a year, and
- major maintenance : one time a year for overhaul of handpumps.

For successful implementation of the programme, the district water engineers concerned will select several enterprising and knowledgeable villagers among people residing in the Study area. The district water engineer's offices will provide for the technical training courses to them. After they have finished the training courses including theory and practice, they are registered as the local mechanics charged with giving technical services to maintain the handpumps on a commercial basis.

The village water committees shall make a contract with the local mechanics certified by the district water engineers. One local mechanic may cover around 40 villages on an average together with four assistant mechanics, thus being able to secure his livelihood. At the initial stage of the implementation of the programme, the district water engineer's offices will supply the local mechanics with transportation equipment and tools required for maintenance and repair of handpumps on a rental basis in order to encourage the programme in early fixation.

4.3 Governmental Intervention

In order to enhance operation and maintenance of the completed rural water supply projects, the district governments concerned are responsible for:

- all maintenance activities proved to be beyond the village level technical capabilities such as boreholes, engine pumps and plumbing.
- ensuring easy availability of fuel and spareparts required for rural water projects.
- training of village technical persons and local mechanics.
- establishment and management of the water funds.

The principal services to be provided by the district government include training programmes for village pump attendants, caretakers and local mechanics, and implementation of community health and education programmes in conjunction with the other authorities involved.

The district water engineer's offices of Hanang, Singida Rural, Manyoni and Igunga are responsible governmental organisations responsible for implementation of this proposed rural water supply projects. The district water engineers shall embark on a programme to revitalise the village water committees. The district water engineers should provide professional advice to the village water committees on operation and maintenance of the water facilities, effective use of the local mechanic services programme and financial management of the projects.

The district water engineer will appoint a staff who has responsibilities for conducting daily activities to be extended to the village water committees. Office technicians will make periodical visits to the target villages twice a year for a village in order to render the village water committees preventative maintenance of engine pumps, pipelines and other engineering structures. Actual expenses shall be charged to the village water committees.

4.4 Education and Training

4.4.1 Introduction

In order to effectively and efficiently manage the village water schemes, the villagers must be equipped with the necessary skills and knowledge. All training activities will focus on the empowerment of the individual users, especially women, in the community. The communities will be enable to plan for improved environmental health and better operation and maintenance of their water schemes. The main training methodology will be gender sensitive participatory

approaches with a view of enabling the participants to apply their own experiences and knowledge in discussing different subjects. The training materials for villagers have been prepared at the final stage of the Study after the education and training have been conducted at the pilot villages.

4.4.2 Basic Principles

(1) Community Participation

Most of activities to be done should strongly be guided by the principles of community participant and bottom up planning and decision making process. Promoting villagers based on participatory methodologies is the most important tools for achieving true participation.

(2) Gender Issues

There is a need to actively promote the participation of both women, youth men in all activities in order to succeed in mobilising all available human resources for development activities. Since women are responsible for procurement of water, cooking and child care, enhancing their awareness of good hygiene can accelerate the improvement of the family health. Most health activities should therefore be targeted towards women.

Whenever villagers are invited to discuss issues related to water or health, the role of women will inevitably arise. It is therefore essential that women be invited to these meetings and be encouraged to actively participate in discussions of issues. It is also an opportunity to promote the modifications of roles within a family and community, and also create understanding for more equal distribution of responsibilities between women and men.

(3) Self Reliance and Ownership

The issues of ownership should be explained, discussed, understood and agreed upon by the community. The users own the facilities and will eventually take full responsibility for the management, financing, operation and maintenance after completion. The financial management issues must be cleared and agreed upon within the group.

(4) Credibility

Credibility requires that what is done has been chosen and that the choice was based on sufficient information. Genuine creditability requires communication of full information and its assimilation, dissemination, acceptance and internalisation. This takes times. In absence of full

information, villagers respond rationally to available information by opportunistic behaviour (when it produces immediate benefits) and reluctance (when action would incur costs).

(5) Sustainability

An installation may last long because it was built simply and strongly, and the users have maintained it well through their own efforts and resources. The villagers should discuss the cost involved. They should also discuss the community's ability and willingness to pay for the services over a longer period of time. From the very beginning the villagers need to understand the financial implications of operating and maintaining their scheme.

The availability of spareparts must also be discussed with the end users so that they know what to expect when there is a breakdown.

(6) Affordability

To get the maximum benefit from the water scheme, the technologies used must be the ones that the villagers can easily understand, can afford and can maintain. Thus, the means of acquiring clean water and improving environmental sanitation must be financially affordable by individual households or villagers. Similarly, the maintenance costs of installations must be made clear to all and must be feasible.

(7) Cost Effectiveness

In all discussions with the villagers it is important to discuss cost efficiency and effectiveness of various activities. This should include choice of appropriate technology, methods to be used, as well as operation and financial management.

4.4.3 Implementation Programme

(PRA)

During the design period of the proposed project, the district water engineer's offices will conduct the participatory rural appraisal (PRA) at all villages covered by the proposed rural water supply programme. The principal objectives of PRA are to inform the villagers of the proposed water supply scheme and implementation procedures of the project, as well as to elaborate on their responsibilities as regards the water scheme.

PRA will be carried out by a group of facilitators qualified for the fields of rural water supplies; health and environmental sanitation; and gender issues. PRA activities in a village include meeting with village government; hearing of village history and preparation of village maps; focus group discussions; site visits; village meeting to brief villagers on the findings of PRA; problem identification; problem analysis; problem ranking; and preparation of village action plans.

(Training and Education of Villagers)
Just after the completion of the construction works, the training and education of villagers will be conducted by a group of facilitators as mentioned above under the supervision of the district water engineer's office in cooperation with other related district offices.

4.5 Proposed User's Organisation and O & M System

4.5.1 O & M Cost

To simplify matters three standard types of water supply facilities are considered for the estimation of O & M cost: L-1-1 in which service population is assumed as 430, L-1-4 in which service population is assumed as 900 and L-2 in which service population is assumed as 4,500.

(1) L-1-1 Water Supply Facilities (Service Population=430)

Item	Quantity	Unit Cost (Tsh)	Cost (Tsh)	Cost (US$)
1) Personnel Cost	3 persons	130,357	391,071	626
2) Repairing Cost			107,990	173
3) Contingencies			14,972	24
4) Depreciation			217,908	349
Total			731,941	1,172
Total excl. Depreciation			514,033	823

The O & M cost can be classified into personnel cost, repairing cost, contingencies and depreciation.

It is proposed that 3 caretakers be needed. The annual cost per person is calculated based on the estimated half day wages of Tsh 500. Personnel cost comes to Tsh 391,071 or US$ 626.

The repairing cost has been calculated on the assumptions that it will be 8% of the procurement cost of a hand pump. The procurement cost of the hand pump is estimated at US$ 2,160.

Contingencies include the cost for stationery, furniture and any other miscellaneous things. They are assumed to be 3% of the personnel and repairing cost combined.

Depreciation is calculated by dividing the procurement and installation cost of the hand pump by its durable life. The installation cost is estimated to be 13% of the procurement cost. The durable life is estimated at 7 years.

The O & M cost adds up to Tsh 731,941 or US$ 1,172. Excluding depreciation, it comes to Tsh 514,033 or US$ 823.

(2) L-1-4 Water Supply Facilities (Service Population=900)

Item	Quantity	Unit Cost (Tsh)	Cost (Tsh)	Cost (US$)
1) Personnel Cost	3 persons	130,357	391,071	626
2) Repairing Cost			368,750	590
3) Contingencies			22,795	36
4) Depreciation			975,000	1,560
Total			1,757,616	2,812
Total excl. Depreciation			782,616	1,252

The O & M cost can be classified into personnel cost, repairing cost, contingencies and depreciation.

It is proposed that 3 caretakers be needed. The annual cost per person is calculated based on the estimated half day wages of Tsh 500. Personnel cost comes to Tsh 391,071 or US$ 626.

The repairing cost has been calculated on the assumptions that it will be 5% of the procurement cost of a submersible motor pump and an invertor.

Contingencies include the cost for stationery, furniture and any other miscellaneous things. They are assumed to be 3% of the personnel and repairing cost combined.

Depreciation is calculated by dividing the procurement and installation cost of the submersible motor pump and the invertor by their durable life. The durable life is estimated at 10 years.

The O & M cost adds up to Tsh 1,757,616 or US$ 2,812. Excluding depreciation, it comes to Tsh 782,616 or US$ 1,252.

(3) L-2 Water Supply Facilities (Service Population=4,500)

Item	Quantity	Unit Cost (Tsh)	Cost (Tsh)	Cost (US$)
1) Personnel Cost				
(1) Caretaker	20 persons	130,357	2,607,140	4,172
(2) Pump Attendants	2 persons	195,536	391,072	626
(3) Accountant	1 person	392,550	392,550	628
Sub-Total			3,390,762	5,426
2) Oil Cost				
(1) Fuel	8,870 litre	470	4,168,900	6,671
(2) Lubricant	165 litre	900	148,500	238
Sub-Total			4,317,400	6,909
3) Repairing Cost			531,043	850
4) Contingencies			247,176	396
5) Depreciation			1,301,688	2,083
Total			9,788,069	15,664
Total excl. Depreciation			8,486,381	13,581

The O & M cost can be classified into personnel cost, oil cost, repairing cost, contingencies and depreciation.

It is proposed that 23 persons be needed: 20 caretakers, 2 pump attendants and 1 accountant. The annual cost per caretaker and pump attendant is calculated based on the estimated half day wages of Tsh 500 and Tsh 750 respectively. The cost for the accountant is calculated based on the half year remuneration for such a person. Personnel cost comes to Tsh 3,390,762 or US$ 5,426.

The oil cost is divided into the cost for fuel and lubricant. Both cost is calculated by multiplying the unit cost by the annual quantities to be required. It totals Tsh 4,317,400 or US$ 6,909.

The repairing cost has been calculated on the assumptions that it will be 3% of the purchase cost of a pump (US$ 8,360), an engine (US$ 7,540) and 0.5% of the purchase cost of pipes (US$ 74,550).

Contingencies include the cost for stationery, furniture and any other miscellaneous things. It is assumed to be 3% of the personnel, oil and repairing cost combined.

Depreciation is calculated by dividing the purchase and installation cost of the pump and the engine by their durable life. The installation cost is estimated to be 31% of the purchase cost. The durable life is estimated at 10 years.

The O & M cost adds up to Tsh 9,788,069 or US$ 15,664. Excluding depreciation, it comes to Tsh 8,486,381 or US$ 13,581.

4.5.2 User's Affordability

(1) Mean, Mode and Median of Annual Household Income

Unit: Tsh

Item	Hanang	Singida Rural	Manyoni	Igunga
Mean	317,751	423,745	315,815	531,786
Mode	200,000	300,000	200,000	300,000
Median	168,000	255,000	163,000	284,000

The above table shows the values of three representative average indicators of the annual household income for the four districts. It is noticed that the values represented by the mode or the median are much smaller than those represented by the mean. It means that the majority of households are distributed in the lower income groups. (Refer to Figure 4.5.1)

(2) Percentage of Cumulative Income of Households Whose Income Falls under the Lower 20% Echelon

Unit: %

Hanang	Singida Rural	Manyoni	Igunga
4.5	4.0	4.6	2.8

The above table shows the ratio of the total income of the above-mentioned households to the total income of all households in the four districts.

(3) User's Affordability

(a) Average Annual Payment for Water per Household

- L-1-1 Facilities (Service Population=430)

It is assumed in the L-1-1 system that the households pay 4% of their income for water in the Hanang, Singida Rural and Manyoni districts. In the Igunga District, however, it is assumed that the households excepting those belonging to the lower 20% income groups pay 2.5% of their

income for water because of the reason that their income is generally much higher than in the other three districts.

Thus, the average annual payment for water per such household is calculated by district as shown below:

Item	Hanang	Singida Rural	Manyoni	Igunga
Tsh	12,710	16,949	12,632	13,294
US$	20.34	27.12	20.21	21.27

- L-1-4 Facilities (Service Population=900)

In the L-1-4 system the households are assumed to pay 4.5% (2.75% in the Igunga District) of their income for water.

Thus, the average annual payment for water per such household is calculated by district as shown below:

Item	Hanang	Singida Rural	Manyoni	Igunga
Tsh	14,298	19,068	14,211	14,624
US$	22.88	30.51	22.74	23.40

- L-2 Facilities (Service Population=4,500)

In the L-2 system the households will pay 5% (3% in the Igunga District) of their income for water.

Thus, the following table on the average annual payment for water per household is worked out:

Item	Hanang	Singida Rural	Manyoni	Igunga
Tsh	15,887	21,187	15,790	15,953
US$	25.42	33.90	25.27	25.53

(b) Annual Revenues

It is assumed that the charge collection efficiency is 90%.

Then, from all the above-mentioned assumptions the annual revenues from water charge for the L-1-1, L-1-4 and L-2 facilities are calculated by district as follows:

- L-1-1 Facilities

Item	Hanang	Singida Rural	Manyoni	Igunga
Tsh	838,829	797,113	818,233	847,622
US$	1,342	1,276	1,309	1,356

- L-1-4 Facilities

Item	Hanang	Singida Rural	Manyoni	Igunga
Tsh	1,975,039	1,876,870	1,926,563	1,951,486
US$	3,160	3,003	3,083	3,123

- L-2 Facilities

Item	Hanang	Singida Rural	Manyoni	Igunga
Tsh	10,973,049	10,427,345	10,703,635	10,644,553
US$	17,559	16,685	17,127	17,033

(4) Water Price by District

Based on the average annual household income, household size, the payment for water as the percentage of household income and the per capita per day water demand (refer to Table 4.5.1(1)-(2)), water price is calculated by district as follows:

- L-1-1 Facilities

Unit: Tsh

Item	Hanang	Singida Rural	Manyoni	Igunga
Per Bucketful	6.21	5.87	6.07	6.17
Per Litre	0.31	0.29	0.30	0.30

- L-1-4 Facilities

Unit: Tsh

Item	Hanang	Singida Rural	Manyoni	Igunga
Per Bucketful	6.99	6.61	6.83	6.79
Per Litre	0.34	0.33	0.34	0.34

- L-2 Facilities

Unit: Tsh

Item	Hanang	Singida Rural	Manyoni	Igunga
Per Bucketful	7.77	7.34	7.58	7.40
Per Litre	0.38	0.36	0.37	0.37

As the above tables show, water price is more or less Tsh 6 per bucketful or Tsh 0.3 per litre in the L-1-1 system, more or less Tsh 6.8 per bucketful or Tsh 0.34 per litre in the L-1-4 system, and more or less Tsh 7.5 per bucketful or Tsh 0.37 per litre in the L-2 system across the four districts.

(5) Cost Revenue Ratios

From the foregoings the cost revenue ratios for the L-1-1, L-1-4 and L-2 facilities work out as shown below:

- L-1-1 Facilities

Hanang	Singida Rural	Manyoni	Igunga
1.145	1.089	1.117	1.157

- L-1-4 Facilities

Hanang	Singida Rural	Manyoni	Igunga
1.124	1.068	1.096	1.110

- L-2 Facilities

Hanang	Singida Rural	Manyoni	Igunga
1.121	1.065	1.093	1.087

(6) Users' Affordability Analysis by Income Group

(a) O & M Cost by System Type

The O & M cost is shown by system type as follows:

System Type	Annual O & M Cost (Tsh)	Annual O & M Cost (US$)
L-1-1	731,941	1,172
L-1-4	1,757,616	2,812
L-2	9,788,069	15,664

(b) **Water Demand and Water Price by System Type**

- Annual Water Demand

Annual water demand is calculated by system type as follows:

System Type	Population	lcd	No. of Days/Year	Annual Water Demand (litres)
	A	B	C	D=AxBxC
L-1-1	430	20	365	3,139,000
L-1-4	900	20	365	6,570,000
L-2	4,500	20	365	32,850,000

- Unit Water Cost

The cost of water per litre/20 litres works out by system type as shown below:

System Type	Annual O & M Cost (Tsh)	Annual Water Demand (litres)	Bill Collection Rate	Water Cost (Tsh) /litre	/20 litres
	a	b	c	d=a/b/c	e=dx20
L-1-1	731,941	3,139,000	0.9	0.26	5.18
L-1-4	1,757,616	6,570,000	0.9	0.30	5.94
L-2	9,788,069	32,850,000	0.9	0.33	6.62

- Water Price (including Lower 20% Echelon Income Group)

Water price on condition that all households pay for water irrespective of their income size is calculated, adding net income to O & M cost.

System Type	Water Cost (Tsh) /litre	/20 litres	Revenue Expenditure Ratio	Water Price (Tsh) /litre	/20 litres
	d	e	f	g=dxf	h=exf
L-1-1	0.26	5.18	1.115	0.29	5.78
L-1-4	0.30	5.94	1.089	0.33	6.47
L-2	0.33	6.62	1.082	0.36	7.16

- Water Price

System Type	Water Price (Tsh) /litre	/20 litres	Revenue Ratio excl. Lower 20% Echelon	Final Water Price (Tsh) /litre	/20 litres
	g	h	i	j=g/i	k=h/i
L-1-1	0.29	5.78	0.961	0.30	6.01
L-1-4	0.33	6.47	0.961	0.34	6.73
L-2	0.36	7.16	0.961	0.37	7.46

(c) Average Household Income and Payment for Water

- Average Household Income

The mean, the median and the lower 20% echelon of annual household income work out to the following:

Annual Household Income	Value in Tsh	Value in US$
Mean	410,000	656
Median	231,000	370
Lower 20% Echelon	159,000	254

Those households whose income is below the mean value account for 77% of all households.

- Payment for Water

The average annual payment for water for a household including the lower 20% echelon income group is calculated by system type as follows:

System Type	Icd	Household Size	Water Price (Tsh/litre)	Annual Payment for Water (Tsh)
	A	B	C	D=AxBxCx365
L-1-1	20	6.8	0.29	14,396
L-1-4	20	6.8	0.33	16,381
L-2	20	6.8	0.36	17,870

(d) Analysis of Payment for Water by Income Group

- Payment for Water as Percentage of Income for Lower 20% Echelon Income Group

The percentage of payment for water to income for the lower 20% echelon income group is calculated by system type as follows:

System Type	Annual Payment for Water (Tsh)	Annual Household Income of Lower 20% Echelon Income Group (Tsh)	Payment for Water as Percentage of Income (%)
	A	B	C=A/Bx100
L-1-1	14,396	159,000	9.1
L-1-4	16,381	159,000	10.3
L-2	17,870	159,000	11.2

The payment for water seems to be a little too heavy for those households belonging to the lower 20% echelon income group.

- Payment for Water as Percentage of Income by Income Group for L-1 System

The percentage of payment for water to income by income group for the L-1 facilities works out to the following:

Income Group	Annual Payment for Water (Tsh)	Annual Household Income (Tsh)	Payment for Water as Percentage of Income (%)
	A	B	C=A/Bx100
Lower 20%	14,396	159,000	9.1
2nd 20%	14,396	206,000	7.0
3rd 20%	14,396	259,000	5.6
4th 20%	14,396	466,000	3.1
Higher 20%	14,396	1,000,000	1.4

As the above table shows, the percentage of payment for water to income lies within the reasonable ranges except that for the lower 20% echelon income group.

When the lower 20% echelon income group is excluded as water charge payers, the above table is modified as shown below:

Income Group	Annual Payment for Water (Tsh)	Annual Household Income (Tsh)	Payment for Water as Percentage of Income (%)
	A	B	C=A/Bx100
Lower 20%	-	159,000	-
2nd 20%	14,892*	206,000	7.2
3rd 20%	14,892	259,000	5.8
4th 20%	14,892	466,000	3.2
Higher 20%	14,892	1,000,000	1.5

Note: *=20 litres/day/person x 6.8 persons x Tsh 0.30/litre x 365 days

- Water Price as Compared with Water Vendors' Price and Willingness to Pay

The indicators to be compared when one discusses about water price are the actual price of water sold by water vendors and the willingness to pay.

There are at present water vendors in 60 target villages according to the household survey. They sell water to the villagers at the rates of Tsh 50 to Tsh 200 - mostly Tsh 50 to Tsh 100 - per 20 litre receptacle.

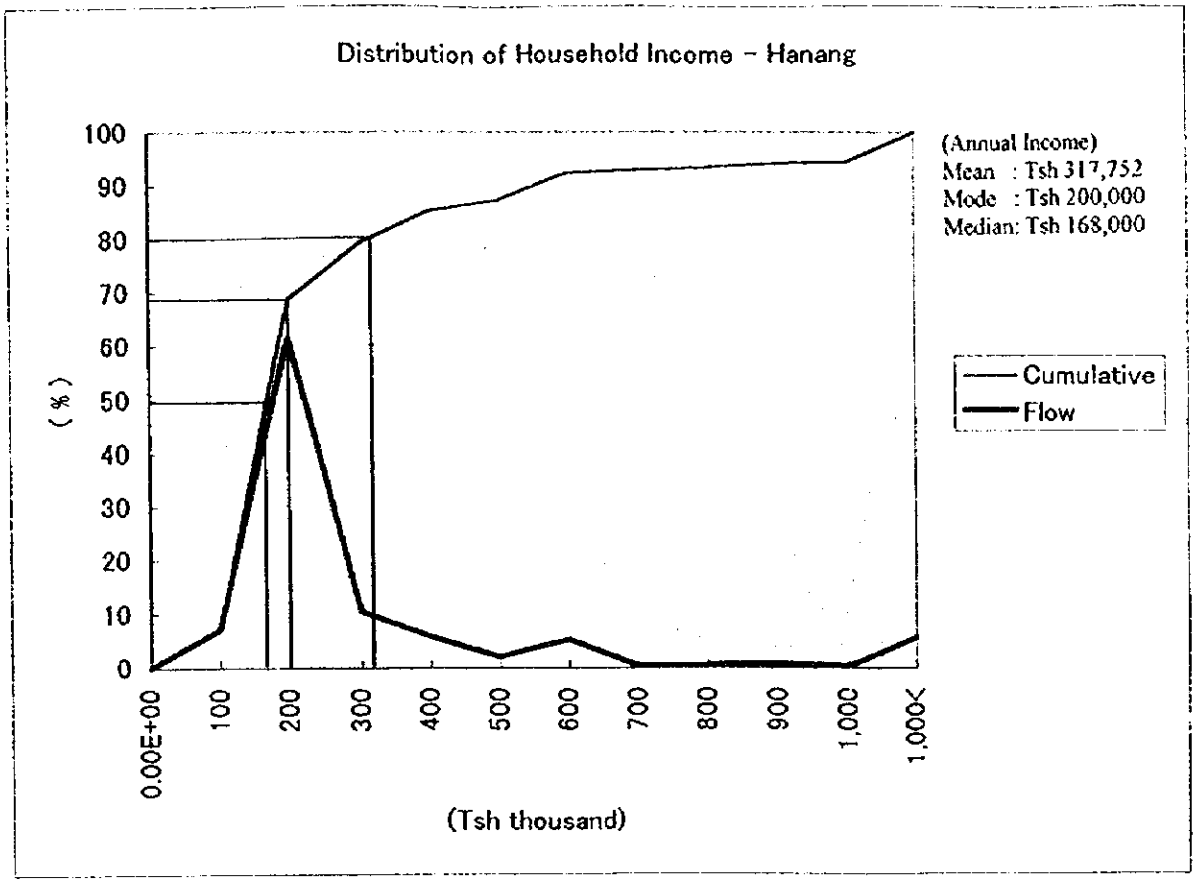
Also, the question, "If water for domestic use with good quality is provided throughout the year, how much will you pay for water charge?"was asked to the households in the target villages in

the household survey. Their answer to the question was Tsh 82 per 20 litres in weighted average.

Considering the above-mentioned figures, the proposed water price of Tsh 7.46 per 20 litres for the L-2 facilities is judged to be a reasonable one.

Table 4.5.1 Payment for Water and Water Price by District

Item	Code	Hanang	Singida Rura	Manyoni	Igunga
Ave. Household Income/Year (Tsh)	A	317751	423745	315815	531786
Family Size	B	5.6	7.9	5.7	5.9
LCD (litres)	C	20	20	20	20
Payment for Water (%)	D	4	4	4	2.5
Payment for Water (Tsh)	E=AxD/100	12710	16949	12632	13294
Payment for Water (US$)	F=E/624.94	20.337	27.121	20.213	21.272
Water Price per bucketful (Tsh)	G=E/(Bx365)	6.21	5.87	6.07	6.17
Water Price per litre (Tsh)	H=G/20	0.31	0.29	0.3	0.3
Payment for Water (%)	I	4.5	4.5	4.5	2.75
Payment for Water (Tsh)	J=AxI/100	14298	19068	14211	14624
Payment for Water (US$)	K=J/624.94	22.878	30.511	22.739	23.4
Water Price per bucketful (Tsh)	L=J/(Bx365)	6.99	6.61	6.83	6.79
Water Price per litre (Tsh)	M=L/20	0.34	0.33	0.34	0.33
Payment for Water (%)	N	5	5	5	3
Payment for Water (Tsh)	O=AxN/100	15887	21187	15790	15953
Payment for Water (US$)	P=O/624.94	25.421	33.902	25.266	25.527
Water Price per bucketful (Tsh)	Q=O/(Bx365)	7.77	7.34	7.58	7.4
Water Price per litre (Tsh)	R=Q/20	0.38	0.36	0.37	0.37



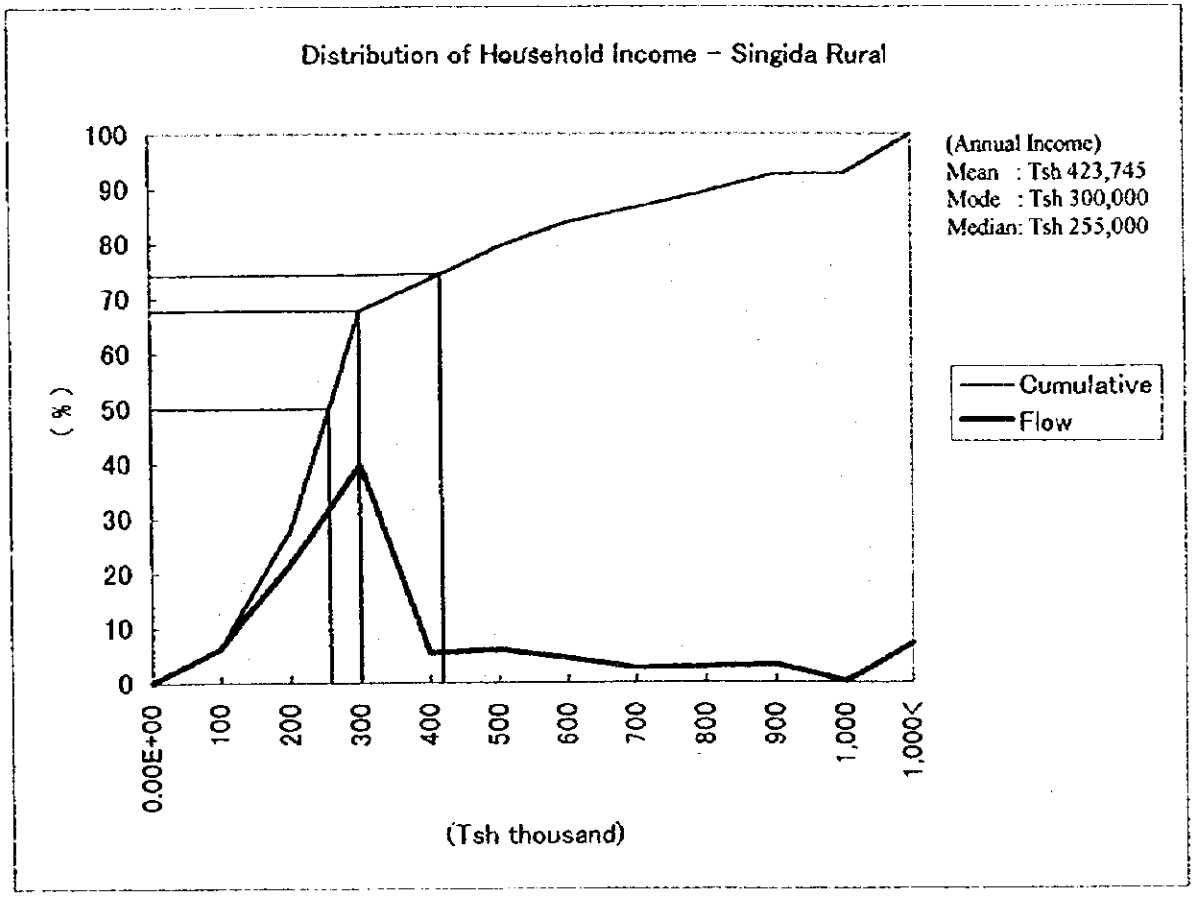
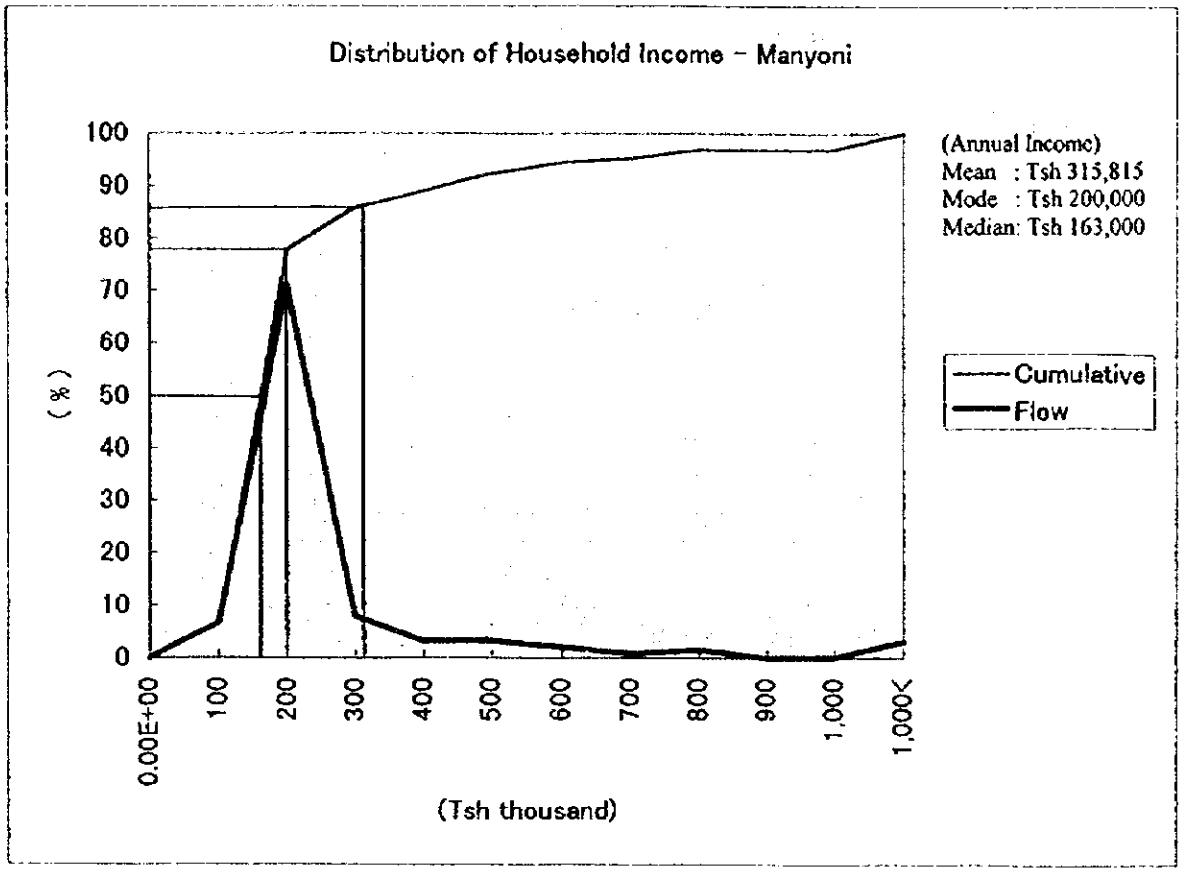


Figure 4.5.1(1) Distribution of Household Income by District



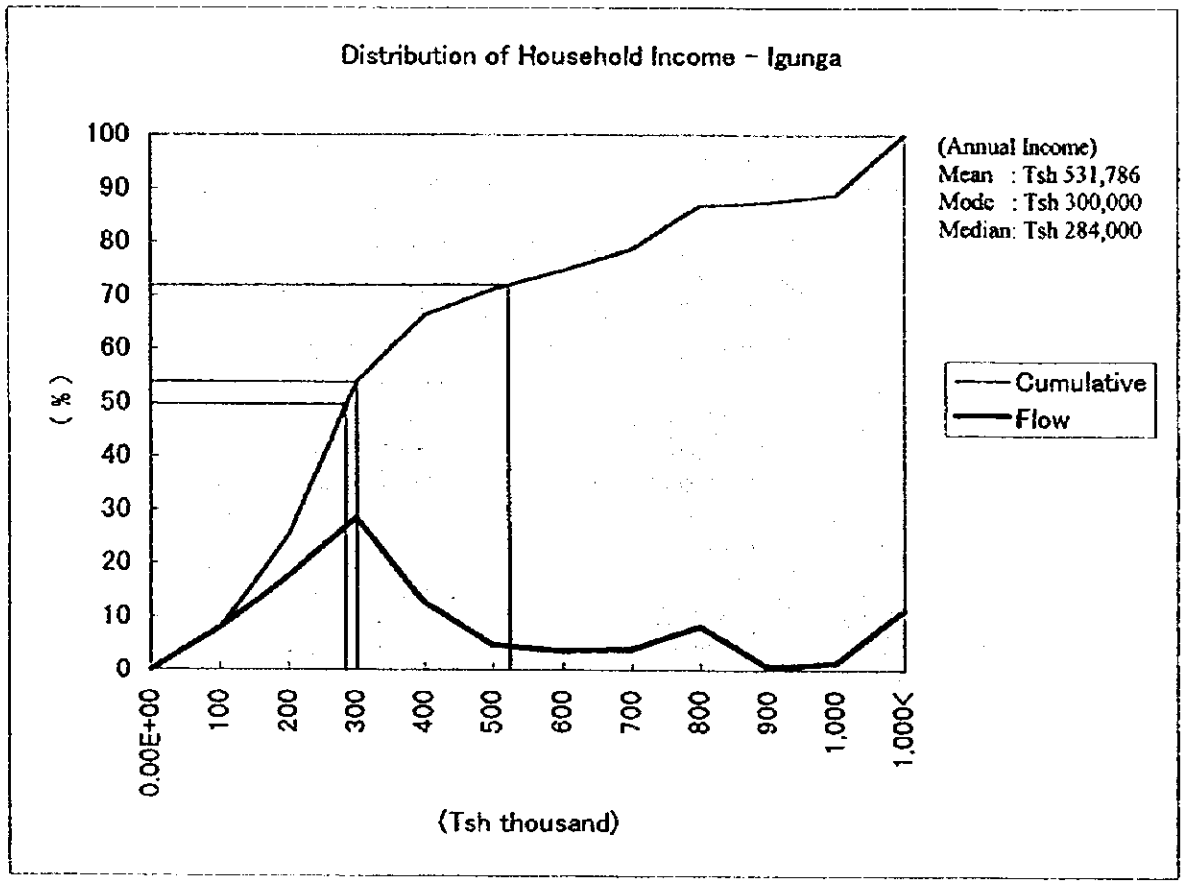


Figure 4.5.1(2) Distribution of Household Income by District

CHAPTER FIVE: RURAL WATER SUPPLY PLAN

CHAPTER FIVE: RURAL WATER SUPPLY PLAN

5.1 Existing Water Supply Schemes

5.1.1 Water Master Plan for Arusha Region

(1) Implementing Period and Donor Agency

Reporting : The interim report was published in July 1993.
Donor Agency : UNDP-UN/DESD

(2) Background

To date Water Master Plan have already been prepared in 16 regions. The four (4) regions for which Water Master Plans are yet to be carried out include:- Arusha, Singida, Morogoro and Dodoma. This plan has been prepared as part of the Arusha Region Water Master Plan. Major problems with water supply in Hanang district are related to inadequate sources of water and malfunctioning of the existing schemes. Only 42% of the villages in the District have reliable sources of water while 45% of the existing water supply schemes are out of operation. In all 40 villages of Hanang district traditional water sources are still considered to be an important element of the water supply.

(3) Objectives

The plan is intended to promote water resources development in the rural areas of Arusha region and it is expected that the plan will attract investment from national and external sources. The approach has five main elements: (i) inventory studies of existing data, (ii) field survey and identification of potential sources of supply and assessment of demand, (iii) resources evaluation of potential sources, (iv) costing of alternative options and (v) preliminary design of proposed schemes.

(4) Conclusions

In elaborating proposals for new water supply schemes of villages in Hanang district, four (4) different categories of schemes are considered in the Water Master Plan as follows:

- single piped water supply schemes : six (6) villages
- grouped piped water supply schemes : two (2) new gravity schemes
- augmented piped water supply schemes incorporated in existing water supply schemes :

four (4) new grouped schemes.

- point source (borehole or shallow well) water supply schemes : 29 boreholes and 105 shallow well.

It can be seen that in the year 2012, provided the proposed water supply schemes will have been successfully implemented, about 76% of the total population of Hanang district will be served by new or extended schemes.

It was concluded that 24% of the Districts' population will have to continue depending upon traditional sources of streams, lakes, ponds and local dug water holes which often are not protected against pollution and may cause health hazards.

For the schemes to be implemented by the Government of Tanzania it was proposed to differentiate between the construction of smaller and larger schemes. The responsibility of construction is lying directly with the Region for larger schemes and delegated through District operating construction teams for smaller schemes.

The proposed strategy for operation and maintenance of village water supply scheme is based on the concept that the scheme after construction is handed over to the villagers who thereafter assume both financial and technical responsibilities. The successful operation of the village water supply therefore becomes primarily the responsibility of the villagers themselves.

It was suggested that the operational and maintenance division of the District will operate a small workshop unit which will be capable of carrying out minor repairs on pumps and other mechanical equipment. At Regional level, operation and maintenance responsibilities will be mainly centred on coordination duties and training.

5.1.2 Water Master Plan for Tabora Region

(1) Implementing Period and Donor Agency

Water Master Plan for Tabora region took place as follows:

Field Work	: Between February 1978 - May, 1979.
Analysis	: Between July - September, 1979.
Donor Agency	: International Bank for Reconstruction and Development.

(2) Background

The Government of Tanzania's national objectives were to accelerate rural development through the grouping of the population in villages larger than traditional and to transmit to the village the agricultural technology, the education and the social benefits that are the goals of the society. A clean, reliable water supply is absolutely vital to the stability of the village formation program.

Tabora region is a semi-arid area with a rural population unequally distributed spatially and heavily involved in grazing of livestock. There are many areas where water stress is acute in the dry season.

The national aims are to obtain a water source within five (5) kilometres of every rural household by 1980 and to install distribution systems to bring clean, piped water to 400 meters maximum from every household by 1991. This is an ambitious design and to carry it through requires major increments in resources inputs. The Water Master Plan effort is to provide a sound basis for use of such resource increments.

(3) Objectives

The approach emphasises on the following four (4) items:

a) Scientific assessment of water resources combining spatial data, climatological data and sound analytical formulations;
b) A spatially desegregated approach that develops the data over the earth and permits aggregation into water resource estimates for villages or groups of villages;
c) An emphasis on finding the least cost solution to provision of rural water supplies with a specified reliability level;
d) Planning for water supply development based on the existing situation and balanced improvement of all aspects of provision of rural water supplies.

The objectives of the Water Master Plan are to (i) estimate the groundwater(deep) potential over the region, (ii) estimate the shallow well potential over the region, (iii) estimate the surface water potential(for small dams), (iv) estimate the surface water potential (for large dams), (v) estimate water demand for the villages, (vi) hydrological analysis in the region, (vii) carry out a program to estimate water quality and identify water quality problems, (viii) survey and analyse

existing water schemes and sources, and (ix) prepare engineering recommendations for construction of rural water supplies in Tabora region.

(4) Selection of Priority Villages

Analysis for 22 priority villages with recommendation was done in the water master plan. The 22 priority villages are Ilolangulu, Mwisolo, Itunduru, Usagali, Ibela Milundi, Kisengi, Ussoke, Bukoko, Uchama, Ulasa, Itundu A., Bulumde, Inala, Ndono, Tutuo, Shigamba, Ijanija, Mondo, Sungwizi, Ilala Wam Shimba, and Zogoro.

It was expected that those villages should get the first call on the development resources in order of priority. In these 22 priority villages, four (4) villages i.e. Itunduru, Bukoko, Mondo, and Sungwizi villages are included in the target villages of this JICA Study.

(5) Conclusions in the Master Plan

- Overview

The report comprises 21 volumes. The investigations are highly interrelated and comprises three main streams:

a) water demand studies
b) engineering cost studies
c) water resource studies

- Main Conclusion

Main conclusions were made to the following aspects, i.e. remote sensing, hydrology, water quality, hydrogeology, shallow wells, scheme survey, reservoir and charco survey, operation and maintenance, village data, in Chapter 2 of Volume 1.

- Conclusion on Water Development Policy

Conclusions on policies for the water development in Tabora region were made to the following aspects, i.e. organisation of RWE's operation, training aspects, village participation, program for village participation, planning of the water program, livestock watering, design considerations, water development strategy, in Chapter 3 of Volume 1.

- Alternative Water Development Strategies

Alternative water development strategies were suggested to the following aspects, i.e. shallow well emphasis, reorganisation emphasis, accelerated program, distribution emphasis, in Chapter 4 of Volume 1.

5.1.3 Activities of NGOs

(1) TCRS (Tanganyika Christian refugee Service)

- Project Title : Singida Integrated Rural Development Project

- Project History : In 1984 TCRS undertook a follow-up of the groundwater development program proposed by AIDAB (Australian International Development Assistance Bureau). The project had been implemented until 1995 in three (3) phases.

- Implementation : Project was implemented for development of water resources, environmental sanitation, agriculture, and rural community sectors. Results of water development are as follows (1984 - Sep. 1997) :

District	S/Well	M B/Hole	Reha./Well	Total
Singida R.	259	61	178	419
Iramba	85	91	56	204
Manyoni	30	32	7	68
Total	374	184	241	691

*S/Well; Shallow well M B/Hole; Medium depth borehole
Reha./Well; Rehabilitation of well

- Future Programme ; Implementation of Phase IV (1996 - 1999) including:
  - Rehabilitation of wells; 30 wells by TCRS and 40 wells by districts.
  - new construction of 95 shallow wells.
  - new construction of 65 medium depth boreholes.

(2) CPPS (Congregation of Precious Blood Fathers)

- Project Title : Rural Water Supply Project

- Project History : The Canadian group started its activities in Manyoni district in

1976.

- Implementation : The objective of the project was to construct boreholes equipped with windmill to supply water to the village people. About 60 of such facilities were so far constructed in Manyoni district.

- Future Programme : Construction of such facilities will be expanded to other area including Singida Rural district.

(3) CARITAS ARCHDIOCESE

- Project Title : Igunga Water Supply Programme (22 villages)

- Project Period : Three years (1997/98 - 2000/01)

- Programme : Water supply and sanitation activities in 22 villages, i.e. Isugili, makomero, Mgongoro, mwanzugi, Hindishi, Kidalu, Isakamaliwa, Bukama, Mbutu, Ibutamusuzi, Mwabikima, Nguvumoja, Obole, Iyogelo, Kininginila, Mwanyagula, Bulenya, Mwamashige, Imalanguzu, Ijogohya, Mwamakona and Mwamashimba villages. All villages are not included in the target villages of the JICA Study.

(4) CBCH

- Project Title : Igunga Water Supply Programme

- Activity : Rural water supply study (existing facilities and rehabilitation) in eight villages (Makomero, Mgongoro, Nyandekwa, Ziba, Ndembezi, Chapela, Igumo and Majengo), of which three villages i.e. Nyandekwa, Ziba and Ndembezi villages are the target villages of the JICA Study.

(5) CDTF (Community Development Trust Fund)

- Project Title : Nangwa Gravity Water Supply System

- Implementation : Pipe systems from the Nangwa spring to Nangwa, Wareta and Dirma villages were constructed as follows:
  - length of pipe (22 km) - break pressure tank (5 nos)
  - cattle trough (2 nos) - storage tank (2 nos)

- public domestic point (4 nos)

- Future Programme : Expansion of the project from Nangwa village to Measkron village.

5.2 Inventory of Existing Water Supply Facilities

5.2.1 Method of Survey

Survey regarding the conditions of the existing water supply facilities in the 284 target villages was implemented in order to obtain data and information deemed necessary for the establishment of rehabilitation plans and construction plans of new water sources and water supply facilities. The survey items included; location, year of construction/broken down, structure dimension, designed and existing capacity, required rehabilitation works and others.

The Study Team organised four survey teams, one for each district. The district water engineers from the concerned district joined in the survey. Firstly, interviews were made with the chairperson or the member of village water committees (VWC) to obtain general information on the existing water supply facilities. After interviews, the survey teams visited the sites for inspection of working conditions and measurements of the size of the water supply facilities.

5.2.2 Existing Water Sources

The results of survey are summarised as follows (for details refer to Appendix 4 Table 5.1 and Table 5.2(1)-(4)).

Table 5.2.2 Summary of Existing Water Supply Facilities

District	Population (1997)	No. of Water Sources in Use									No. of Water Sources not in Use								
		BP	BW	WP	WL	WH	DM	SP	OT	Total	BP	BW	WP	WL	WH	DM	SP	OT	Total
Hanang	62,501	1	0	3	0	167	4	3	4	182	1	0	13	0	0	1	0	0	15
Singida Rural	339,791	37	4	221	147	246	13	8	4	680	46	2	19	4	1	2	0	0	74
Manyoni	147,358	27	23	45	19	69	5	0	2	190	29	5	0	0	2	0	0	0	36
Igunga	142,698	6	0	5	21	121	44	0	6	203	5	0	1	0	3	1	0	0	10
Total	692,348	71	27	274	187	603	66	11	16	1,255	81	7	33	4	6	4	0	0	135

BP: Borehole with pump/Engine or Handpump BW: Borehole with Windmill

WP: Dug Well with Handpump WL: Dug Well Only WH: Water Hole

DM: Dam (incl. Charco Dam) SP: Spring OT: Others

There are 1,400 locations of water sources in the Study area, of which 107 water sources (or, 8%) are out of operation. The water sources include water holes (627 locations or 45%), dug wells (506 locations or 36%), boreholes (170 locations or 12%), charcos (67 locations, or 5%) and others like springs and temporary sources (130 locations, or 2%).

The following table gives the distribution of boreholes and dug wells, main water sources in the Study area. Most of the villages in Singida Rural and Manyoni districts rely their water sources on boreholes and dug wells.

District	Target Villages	Water Source Boreholes (%)	Dug wells (%)	Total (%)
Hanang	33	2 (1)	16 (3)	18 (3)
Singida Rural	129	89 (44)	391 (79)	480 (70)
Manyoni	72	84 (48)	64 (13)	148 (21)
Igunga	50	11 (7)	27 (5)	38 (6)
Total	284	186	498	684

With respect to service level of the existing water supply systems, the following classification is made:

Service Level-1 : -Borehole with handpump (BH+HP)
-Borehole with windmill (BH+WM)
Service Level-2 : -Borehole with engine pump (BH+EP)

According to the above classification, of total 186 water supply systems with water sources of boreholes, 71 water supply systems were designed at service level-2.

District	Level-1 BH+HP	BH+WM	Level-2 BH+EP	Total (%)
Hanang	1	0	1	2
Singida Rural	38	6	45	89
Manyoni	35	28	21	84
Igunga	7	0	4	11
Total	81	34	71	186

Though 186 water supply systems were constructed, 68 systems are out of operation chiefly due to breakdown of engines and pumps.

Particular	Level-1 BH+HP	Level-1 BH+WM	Level-2 BH+EP	Total (%)
In operation	53	27	18	98 (53)
Out of operation	28	7	53	88 (47)
Total	81	34	71	186 (100)

5.3 Water Source Development Plan

5.3.1 Projection of Population

(1) Data Source

The last National Population Census (1988) gives the average annual population growth rates (1978-1988) of four districts in the Study area as follows:

Hanang District	:	4.03%
Singida Rural District	:	2.92%
Manyoni District	:	2.85%
Igunga District	:	0.71%

The Ministry of Health has estimated the national population in 2000 (Health Statistics Abstract, 1996), in which the following annual growth rates for the four districts in the Study area were applied:

Hanang District	:	3.36%
Singida Rural District	:	2.97%
Manyoni District	:	2.85%
Igunga District	:	0.71%

The annual population growth rates projected by the Ministry of Health have been modified by quoting the trend of population growth rates of the Bureau of Statistics (Statistical Abstract, 1995) in which the annual population growth rates of Tanzania mainland are projected in consideration of social factors: 2.85% up to 1995, 2.85% up to 2000, 2.81% up to 2005 and 2.73% up to 2010. Accordingly, the following annual population growth rates have been proposed to estimate the population for project planning.

Table 5.3.1(1) Annual Population Growth Rate (%)

District	1997-2001	2002-2006	2007-2016
Hanang	3.36	3.32	3.24
Singida Rural	2.97	2.93	2.85
Manyoni	2.85	2.81	2.73
Igunga	0.71	0.71	0.71

(2) Estimated Population

The population in the target years has been estimated; the total population in the Study area is projected to increase from 696,311 in 1997 to 1,148,000 in 2016, being about 1.6 times of the current population.

Table 5.3.1(2) Estimated Population

District	1997	2001	2006	2016
Hanang	62,501	73,731	86,810	119,412
Singida Rural	343,754	397,926	439,740	608,912
Manyoni	147,358	169,588	194,793	255,003
Igunga	142,698	147,836	153,160	164,386
Total	696,311	789,081	894,503	1,147,713

5.3.2 Allocation of Facilities

As mentioned previously, several kinds of water sources are being used in the Study area. In planning of water source development, it has been considered that the existing water source in use will have to continuously utilised as useful water sources for rural water supply in the Study area because of the scarcity of available water sources including groundwater as well as economic considerations of the project which have to cover the 284 target villages with the total population of around 700 thousand persons.

As a first step of project planning for estimate of population to be served, the current population being served with the existing water sources is subtracted from the projected population of the respective target years. These existing water sources include boreholes, dug wells, water holes, dams and charco, spring and others such as lake, ponds and river flow.

Secondly, handpumps of the boreholes and dug wells, which are being not used due to mechanical breakdown of handpumps, is proposed to be replaced with new ones. However, no replacement of engine-pumps of the boreholes which are not in use is proposed. This is due to

the fact that such boreholes have problems of borehole structure as revealed through the inventory survey of the existing water supply facilities. The estimated population to be served by the replacement of handpumps is furthermore subtracted from the projected population of the respective target years.

Thirdly, water demand of individual villages is calculated based on the above adjusted village population to obtain numbers of boreholes with handpumps (L-1 service level) to be newly constructed (refer to Table 5.3.2 and Appendix-4: Number of Borehole with Handpump).

Finally, consideration is given to the list of boreholes with handpumps; if the assumed static water level of a borehole is as low as more than 40 meters below the ground surface, installation of solar pump system is proposed; and for villages with the service population of more than 4,500 persons, construction of boreholes with engine-pump and simple distribution system (L-2 service level) is proposed. The final selection of the water sources is presented in Table 5.3.2 and Appendix-4 Table 5.3(1)-(4).

Regarding water provision for livestock, construction of charco dams is proposed for the villages where no charco dam exists (refer to Table 5.3.2 and Appendix-4 Table 5.4(1)-(4)).

Table 5.3.2 Summary of Facilities Allocation

Facilities \ District		Hanang	Singida Rural	Manyoni	Igunga	Total
New Construction						
Borehole with Handpump	2001	45	106	59	54	264
	2006	100	317	147	127	691
	2016	339	1,240	555	372	2,506
Borehole with engine-pump	2001	1	4	2	2	9
	2006	-	2	-	-	2
	2016	1	-	-	-	1
Borehole with Solar System	2001	-	4	3	-	7
	2006	-	7	4	-	11
	2016	-	17	7	-	24
Charco dam	2001	12	24	17	11	64
	2006	21	48	36	22	127
	2016	46	109	87	30	272
Total	2001	58	138	81	67	344
	2006	121	374	187	149	831
	2016	386	1,366	649	402	2,803
	Total	565	1,878	917	618	3,978

5.4 Facility Plan

5.4.1 Design of Borehole and Well

(1) Design of Borehole

The drilling borehole prevailing today in Tanzania is limited in the air-hammer (DTH) method. In many cases, the Study area is covered, more or less by soft superficial formation overlying the hard bed-rock formation. In many cases, the borehole site is selected on a fractured zone where forms an excellent aquifer in depth but is often collapsible. Besides the air-hammer drilling, therefore, the mud-circulating method is quite necessary in order to effectively drill a borehole and increase the successful rate.

The bed-rock portion of most existing boreholes in Tanzania is uncased and opened. In order to extend the life-span of the borehole as well as pump, whole portion of borehole is to be properly cased by casing and screen pipes and packed by selected gravels.

As the results of review of existing borehole records, an average depth of project borehole is proposed to be 100 m over the districts, 40 m of soft formation and 60 m of bed-rock formation. The size of permanent casing and screen pipes is to be 100 mm (4 inches) for a handpump borehole and 150 mm (6 inches) for an engine-pump and solar-pump borehole.

Thus, the proposed designs of borehole are to be as shown in Figure 5.5.3(1).

(2) Design of Well

In this Study, new construction of dug wells are not planned at the target year of 2001, because present dug wells are assumed to be used till that year. However, as the lifetime of a dug well is estimated at 5 years, reconstruction of dug wells is necessary at the years of 2006, 2011 and 2016. The design of dug well is shown in Figure 5.5.3(2), considering the implementing condition of the dug well in the Study area.

5.4.2 Pumping Facilities

(1) Handpump

In area where groundwater is readily available at moderate depth, constructing a number of wells installed with handpumps is cheapest means for providing a good water supply.

Handpumps are easily maintained by caretakers to be selected by the water user's groups, with minimum skills, a few simple tools and modest training.

The specifications and application of handpump for boreholes well are as follows:

-Pumping volume per stroke	:	0.32 lit.
-Number of stroke	:	40-50 stroke/min
-Pumping volume	:	800-1,000 lit./hr
		(average 800 lit./hr)
-Pumping efficiency	:	0.8
-Actual pumping volume	:	700 lit./hr (at 30m deep of water level)
-Limit of pumping depth	:	40m
-Operation hour	:	12 hrs/day
-Pumping water per day	:	8,640 lit./day
-Service population	:	430 (at 20 lit./capita/day)
		290 (at 30 lit./capita/day)

The condition of hand pump installation and headworks are shown in Figure 5.5.3(3).

(2) Engine-pump

Pumps with engine or motor should be introduced to the area in which application of handpump seems to be uneconomic in consideration of population size. Borehole pump is recommendable as a type of pump in this Study area, because this type is applied in many water supply schemes. So that this type is advantageous on the maintenance aspects.

Regarding the prime mover, engine operating by diesel oil is recommendable in this Study area, because almost of the Study area has no supply of electricity, and also engine is familiar on the present water supply schemes.

(3) Wind-pump System

In view of the windmill operation, wind-run of 12 km/hr (3.3 m/sec) makes starting operation and wind-run over 32 km/hr (8.9 m/sec) reaches to a full operation. The condition may be converted into daily basis that a wind-run over 150 km/day (1.7 m/sec) is required for the minimum operation and over 300 km/day (3.5 m/sec) is a good wind to gain good performance.

The wind-run records in the Study area are available from three meteorological stations in Singida, Manyoni and Sekenke as stated in Section 1.4.1. In evaluation of wind in view of said windmill operation, the wind-run in Singida shows good record as 220 km/day as an annual daily mean, 380 km/day as the monthly maximum and 108 km/day as the monthly minimum. Despite that many wind-pumps are under operation in the District, the wind-run records in Manyoni are incredibly poor showing 94, 140 and 53 km/day respectively. Those in Sekenke are also poor being 104, 172 and 48 km/day. Both records are deemed to involve some improper components.

Possible application of wind-pump in the Study area is examined through the available daily wind-run records in Singida Airport (January 1987 to December 1988).

In consideration of prevailing condition that the wind-pump would be applied to a borehole of which static water level is below 40 m, the total head is required for some 60 m, and pumping capacity be large as much as possible, the type of wind-pump is supposed to be a Southern Cross windmill, which is most popular in the Study area, Model IZ-14 with pump in 70 mm size.

Since the daily wind-run record given in an average wind-speed is not sufficient for an analysis of actual performance of wind-pump, premises are set forth that all daily wind-run was distributed in a pattern of full utilisation, above 12 km/hr and below 32 km/hr. In such an ideal case an output of 400 lit./hr to 1,000 lit./hr may be achieved. For the interval between 12 km/hr and 32 km/hr, an average output of wind-pump is assumed to increase under a proportional constant, K(: 29.6 {lit./km]), to a daily wind-run, as expressed in the following equation:

Daily water output {lit./day] = K[lit./km]*Daily wind-run [km/day].

Water balance in the areas is studied for wind-pump outputs for a two-year period and water consumption by different service population at supply rate of 20 lcd is as shown in Appendix-4 Figure 5.8. As is seen in the figure, 250 population could be covered through a year with a wind-pump having a 30 m^3 water tank.

(4) Solar-pump System

A possibility of use of solar-pump (photovoltaic pumping) system is examined in this section. In consideration of the experience and available services in Tanzania, Grundfos solar pumping system is taken into mind.

The sunshine records in the Study area are available from three meteorological stations in Singida, Manyoni and Sekenke as stated in Section 1.4.1. An averaged annual sunshine hour per day is not so excellent showing 7.7 hr/day in Singida, 7.9 hr/day in Manyoni and 7.1 hr/day in Sekenke.

Taking above records, geographical situation, required water-head (60 to 70m) into account, the photovoltaic factors and expected water amount by month are estimated as shown in the following table:

Table 5.4.2 Design Work Sheet of Photovoltaic Pumping System

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ih (cal/cm^2 day)	560	480	550	500	550	460	460	430	500	500	510	540
Tilt Factors (Ft)	0.92	0.94	0.98	1.05	1.10	1.14	1.12	1.06	1.02	0.96	0.92	0.90
Ir (kWh/m^2 day)	6.4	5.4	6.3	6.1	7.0	6.1	6.0	5.3	5.9	5.6	5.6	5.7
Q (m^3/day) (11hr)	36.0	29.0	36.0	34.0	38.0	34.0	34.0	29.0	32.0	30.0	30.0	31.0
Q (Singida)	20.0	20.0	25.0	22.0	25.0	27.0	28.0	24.0	25.0	24.0	20.0	17.0
Q (Manyoni)	21.0	21.0	22.0	23.0	25.0	24.0	28.0	24.0	27.0	25.0	23.0	19.0

Notes: Ih; horizontal irradiation values,
Ir; irradiation values, tilted surface, Ir = Ih × Ft × 1/86,
Q; expected water quantities in case of 3,520 WP (double 55WP × 32pcs system).

The minimum daily pumping rates in monthly average in Singida and Manyoni are estimated to be 17.0 m^3/day and 19.0 m^3/day (both taken place in December) respectively. Thus, some 900 service population can be covered by this system with 6" borehole, a 30 m^3 water-tank and two domestic points. A conceptual layout of the system is shown on Figure 5.5.3(4).

5.4.3 Design of L-2 System

L-2 systems will be constructed at the villages of which service population is more than around 4,500 persons. Given the service population of 4,500 persons, capacities of typical L-2 system are designed as follows:

Daily water demand (with a water supply efficiency of 0.9):

Target year 2001: 4,500 persons 20 lcd ÷ 0.9 = 100,000 lit./day
Target year 2006: 4,500 persons 20 lcd ÷ 0.9 = 100,000 lit./day
Target year 2016: 4,500 persons 30 lcd ÷ 0.9 = 150,000 lit./day

Pump operation hours and water yield:

Water will be supplied for 10 hours a day; however, pump operation hours will be 16 hours a day depending on yield of boreholes. Water yield of the system is calculated as follows:

Target year 2001: 100,000 lit. ÷ 16 hours ≒ 6.5 m^3/hour
Target year 2006: 100,000 lit. ÷ 16 hours ≒ 6.5 m^3/hour
Target year 2016: 150,000 lit. ÷ 16 hours ≒ 9.5 m^3/hour

Pump capacity and reservoir tank:

Pump capacities are determined based on service population, water consumption rates (lcd) and pump operation hours as under:

Target year 2001: 4,500 x 20 lcd ÷ 16 hours ≒ 6,000 lit./hour, or 100 lit./min
Target year 2006: 4,500 x 20 lcd ÷ 16 hours ≒ 6,000 lit./hour, or 100 lit./min
Target year 2016: 4,500 x 30 lcd ÷ 16 hours ≒ 9,000 lit./hour, or 100 lit./min

The capacity of a reservoir tank is proposed to be 90 m^3 which can accommodate the water nearly equal to the daily water supply volume.

Public tap:

Public taps with double faucets will be installed. The service population of a public tap is 450 persons. Accordingly, 10 public taps will be installed to cover the service population of 4,500 persons. Locations of public taps will be distributed at a density of one tap per one square kilometre on an average. Typical layout of the L-2 system is illustrated in Figure 5.5.3(5).

5.4.4 Design of Charco Dam

(1) General

The topography of the Study area is generally too flat to construct valley dams. In Tanzania the construction of charco dams recommended where the population is scattered, and where a large number of small water supplies is required. The type of areas in which charco dams are to be

constructed is open, rolling, or flatfish plains, where well defined stream lines are developed, but where the depth of impervious materials is considerable.

In view of the above, the Study area allows to build charco dams for water supply of livestock purposes. The average size of charco dams built in Tanzania is 6,800 cu.m of reservoir capacity and 4.5 m of embankment height according to the experiences of the Ministry of Water.

Water stored in a reservoir is drawn from the reservoir to a water collecting pond through pipes, and is lifted with a handpump to a cattle though located just downstream of the charco dam. The typical layout of charco dam is illustrated in Figure 5.5.3(6).

(2) Water Balance

Using meteorological data observed at the stations of Manyoni, Sekenke and Singida air field, water balance studies are made in order to estimate number of livestock units to be served with a proposed charco dam. The major dimensions of a typical charco dam established for the Study are as follows:

Depth	Reservoir Area (m^2)	Storage (m^3)	Remarks
0	300	0	
2.0	430	200	Low water level
15.0	1,860	4,760	
17.5	2,870	6,770	Full water level

Water balance simulation was run on a monthly basis on the following conditions:

- Full water level is kept in April; the end of rainy season, and low water level is kept in the mid November; the start of rainy season.
- Rainfall on the reservoir in May and November is neglected in the calculation for conservation estimate.
- Evaporation from the reservoir surface is counted as a water loss.
- Water loss = pan evaporation x 0.7 x reservoir area
- Water requirement is 25 lit./day/livestock unit.

As a result of water balance simulation, it has been revealed that proposed typical charco dam may provide water throughout the year enough for raising 1,040 livestock units in Manyoni,

1,000 livestock units in Singida and 980 livestock units in Sekenke. Accordingly, the number of livestock units is estimated to be 1,000 for one charco dam.

(3) Construction of Charco Dam

The number of livestock units and existing charco dams is available on the village basis through the inventory survey of the target villages. Regarding the allocation of charco dam, the following principle is taken;

- one charco dam by the Year 2001 to the villages where three or more dams are required.
- another charco dam by the Year 2006 to the villages where two or more dams are required; and
- remaining charco dams by the Year 2016.

The number of proposed charco dams is determined according to the above rules as given below (for details, refer to Appendix-4 Table 5.4(1)-(4)):

District	Year 2001	Year 2006	Year 2016	Total
Hanang	12	21	46	79
Singida Rural	24	48	109	181
Manyoni	17	36	87	140
Igunga	11	22	30	63
Total	64	127	272	463

5.5 Plan of Rehabilitation and Replacement

5.5.1 Rehabilitation of Existing water Facilities

(1) Type of Facilities

Based on the results of the inventory survey of the existing water supply facilities, the rehabilitation plan has been formulated. The plan includes:

- rehabilitation of the water facilities which are not in use due to mechanical breakdown of facilities, and
- rehabilitation of the water facilities which are in use; but the facilities are aged, resulting in low working efficiency.

The existing water facilities to be rehabilitated are classified into the following four types according to the nature of their water sources and pumps:

- L-1-1 type : borehole with handpump (deep)
- L-1-2 type : dug well with handpump (shallow)
- L-1-3 type : dug well with windmill
- L-2 type : borehole with engine-pump and distribution line

(2) Water Facilities Out of Use

Though not in use, some existing water facilities can be rehabilitated through installation of new pumps, engines or windmills. The following 35 water facilities will be rehabilitated in the target year 2001:

Type	Hanang	Singida Rural	Manyoni	Igunga
L-1-1	1	10	6	-
L-1-2	13	3	-	-
L-1-3	-	-	2	-
L-2	-	-	1	-
Total	14	13	9	-

(3) Water Facilities in Use

Handpumps and windmills of 119 water facilities will be rehabilitated to improve their working efficiencies so that the existing water sources be fully utilised for the villagers.

Type	Hanang	Singida Rural	Manyoni	Igunga	Total
L-1-1	1	33	17	-	51
L-1-2	14	14	7	4	39
L-1-3	-	4	25	-	29
Total	15	51	49	4	119

5.5.2 Replacement of Water Facilities

Main components of the existing water facilities and proposed water facilities will be replaced by new ones depending on their lifetime. The lifetime of main components applied to the replacement plan is given below:

- Borehole : 20 years
- dug well : 5 years
- engine-pump : 10 years
- handpump (deep well) : 7 years
- handpump (shallow well) : 5 years
- pipeline : 30 years

The following existing water facilities will be replaced in the year 2001:

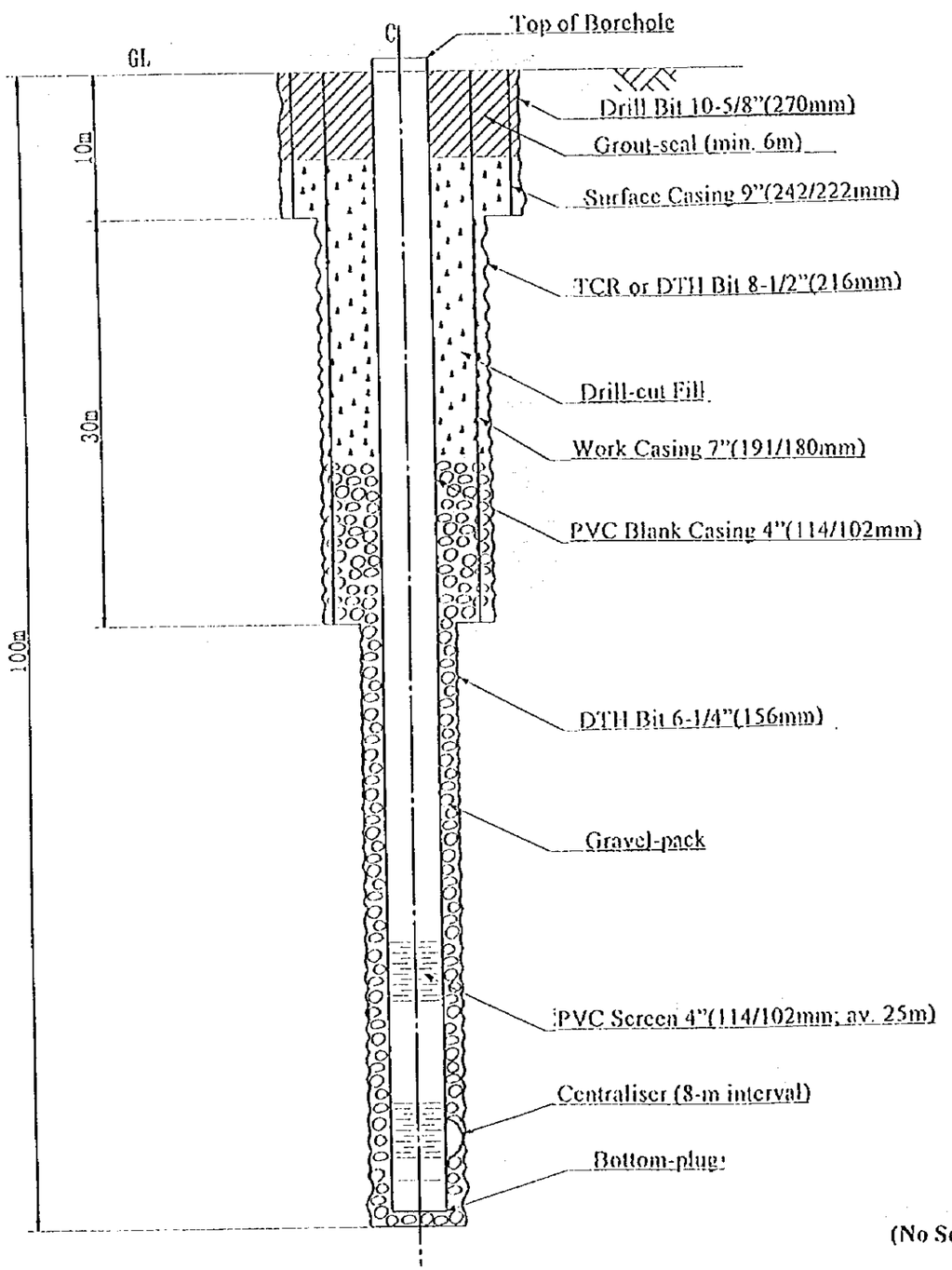
Type	Hanang	Singida Rural	Manyoni	Igunga	Total
L-1-1	-	23	11	-	34
L-1-2	1	11	7	4	23
L-1-3	-	4	23	-	27
L-2	-	3	9	2	14
Total	1	41	50	6	98

The water facilities to be constructed under the project need to be replaced according to their lifetime. Number of such water facilities amount to 2,412 in total as summarised below:

Type	Hanang	Singida Rural	Manyoni	Igunga	Total
L-1-1	190	529	267	235	1,221
L-1-2	-	-	-	-	-
L-1-3	-	-	-	-	-
L-1-4	-	11	7	-	18
L-2	1	6	2	2	11
Total	191	546	276	237	1,250

Figure 5.5.3(1) Borehole Design

(1) TYPE-A (For Handpump Borehole)



(No Scale)

(2) TYPE-B (For Power-pump Borehole)

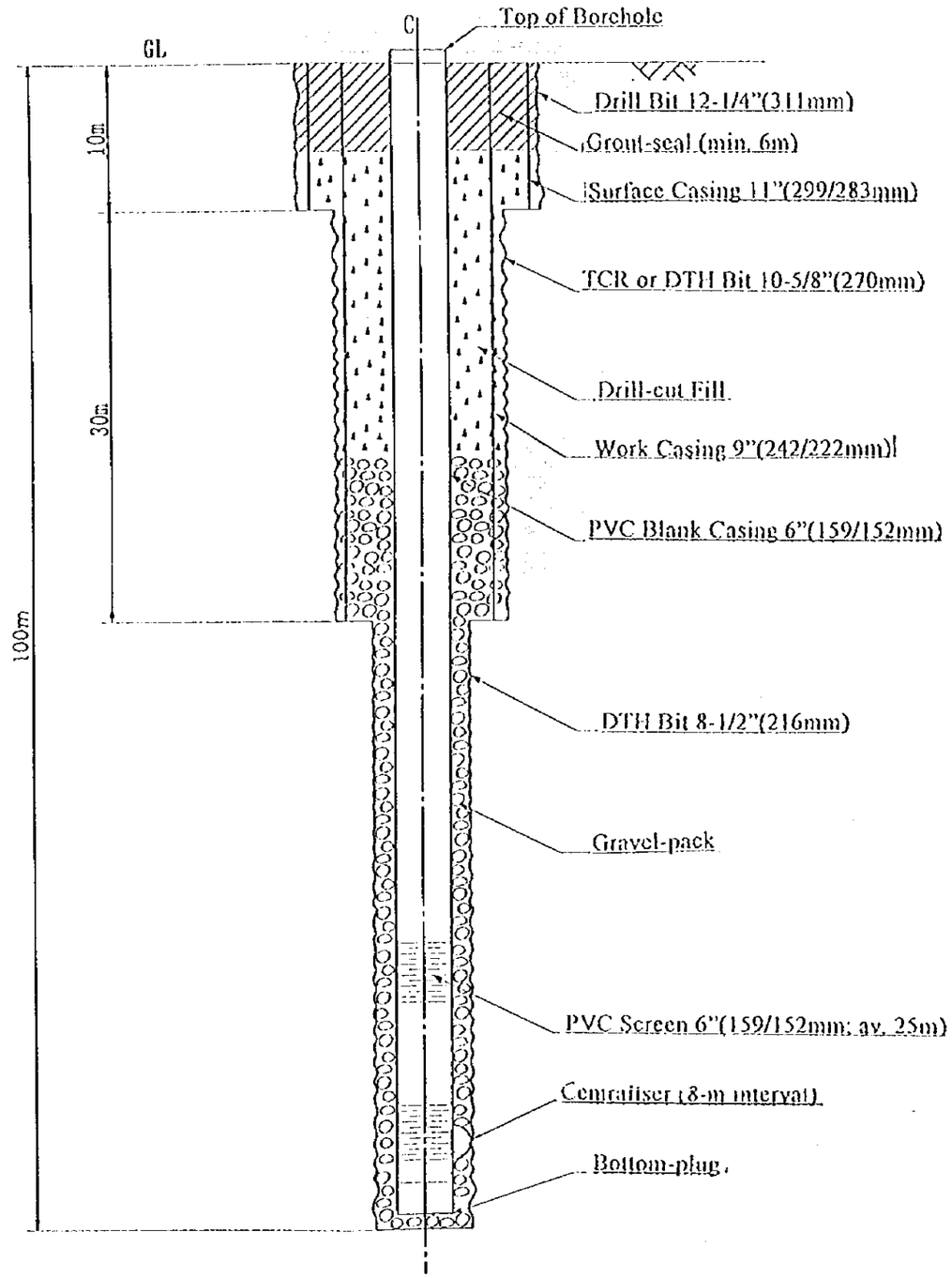
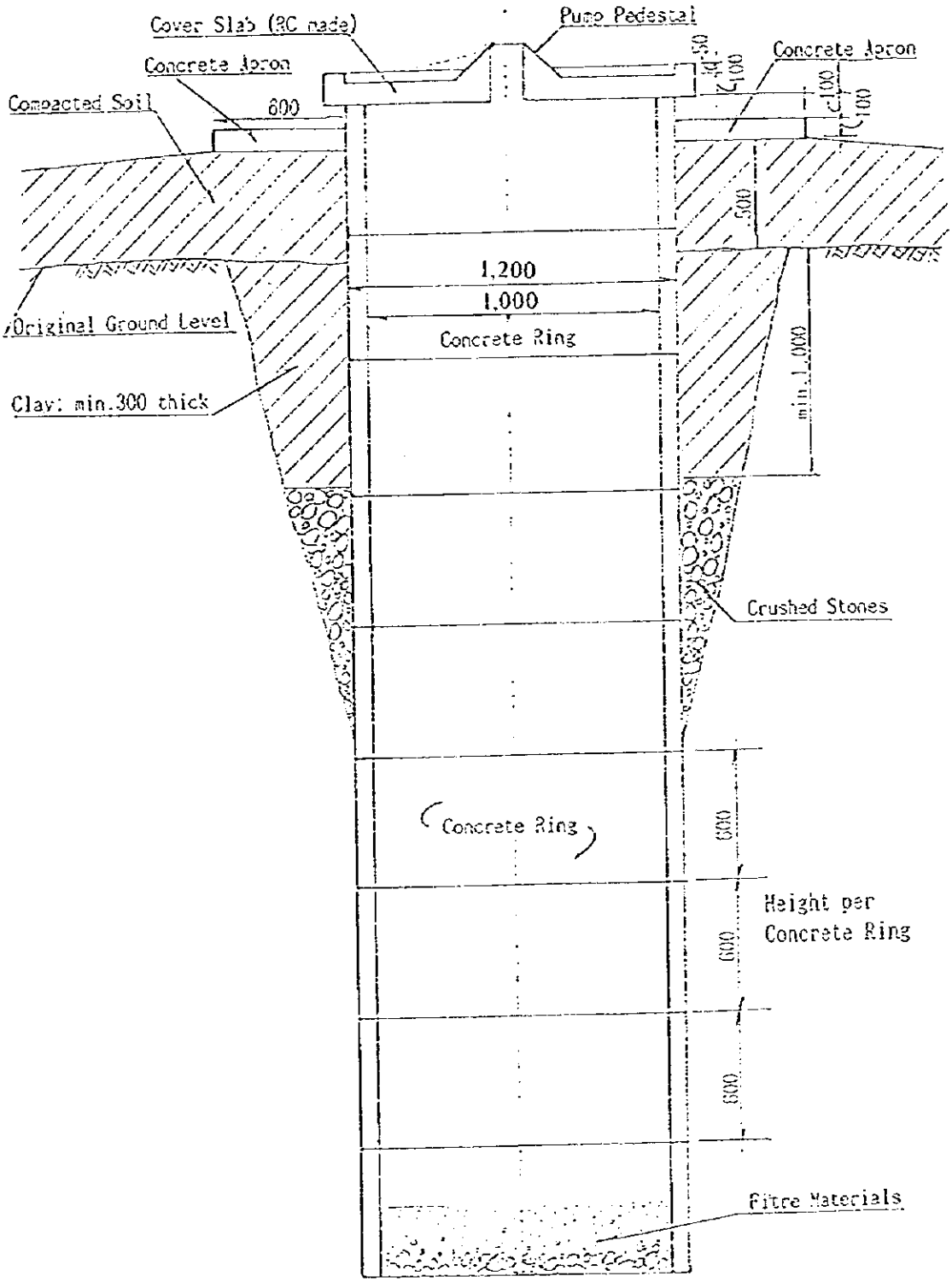
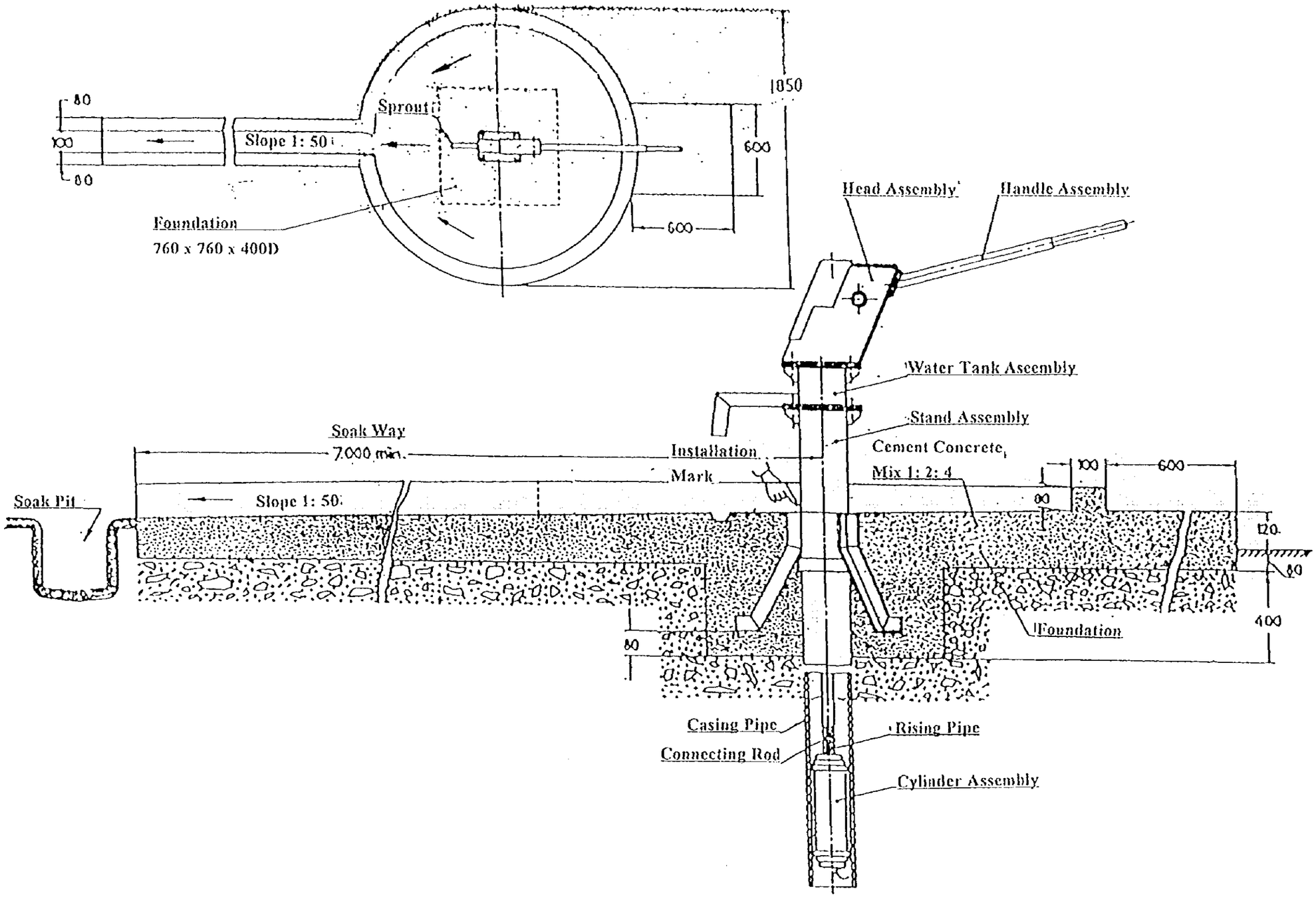


Figure 5.5.3(2) **DESIGN OF SHALLOW DUG-WELL**

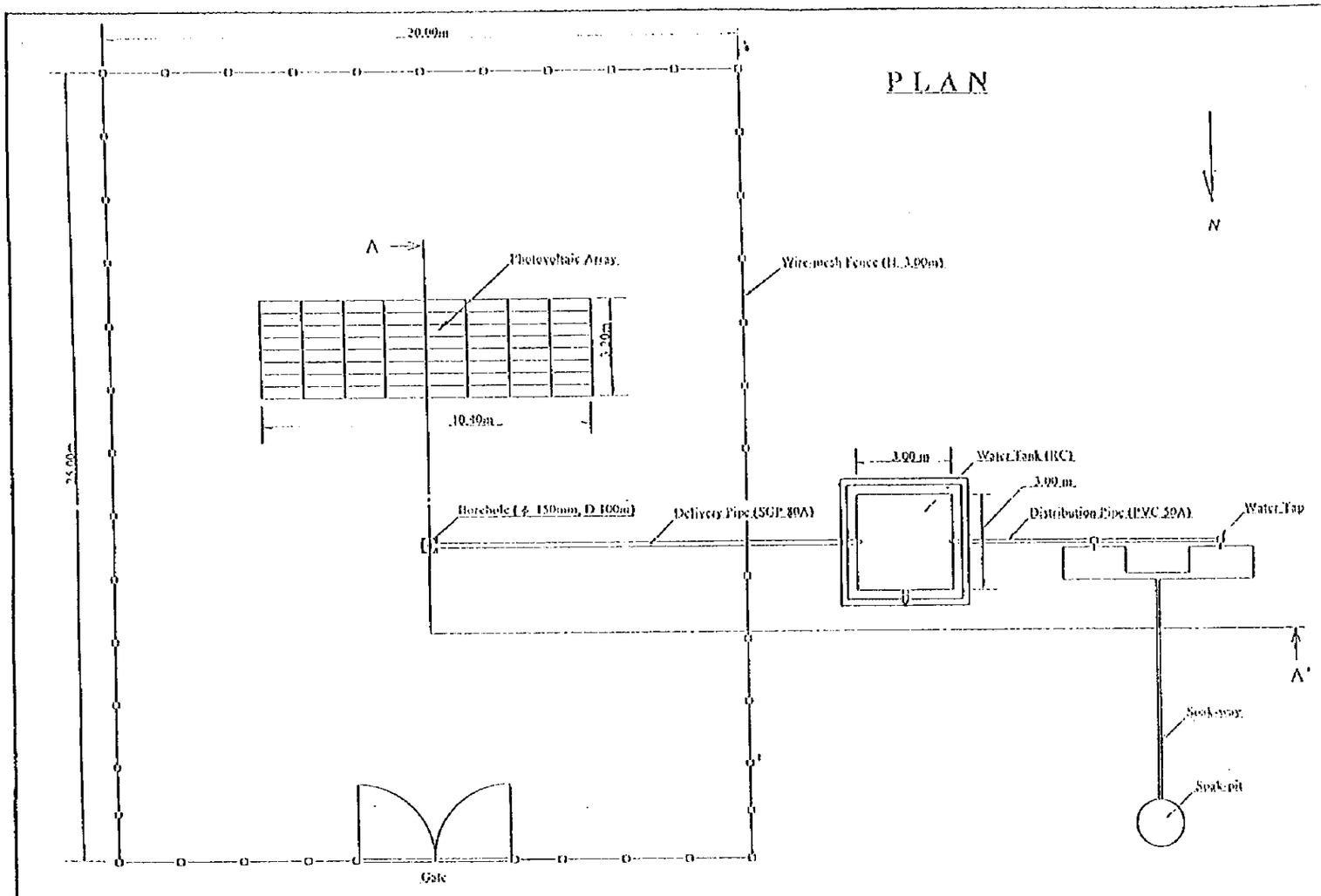


Note: All dimensions in millimeter.



All dimensions in millimetres.

Figure 5.5.3(3) Design of Borehole Headworks



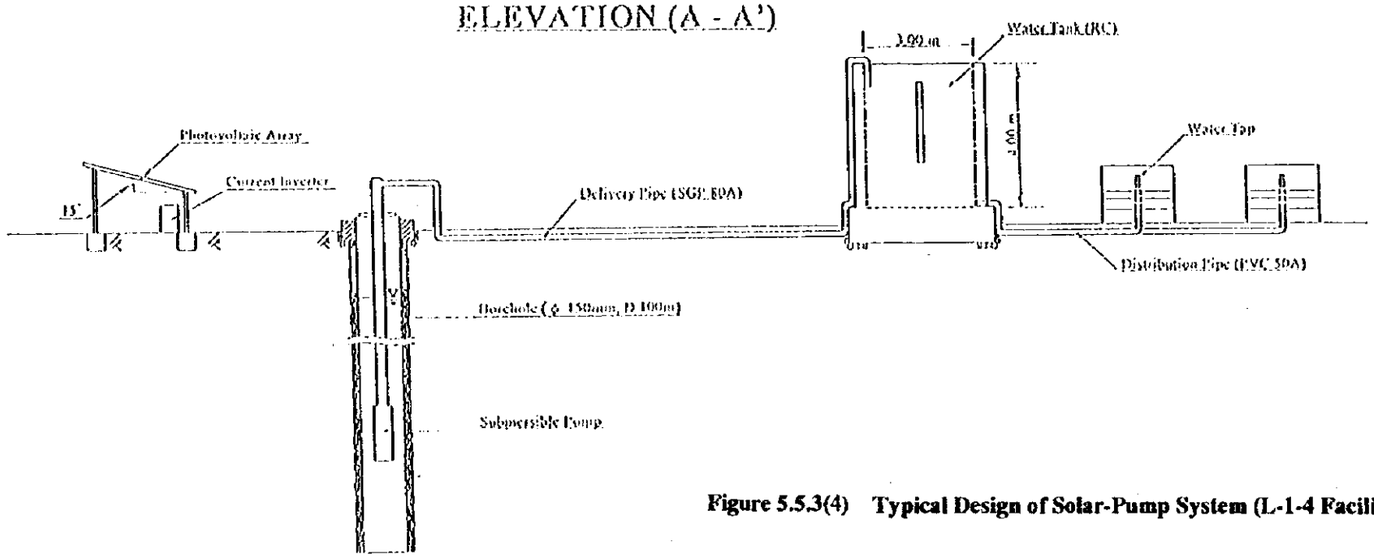


Figure 5.5.3(4) Typical Design of Solar-Pump System (L-1-4 Facility)

Scale
0 5 m

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THE STUDY ON GROUNDWATER DEVELOPMENT IN HANANG, SINGIDA RURAL, MANYONI AND IGUNGA DISTRICTS
TYPICAL DESIGN OF SOLAR-PUMP SYSTEM (L-1-4 FACILITY)

DATE	March, 1998	FIGURE NO.	5.5.3

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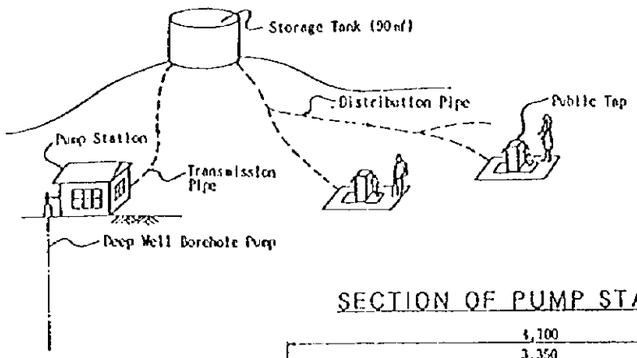
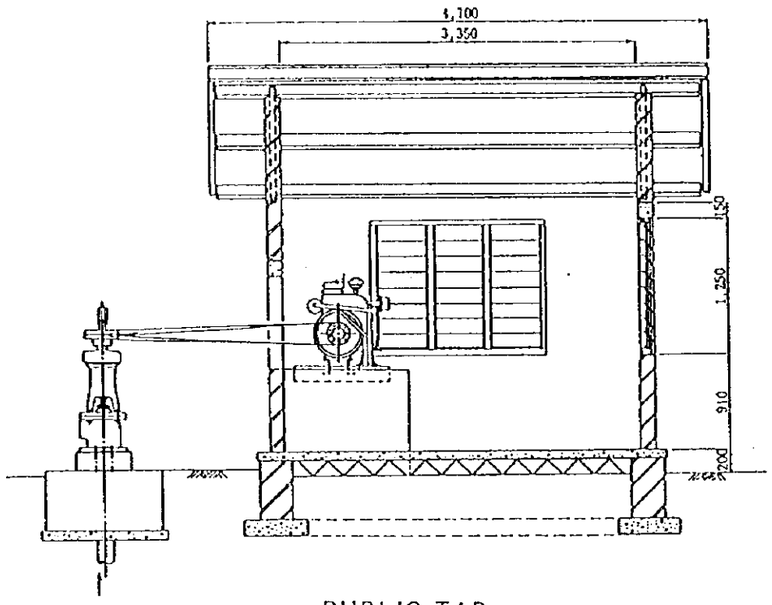
JAPAN ENGINEERING CONSULTANTS CO. LTD.

ILLUSTRATION OF THE PLAN

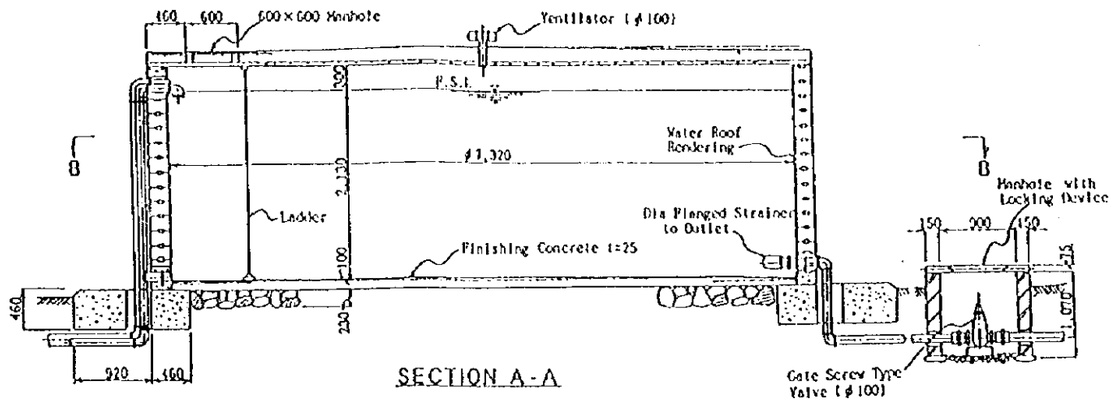


SECTION OF PUMP STATION

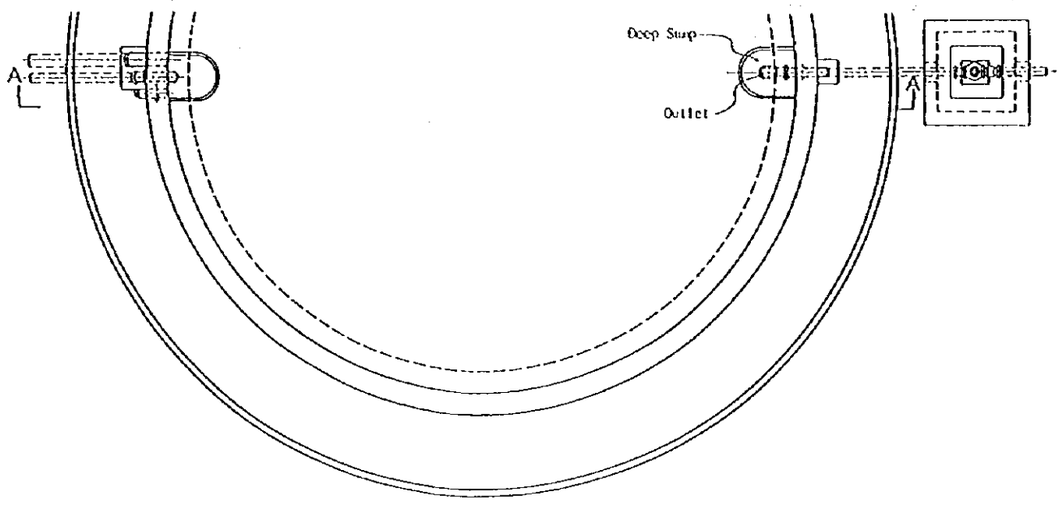


PUBLIC TAP

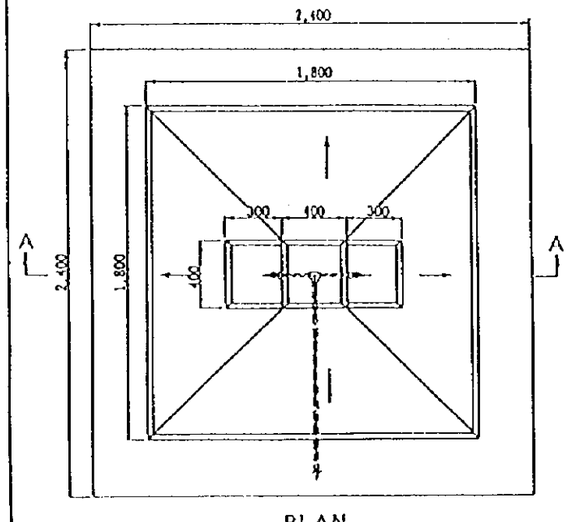
STORAGE TANK (90M³)



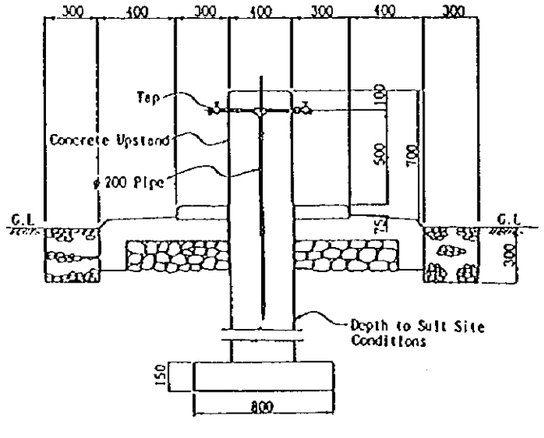
SECTION A-A



PLAN WITHOUT COVER SLAB
(SECTION B-B)



PLAN

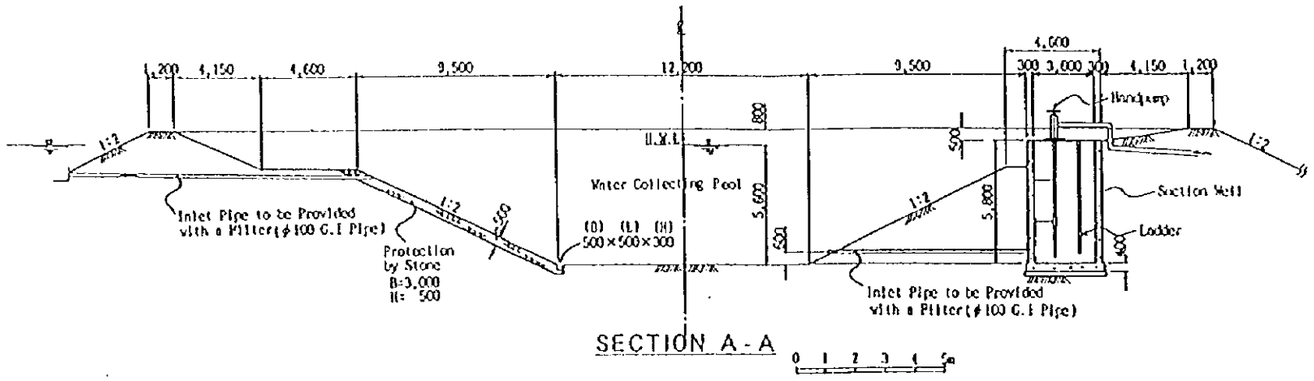


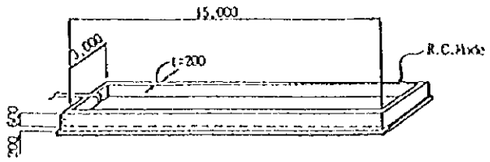
SECTION A-A

Figure 5.5.3(5) Typical Design of L-2 System

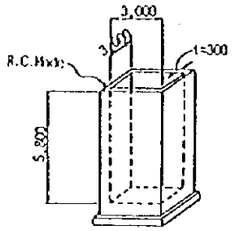
JAPAN INTERNATIONAL COOPERATION AGENCY	
THE MINISTRY OF WATER	
THE GOVERNMENT OF THE UNITED REPUBLIC OF TANZANIA	
STUDY ON THE GROUNDWATER DEVELOPMENT FOR	
HANANG, SINGIDA RURAL, MANYONI AND IRINGA DISTRICTS	
TYPICAL DESIGN OF L — 2 SYSTEM	
DATE: Mar. 1988	FIGURE NO.: 5.5.4
SANYU CONSULTANTS INC.	
JAPAN ENGINEERING CONSULTANTS CO.,LTD	

Figure 5.5.3(6) Typical Design of Charco Dam

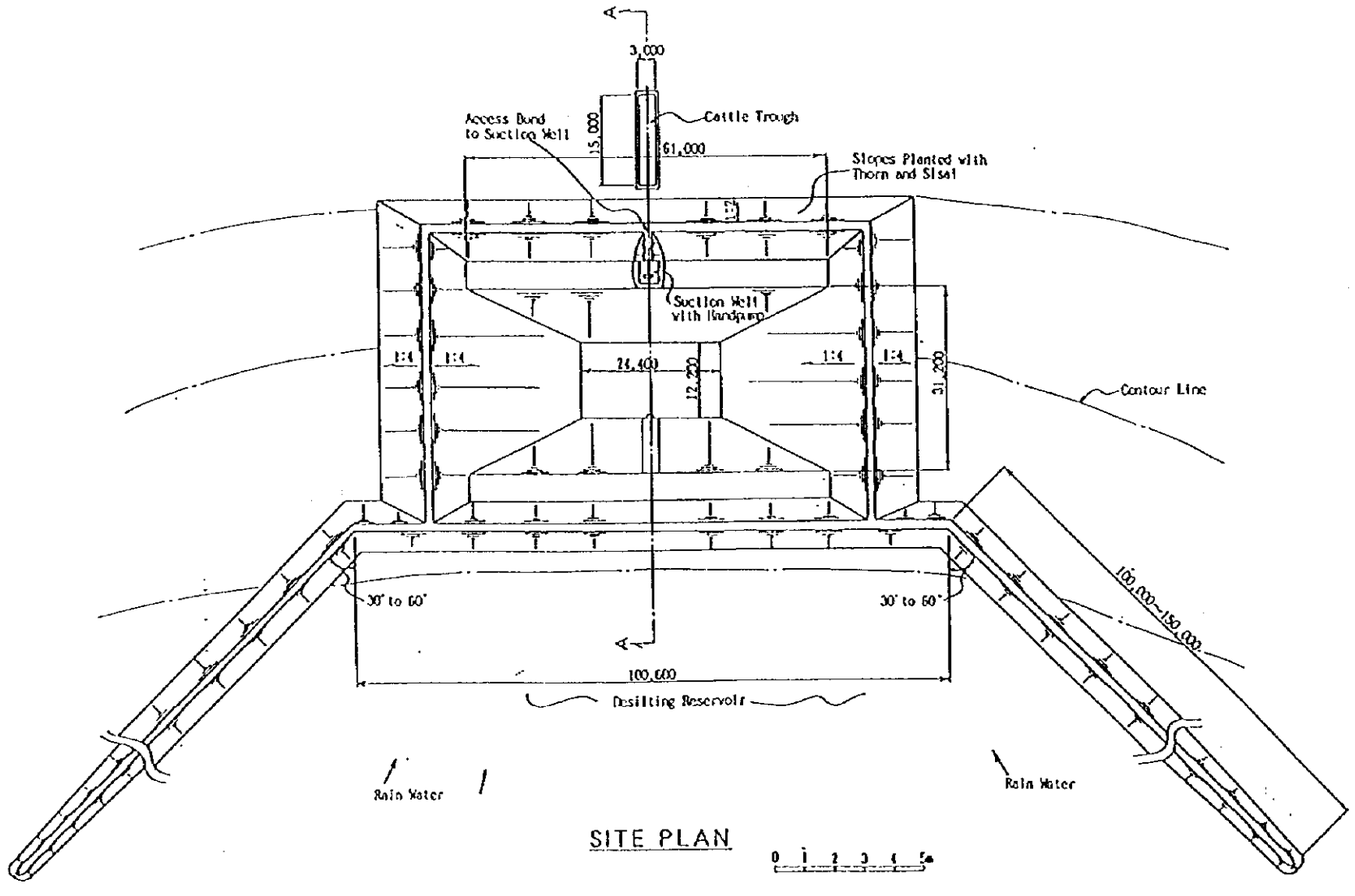




CATTLE TROUGH



SUCTION WELL



SITE PLAN

JAPAN INTERNATIONAL COOPERATION AGENCY THE MINISTRY OF WATER THE GOVERNMENT OF THE UNITED REPUBLIC OF TANZANIA			
STUDY ON THE GROUNDWATER DEVELOPMENT FOR HANANG, SINGIDA RURAL, MANYONI AND IRINGA DISTRICTS			
TYPICAL DESIGN OF CHARCO DAM			
DATE	Mar. 1998	FIGURE NO.	5.3.5
. SANYU CONSULTANTS INC. JAPAN ENGINEERING CONSULTANTS CO.,LTD			

CHAPTER SIX: GENDER ISSUES AND WOMEN IN DEVELOPMENT

CHAPTER SIX: GENDER ISSUES AND WOMEN IN DEVELOPMENT

6.1 Overview on the Situation of Women in Tanzania

6.1.1 Introduction

Since independence, the Government and the ruling party have spoken frequently of the need to view women as equal partners with men in the development process, and of their determination to see that women enjoy equal access to schooling and jobs. However, in practice, women have to take responsibility for most of work in agriculture and for all household and child rearing activities. Despite women's heavy responsibilities, their participation in decision making at all levels is still very limited.

Religions and traditional forces have proven very resistant to changing the traditional role of women, especially those in rural areas, whose lives continue to be constricted by the expectations of the men in their families and those holding power at all levels of society.

One thing should be clear: gender is socially and not biologically constructed. It therefore refers to a structural relationship of inequality between women and men as manifested in labour markets, political structures and household. It is not for example in-born as women would have it, that a women work 14-plus hours a day for cooking and cleaning, in addition to her child bearing and rearing roles.

6.1.2 Socio-economic Situation of Women

(1) Women in Agriculture

Agriculture dominates the Tanzanian economy, accounting for more than 45% of total GDP, about 70% of exports and 89% of employment. At the time of the 1988 census, about 70% of Tanzania's economically active population stated that their main occupation was agriculture, most of whom being women.

Because of the sexual division of labour in Tanzania, livestock and cash crops are ostensibly the responsibility of men, and food crops, that of women. However, women are expected to do all the work on the family's substance crops as well as much of the day-to-day work on the cash crops.

(2) Women in Formal Sector Employment

Only small proportions of women are employed in formal wage sector as compared to men. Women comprise only 20% of the wage and salary employment and they are mainly employed and clustered in women stereotype occupations such as nursing, midwifery, stenography, typing and in such other activities which require minimum qualifications (Labour Force Survey, 1990/91).

Two-thirds of all women employed in the formal sector are in services, as compared to one-third of the men, making them particularly vulnerable to retrenchment in the public service. The low participation of women in formal sector employment may be because of among other things:

- lower educational attainment, particularly in skills demanded by the modern sector,
- lower migration rates of women to urban areas where most formal employment is offered,
- cultural beliefs and attitudes e.g. considering it improper for women to participate in outside employment where she might be under the control of someone other than her husband,
- stereotyping of sex roles limiting the kind or employment which is viewed as acceptable for women as well as giving them the responsibility for child care and maintenance of the household.

(3) Women in Informal Sector Employment

While women's participation in formal employment in Tanzania is relatively low, the informal sector has long provided a more accessible and culturally acceptable means of earning cash income for women. Access requires no formal education, hence the majority of women participating in the informal sector are in most cases unskilled workers. A very large number of women derive their income by performing multiple tasks in this sector for the survival of the family.

In recent years, informal income-generating activities in both rural and urban areas carried out by women have increased dramatically.

(4) Women and Education, Training and Media

The priority given to education since independence resulted in rapid increase in primary school enrolment, though in the early years it was mainly the boys who benefited. However, with the

introduction of the goal of universal primary education in 1974, attendance for both sexes became compulsory, and the gap between boys and girls' enrolments narrowed rapidly.

In 1985 UN adopted Nairobi Forward Looking Strategies (NFLS) for the advancement of women, underlined education as the basis for full promotion and improvement of the status of women and called for education to be delivered and directed to women as intellectuals, policy makers, decision makers, planners, contributors and beneficiaries in development.

On education, training and media in Tanzania, the following main issues can be noted:

- Literacy rates for women have improved remarkably since 1978 although men's rates are still higher than women's. Literacy rates for women increased from 56% in 1975 to 88% in 1986.
- Education in Tanzania is pyramidal. There are inequalities of access between women and men especially at higher levels.
- There is a tendency for women to specialise in non-science subjects compared to men, and are less likely to undertake advanced degrees.
- There are few women involved in research and development in scientific and technological institutions.
- Women are participating in cultural activities outside the home and are increasingly joining the media profession which was once a men's domain indicating some visible changes in gender relations.

6.1.3 Efforts by the Government

The Government has made every effort to promote women development as follows:

i The formation of organisations which aim at the development of women such as the Ministry of Community Development, Women Affairs and Children, established in 1990.

ii Formulation of policy on women in development in 1992 which aims at defining the meaning of the concept of women in development, identifying problems arising from planning without gender focus and to give guidelines on gender main streaming in the planning process, identifying obstacles hindering the participation of women in development and to direct ways of removing them, and initiating strategies and establishing a system of reducing women's heavy workload.

iii Introducing a new system of education which was geared towards the enrolment of more girls and establishment of co-educational secondary schools to reduce the disparity between the number of girls and boys in secondary schools and higher learning institutions.

iv Introducing a system of reviewing all laws which discriminate against women, to ensure women's equal right.

v Developing and implementing programmes that lessen women's heavy workload such as improved water supply, health and sanitation programmes, as well as programmes on village woodlot, rural energy, village transportation, food processing, childcare, etc.

vi Intensifying and supporting programmes designed to improve women's health and nutritional status e.g. mother and child health, family planning services, etc.

vii Enabling Tanzania to become a member of international organisations dealing with women's issues, and implementing international agreements which safeguard the right of women. Tanzania has ratified the United Nations convention on the eradication of all forms of discrimination against women.

viii Establishing several special credit schemes directed specifically at women. Examples of these credit schemes include the women development fund, UNIFEM, credit scheme for productive activities of women, IFAD/southern highlands extension and rural financial services project, etc.

6.2 Situation of Women in the Study Area

6.2.1 Introduction

According to 1988 population census, Singida Rural district had a population of 285,092 people; Manyoni 135,475 people; Hanag 113,190 people; and Igunga 203,097 people. Women comprise 52% of the total population in Singida Rural, 51.5% in Manyoni, 49% in Hanang and 50% in Igunga districts respectively.

In the Study area, women have to take responsibilities for most of work in agriculture and for all household activities. Despite women's heavy responsibilities, their participation in decision making at all levels is still very limited.

The main occupation of the people in the Study area is agriculture, both crop production and livestock rearing. Taking the Hadzabe for instance, who depend on solely on hunting and gathering, men do the former, the gathering is shared. The Barbaig on the other hand, who also depend solely on livestock keeping, it is the women who construct the temporary huts, look after cattle/calves, do milking and look after children while men are responsible for increasing the herd, by being given rewards for the courageousness they have shown to the society, for they believe that all the cattle in the world are theirs and they have the role to restore them to the society from other undeserved societies.

For the rest of the tribes residing in the Study area (Nyaturu's, The Iraq's, Gogo's, Nyamwezi's) the case is different. Being mostly farmers, the division of labour between men and women is quite unequal. As it will be elaborated below there are specific roles performed differently between men and women, as well as roles which are shared by each gender category.

However, the overall picture connotes the facts that women in most of the villages in the Study area have been deprived of their basic human rights. The majority of women are poor, who are being exploited as agricultural producers involved in food and cash crop production. Women do all household activities, and they do not have any access and control over resources. They are not even involved fully in decision making structures at different levels of the society.

6.2.2 Socio-economic Situation of Women

(1) Daily Activities

The family as the basic unit of production, reproduction and consumption remains heavily dependent on the mother. In the Study area it is women who provide welfare needs to their families, on top of which they have responsibilities for the care, informal education and up-bringing of children. The daily activities carried out by women in the Study area are much more similar from one village to another. Most of the women met argued that they work for almost 15 to 16 hours every day, as most of them wake up early in the morning, 5:00 a.m. and sleep late at around 10:00 p.m. at night.

The daily activities done by most women, among others, include fetching of water for domestic use. Although the analysis done from the findings of the household survey indicates that about 50% of households could not differentiate the roles performed within the household, but the fact remains that women have the overall responsibilities of collecting water for home use. Taking Singida Rural district as an example, of those 772 households that were able to differentiate the

roles within the household, 585 households (or, 76%) argued that water fetching for domestic use is the responsibilities of women.

In addition to water collection, daily activities by women include cleanliness of the home and its environment, cooking of food for husband and children, washing of clothes, dishes and others, care of children, collection of cow dung, processing of milk products and selling of milk, and looking after calves. Apart from the above activities, women are the main producers of agricultural products including food crops for household consumption.

The gender division of labour in most of the villages overloads women with many activities as compared to men, denying women time for leisure at all, as enjoyed by men. According to the household survey, the major activities done by men in all the districts are farming and livestock grazing.

(2) Women in Agriculture

Women in the Study area, as it is the case in many parts of the country, are the main producers of agricultural products. There are agricultural roles which are specific to each sex and those which are shared. Agricultural roles specific to women are farm preparation, cutting of crop remnants, sowing, spreading of farm yard manure in the farms, looking after birds, separation of the produce and husks, transportation, storing and preservation of the produce. The shared ones are cultivating, weeding, harvesting and threshing.

Women are expected to do all the work on the family's subsistence crops as well as much of the day-to-day work on cash crops. Most of women in the Study area are smallholder agricultural producers and face additional constraints which men do not. These constraints include:

- limited assistance from their husbands,
- time constraint because of heavy demands of house work and child care,
- limited access to extension advise for raising yields,
- limited money to invest in improved inputs due to lack of access to credit, greater demands on cash for household expenses, and fewer opportunities and less time for other income generating activities.

In livestock rearing, women are responsible for pasturing care, milking the cows, processing milk products, selling milk and ghee and look after calves. While others have the opinion that the introduction of tractors and animal drawn equipment have reduced male workload and

permitted an expansion of the area under cultivation, labour demand for women was increased in sowing, planting, weeding and harvesting which were not provided with labour saving equipment.

(3) Women Income Generating Activities

In most cases women are organised into informal groups for conducting income generating activities. In the Study area, the households survey revealed that a very small portion of the women are members of women groups: 10.4% in Manyoni district, 17.6% in Hanang district, 25.7% in Singida Rural district. Most of women are not aware of the idea of forming or joining women organisations and/or groups: 68.3% in Manyoni district, 73.7% in Hanang district and 60.2% in Singida Rural district. Very few women had not joined women groups because of their husbands refusal to give them permission: 0.1% in Manyoni district, 1.7% in Hanang district and 0.2% in Singida Rural district.

Income generating activities undertaken by women in the Study area, to a large extent, depend on seasonal or unreliable inputs. The kinds of projects they run include farming and livestock keeping on a small scale. Actual activities are cultivation of food and cash crops which they sell, gardening tree nurseries/fruit trees and vegetables, and other projects such as grain milling, oil processing, bakeries, local brewing and so on.

The majority of women interviewed indicated that among the major constraints they face as regards their income generating activities include lack of capital; lack of raw materials; lack of markets; and lack of the necessary skills to effectively run their projects.

The household survey, however, showed that most of women interviewed are not aware of any training programmes to be provided to women groups on how to run income generating activities: 67.7% in Manyoni district, 70.1% in Hanang district and 59.8% in Singida Rural district. This may suggest the importance of training of rural women for economic empowerment.

6.2.3 Problems in the Study Area

Women in the Study area face a number of problems, most of which are common problems in different parts of the country, as discussed below:

Heavy Workload as a Result of Gender Division of Labour:

As already explained above, the gender division of labour results in women being allocated a lot of work as compared to men. Most of these are both energy and time consuming. As a result, health status of women deteriorates. Also because of heavy workload, most of women lack enough time to engage in productive income generating activities. However, most of the jobs allocated to women are gender stereotype.

No Access and Control over Resources:

Women in all villages do not have access and control over available resources. As a result, women can not carry out production activities effectively. Land, for example, which is a major and most valuable resource in the rural areas, is being owned by men. The responses to the question that who controls the income from sales of farm products between men and women or both gave the highest score of 43.6% (both) in Singida Rural district, 55.5% (both) in Manyoni district and 48.9% (both) in Hanang district according to the results of household survey. The basic fact, however, is that when farm products are sold, it is men who have control over the cash money obtained.

In pastoralist communities, it is men who have control and the say on the animals, including decision on when and how many to be sold. Women are not involved in such decision at all.

Low Level of Education:

Women, for a long time, have been denied equal opportunities with men in education. In most of the villages educating girls are seen as a waste of money. As a result of low level of education, most women lack essential knowledge and skills to carry out different projects to raise their income.

Low Level of Participation in Decision Making Structures:

Women in the Study area are not equally represented like men in the decision making structures at different levels. As a result, women development needs are not fully addressed when various decisions are being made. The household survey revealed that very few women have ever participated in village meetings: 33.6% in Manyoni district, 33.0% in Singida Rural district and 25.8% in Hanang district.

Although the Government has issued various policy directives to ensure increased participation of women in decision making, but the number of women involved is still very small.

Cultural and Traditional Belief/Practices:

The cultural and traditional belief and practices existing in the most of the villages discriminate women and deny them equal opportunities with men to enjoy the benefits/services available in the society. In many villages, for example, it is argued that certain types of nutrition food are only eaten by men resulting in deteriorating women's health status. Women in some villages are not allowed to mix with men, or talk in front of men because of traditional beliefs. In such cases, they can not attend effectively in different committees where they are elected in. If they attend meetings, they are just there as dormant participants who do not talk or argue issues.

Lack of Institutional Support:

Because of their poor situation, most women in the Study area have been, for quite a long time, denied institutional support which have been necessary towards women advancement. Because women do not have any access and control over resources, most financial institutions do not give credit to women as they lack collateral. Women, especially those in rural areas, are seen as risk borrowers. Most of extension services provided in rural areas are more directed to men than to women.

6.2.4 Efforts Taken to Solve Women's Problems

In the regions and districts, it is the Community Development Department which has been entrusted by the Government with the responsibility of promoting the welfare of women in their respective regions or districts. The Community Development Department in the regions and districts under the Study area has done the following in promoting women advancement for their respective areas:

i Mobilising women to form groups to carry out different income generating activities,

ii Assist women in preparing project profiles for carrying income generating projects, and giving them advise as to sources of funds to implement the projects both in terms of loans and grants.

iii In collaboration with other departments, conduct training sessions for women so as to improve women's management capabilities for effective management of their projects.

iv Giving advice in establishing and running day care centres.

v Conducting gender awareness campaigns at different levels.

vi Collection and analysis of gender desegregated statistics to be used in the planning process and decision making.

vii Advocating for women problems being included/incorporated in the village, ward and district as well as regional development plans.

However, the Community Development Department has been facing many problems that have been limiting factors to better performance in promoting women advancement in their respective regions or district. These include:

i Lack of sufficient specialists especially at village and ward levels.

ii Poor working conditions of staffs: lack of working tools and stationery, and no transportation facilities and incentives.

iii Lack of funds from the district councils or central government to the department. As such, the staffs of the department could not travel to the villages to perform their duties and responsibilities. Also, as a result of lack of funds, the department in most areas has failed to fully put into practice the training programmes for women and women economic groups that were planned for.

iv Lack of training of staffs. Most of the department staffs have been in the field for many years without refresher courses and/or short term training programmes and thus they are not really conversant into new development and new innovations.

6.3 Gender and Development

6.3.1 Introduction

For a long time, women in development (WID) have been successful in increasing development practitioners' awareness of women's situations and concerns. It has stimulated networking and alliance building among rural women and their advocates. WID emphasises the substantial roles of women and their contribution to development process. By treating women as special beneficiaries in projects and programmes, women's issues often become mere appendages to mainstream development interventions.

Gender refers to the social relationship between women and men as opposed to sex which refers to the biological differences between men and women. Therefore, gender does not mean women

and men but the social relationship between them and the way this relationship is socially constructed.

The gender and development approach seeks to understand the ways of gender constraints or advances efforts to promote sustainable economic growth while ensuring an equitable distribution of its benefits.

Gender relations in most of the target villages are characterised by the division of labour and patriarchal power relations which result in women and men playing different roles and having different levels of access and control over resources. The reproductive role includes child bearing and rearing as well as home management. Women perform the greatest portion of this role.

Women are often the major suppliers of household subsistence. When their access to productive resources decline, more people effect, including hunger, malnutrition and illness. For this reason the advancement of women is central to achieving sustainable development.

The purpose of integrating gender into development programmes is to enable equal distribution of resources so that women and men can participate fully in an effective and efficient way in the development process and benefit without marginalising one gender category. This process is based on the simple rationale because women and men play different roles, they have different access and control over resources, and hence have different gender needs.

6.3.2 Integration of Gender in Proposed Project Plan

Integrating gender issues in the proposed project plans is important and should focus at the beneficiaries level, particularly at water user group level.

(1) Provision of Water and Sanitation Facilities

Provision of clean and safe water and sanitation facilities will help in reducing substantially the heavy workload of women as they would be relieved from walking long distances and having sleepless nights during dry seasons in search of water. Also, it is envisaged that water borne diseases would decline tremendously. Having water points near the homes might change men's attitude towards water collection, by enabling men to assist women in collecting water when women are busy for doing other activities.

Women should actively participate in decision making about: site selection, technology choice, developing work schedule, deciding on time of operating water points and so on.

(2) Decision Making

Women play an important role in water management. As it has already been said, women are most often the collectors, users and managers of water in the household. For this reason, it is important to include women in the decision making structure on issues around water supply, health education and environmental sanitation.

Women should comprise at least 50% of members of the village water committees as well as the water user group committees to be formed at each water point.

(3) Operation and Maintenance

All activities to be planned should target to involve and benefit women and men in all stages of the decision making, implementation and evaluation for water schemes. Equal opportunities should be made available to both men and women in the following activities:

Provision of Repair Services

Surveys should be done to identify women technicians who can provide repair services for the village water facilities. Such women should be promoted by being given short training on technical skills as well as working tools whenever considered appropriate.

Evaluation and Monitoring

There should be equal representation of women and men in the evaluation and monitoring exercises. Women should be given technical skills to enable them to undertake both technical assessment, management assessment and water quality assessment.

Scheme Attendants

The focus should have scheme attendants consisting of both women and men. Probably a village could have at least two (2) village water scheme attendants; one female and one male. Availability of water is a priority concern of all women; thus a female scheme attendant will have a commitment to ensure that proper operation and maintenance of water supplies is carried out.

Having female scheme attendant is also providing equal opportunities to women in male stereotype jobs. When women are involved in operation and maintenance, the chances of

making big savings and having properly maintained schemes are greater. Women should be given necessary training to enable them to undertake the tasks assigned to them effectively.

(4) Training of Villagers

Apart from focusing such training on the organisation and management of water supply schemes as already elaborated above, training of villagers should also cover gender awareness with the objectives of drawing more women into the decision making structures. Gender awareness training will result in more women being nominated in the village government, and also result in more women participating in different committees and sub-committees, whose function complements those of the village water committee.

This will enable women to raise their voice of concern to safeguard the interests of maintaining a sustainable water supply because this is one of their priority practical gender need. Furthermore, training of villagers should also focus to provide competence building among women members in the decision-making structure. This is important because, even if the number of women in decision-making structure is increased, it becomes totally meaningless if these women are incompetent, less knowledgeable, without a critical and analytical mind, who can not urge facts out and thus influence decisions for positive actions.

As it has been noted above, the majority of women in the Study area do not have equal access and control over resources such as education, training, technology, cash saving/credit and capital as compared to their male counterparts; and as a result, when they are in a group of men they lack confidence to discuss issues. Training in competence building should thus include skills in analysis of problems and needs, assertiveness creating confidence, etc.

Training of villagers, and particularly gender awareness training, should not be limited to the members of village water committees, village governments, scheme attendants, water user groups, but target beneficiaries should also include influential women and men in the community including religion leaders, extension staff, influential elders, teachers, leaders of women organisations, etc.

6.4 Topics of the Programme

6.4.1 Gender and Development

The gender issue is a very wide subject explained differently by different people. Many governments have so far insisted that gender issues and in particular women issues should be incorporated in their national plans. It is also very important that women are empowered to participate fully in all activities concerning national development, politics, legal status, health, economy, education and so on. Women are marginalised in almost all spheres of life. That is why today many countries have developed plans, strategies and systems to eliminate constraints against women. This subject on gender and development will give light to participate on the concept of gender and development.

The principal objective of this topic is to enhance the status of women through increased knowledge of the community; participants shall be enhanced to identify and repeal biased provision in the meaning of development and the different relationship between women and men ; and participants shall be educated on gender requirements for men and women.

(1) Gender Concept

Sex differentiates human beings as either men or women. As a result of such differences men cannot bear children but can make women pregnant. Gender means more than sex. It explains the social relationship between men and women.

Gender Aspects:

This can be defined as existing relationship between men and women in a community. Such relationship in the society is built by the society itself. The relationship usually differs between one community to the other, and also according to economic situation, such a situation is mainly seen in family formation, and the way of administering and access to economy.

In many African countries, it is men who have access to make decisions rather then women, thus creating differences of behaviours between men and women. For example, a woman is regarded as a quiet, polite, refined, courteous and a person who needs to be assisted. A man on the other hand is regarded as a guide, advisor, administrator and a family leader. In that case therefore men become more powerful than women.

Justifications:

- Participants should view out their understanding on the difference between women and men.
- Participants shall explain their understanding on how traditional and cultural attitudes contribute to differentiate gender.
- Participants shall explain what they think would be done to rectify such cultural behaviours.

Participants should be given opportunities to suggest ways of rectifying relationship which are against women advancement.

(2) Gender Needs

Usually demands differ among men and women depending on appearance and work performed in the community. The development plans should also be planned as regards to gender differentiation so as to bring about development and also boost up standards of living of each gender category.

The principle objective of the gender needs is to enable women identify differences on gender requirements between women and men. Participants should be conversant with: the growing gap between women and men which may develop gender imbalance in all levels of development; identification of aspects that limit women voices from influencing allocation of domestic resources.

Situation of Gender Needs:

Existing gender requirement in a community is a result of duties performed by men and women to promote their development activities. Women have essential requirements which should be well kept such as the increase of number of health centres, cooking fuel, nutrition feedings, appropriate machines, transport of farm products and so on. Such requisition will ease women burden by bringing about better facilities to the community. Men will also have advantage by using such facilities.

Also the law offers equal rights to men and women, there will still be legal provisions which do not work for the interest of women, of most significance there are application of customary law that affects women's legal rights. Such customary laws actually prevents women from advancement. Also there are traditional customs which prevent men from looking after children,

those which do not permit men to perform duties thought to be of women's nature, and those which prevents women to perform duties thought to be of men's nature.

Justification:

- Participants should be able to justify roles of women and men and explain how they differ according to their gender bias.
- Participants have to show different requisitions for women and men and those aspects which prevent women's opportunities for their advancement.
- Participants should indicate constraints which effect women from solving their own problems as related to their development. They should also suggest ways to get rid of cultural and custom laws which affect women and men's basic requirements.

(3) Women Participation in National Development

Before going through the concept of women participation in development, it is better to first learn duties of women in the society and why they should be made to participate fully in the development process. Women are fully responsible to produce both cash and food crops, and to look after the communities. Despite all these heavy responsibilities women are still marginalised and not given desirable respect.

The principle objective of this topic is to enable women to participate in solving their own problems; participants should be able to express areas where women are being marginalised and suggest solutions to rectify the problems; participants should suggest indicators to be used in order to fit in gender development plans; and participants be able to include gender issues to their community programmes.

Situation of Tanzanian Women:

Women spend up to eight (8) hours a day for planting, weeding, manuring and harvesting. During peak periods in the growing seasons, their hours in fields may be longer. They do all this work using poor farm implements, and yet in most of the communities, women are very marginalised.

Statistics show that out of 7,000,000 elder women, 2,000 – 4,000 die on maternal situation. Statistics also indicate that 2,000,000 women give birth at the age of below 16 years, being very dangerous to their lives. Whenever the mother delivers, the maternal mortality rate is a serious

issue. Problems on women and children become much serious as a result of poverty, malnutrition and long hard working hours.

Such a situation could be rectified by enabling women to participate fully in community decision making process. But because of traditional and customary laws which exist among tribes, women are not allowed to participate in decision making. However, some developments to rectify the situation are still at the national and international levels.

The Government, NGOs, private institutions and women themselves are doing their best to solve the problems. The formal structure to deal with women issues was created in the Department of Community Development in the Prime Ministers Office in 1980. In 1985, women issues were placed in the Ministry of Community Development, Culture, Youth and Sports, and in 1989 under the Ministry of Local Government, Community Development, Cooperatives and Marketing. In 1990, a full fledged Ministry of Community Development, Women Affairs and Children (MCDWAC) was set up as the highest state organ with a mandate to coordinate and facilitate representation of women's issues in the top level decision making organ of the state.

Donor agencies on the other hand made vast contributions to help MCDWAC, women groups and NGOs dealing with women issues to boost up women development process. At the international level, UN general assembly declared in 1975 an international women's year, for (4) world conferences have been held: in Mexico city (1975), Copenhagen (1980), the Nairobi forward looking strategies for advancement of women by year 2000 (1985) and Beijing platform for action (1995).

During the decades, members of states were required to examine the status and rights of women and to initiate processes that would bring women into decision making at all levels, The policy on women in development for Tanzania Mainland was prepared in 1992 to be implemented concurrently with other sectoral policies. The objectives of the policy are:

- To define the concept of women in development.
- To identify problems arising from planning without gender focus and to give guidelines in planning with gender focus.
- To identify obstacles hindering the participation of women in development and to direct ways of removing them.
- To initiate strategies and establish a system of reducing women's heavy workload.
- To expound on ways which be used in coordinating women development programmes.

A community development policy was adopted in 1996 for Tanzania Mainland. Its major objective is stated as to enable Tanzanians as individuals or in their families and/or groups to contribute to self reliance efforts aimed at bringing development at all levels. The policy seeks to ensure that gender issues are incorporated in the planning process, strategically focuses on health and agriculture in enhancing people's capabilities for development and underlines community participation in planning and implementation of development activities.

Justification:

- Participants should explain problems they are facing.
- Participants should record such problems according to priority.
- Participants should arrange implementation strategies.

Participants should work to indicate roles and responsibilities performed by women and men according to their ages, and explain reasons why such a situation happens and finally point out what is to be done to solve such problems.

6.4.2 Women Economic Empowerment

The family as the basic unit of production, reproduction and consumption remains heavily dependent on the mother. It is the women who provide the welfare needs to families, on top of which they have responsibilities for the care, informal education and up-bringing of children, who in the long run are being prepared to participate and contribute to the national development programme.

Through community programmes, women have been mobilised and assisted through training to become aware of their own problems and have been encouraged to undertake various income generating activities in order to improve their standard of livings. Many traditional communities and religious norms have influenced women's backwardness and caused inferiority complex to them and thus initiated women not able to advance themselves in the economic development.

The main objective of this topic is to develop economic power to women by training them on planning, formulation, developing and ministering their economic projects. To this end, women should be assisted to examine and find ways of forming and establishing economic projects, equipped with commercial strategies, able to develop confidence and forward focusing on planning process, and able to share their expertise on economic management.

Women's contribution in Tanzania Economic Development

The villagers are the basic unit of agricultural production in the country. It is the men in villages who are engaged in cash crop production, while women work to produce both food and cash crops. Though women work continuously in agricultural production, but they are limited to farm ownership, credit facilities, appropriate farm technologies, education and communication aids. Also they are not involved in the decision making process to the use of income generated by either gender.

Women Business Techniques

At the village level, women are engaged in agricultural production but at the urban centres they are mainly involved in small businesses run by either individual persons or groups. Such businesses are meant to boost up economic situation of women. Profitable business is a result of a well organised business profile such as:

- determining type of project or business to conduct,
- competition among the people dealing with same activities,
- availability of capital and market facilities,
- availability of inputs for easy production,
- whether women are healthy, and have enough time to look after business,
- education, knowledge and experiences of women themselves,
- ability to use technology and mechanisms for their machinery/equipment,
- availability of enough support from other institutions such as banks, transportation, shopping centres and so on.

Market

In any business or project, one should first determine markets for his/her commodities. The following questions are to be reviewed:

- Who will be the customers?
- What commodities customers need?
- Where to find customers?
- Are your customers able to purchase your commodities?

Book Keeping

Book keeping is necessary in any business in order to determine whether the business is making profits or not. The following books of accounts should be available at any small business enterprise:

- Payment voucher:
  used when any payment is made.
- Receipt voucher:
  used when cash is received.
- Cash book:
  books to show total cash received and cash spent

Justification :

- Participants to indicate projects they had initiated and explain how they managed to start them.
- Participants to explain problems when they started operations.
- Participants to explain hoe they keep records on their business accounting procedures.
- Participants to explain how they are able to market commodities.

6.4.3 Management and Leadership Skills

Management is an art of cooperation and unity among the managing team and the people managed at a certain period of time without gender bias. The objective of this topic is to enable women to manage and administer their projects. Women should participate in management and administration issues, and involve themselves as potential leaders.

The low level of participation of women in leadership has the socio-cultural and historical causes, including colonial and institutional arrangements as well as religious and cultural beliefs which segregated women as a group. Their participation in leadership activities was comparatively insignificant.

(What is leadership?)
Leadership is to show ways and to stay at a forefront line. In order to take a leading role, leaders should have wisdom and have people who are willing to follow her/him. Leaders should therefore make sure that they are accepted by the people they are leading.

(Types of Leadership)
There are so many types of leadership, but the following types are very common:

- Dictatorship:

An example of a child and son leadership; this type of leadership is useful in a situation which needs extra care and where mistakes are unforgiven events. But this also could be an obstacle in a situation where there is a technical and delicate operations.

- Democratic:

This is regarded as the right of the people to run their lives according to their wishes either directly or through their chosen representatives. True democracy involves participatory democracy by the people at all levels so that the people have a voice in the discussions by which they are governed.

- Autocratic:

People are given wide independence to perform anything they wished without following other people's principles. The existence of such type of leadership is an indicator of failure because people become an authority in decision making and supervision of their organisation.

(Administration)

Administration is a process in which activities are directed to a proper channel and implemented according to the plan. In administering, the following should be included:

- Formation of minor committees:

Committees to be formed should include financial, planning, economic and security committees depending on the projects undertaken by the group.

- Calendar of work:

Every women group must have a daily working timetable/calendar to direct individuals.

- Implementation schedule:

Individuals in a group ought to know what they are supposed to do everyday. The administrative committee must prepare a list of activities to be performed by members of the group.

- Followup programme:

There must be a continuous followup programme to every activity in the project. This will help groups to modify events whenever anything goes wrong.

- Feedback and implementation reports:

Small groups are obliged to write reports at a particular time in order to continue increasing productivity. Feedback is of importancy since it is the only way to indicate whether the project is operating at a profit or at a loss.

(The Roles and Responsibilities of A Leader)

Roles and responsibilities of a leader usually are concerned with acts, laws and regulations. A leader will always manage her group according to norms and regulations established by the particular group.

(Evaluation)

This is a final stage which tries to see whether objectives are as planned or not. Project evaluation may be conducted at the middle or at the end of the year. The aim of evaluating a project is to try to correct errors which may have occurred during the project implementation period and thereafter find other ways of maximising profits.

(Quality of A Good Leader)

In order to qualify to be a leader, the following qualities are to be realised: a leader should be patient and faithful; a leader should be knowledgeable and skillful at her/his working place; a leader should be hard working and cooperative.

Justification :

- Participants should justify types of leadership.
- Participants should discuss types of leadership/relationship they have at the community level.
- Participants should show the wicked and adequate of types of leadership.
- Participants should explain the quality of good leadership.

CHAPTER SEVEN: HEALTH AND ENVIRONMENTAL SANITATION

CHAPTER SEVEN: HEALTH AND ENVIRONMENTAL SANITATION

7.1 Introduction and Background Information

7.1.1 The National Health Policy

The Ministry of Health in 1988/89 appointed a team of senior technical employees to prepare policy recommendations which were distributed to other ministries, health related institutions and regional health administration for comments. The recommendations and suggestions were used in the formulation of the National Health Policy Document (National Health Policy, 1990). Therefore, the National Health Policy serves as a tool for health workers to guide the process of planning, implementation and evaluation of health service performance.

The major focus of National Health Policy is to improve the health status of all people wherever they are in Tanzania in order to reduce morbidity and mortality, and thereby raise life expectancy of the people concerned. It should be borne in mind that before Tanzania attained her independence on December 9, 1961, health services were established in urban areas and were mainly curative; and therefore, the colonial government did not make any efforts to develop health services in the rural areas. After independence, the health service plans and strategies were considered as part of overall national development plans.

The specific objectives of the policy are to:

- Reduce infant and maternal morbidity and mortality and increase life expectancy through the provision of adequate and equitable maternal and child health services, promotion of adequate nutrition, control of communicable diseases and treatment of common conditions.
- Ensure that health services are available and accessible to all people wherever they are in the country, whether in urban or rural areas.
- Move towards self sufficiency in manpower by training all the cadres required at all levels from village to national levels.
- Sensitise the community on common preventable health problem and improve the capabilities at all levels of society to assess and to analyse problems and to design appropriate action through genuine community involvement.
- Promote awareness in the Government and the community at large that health problems can only be adequately solved through multisectoral cooperation, involving such sectors as education, water and sanitation, agriculture, community development, women

organisations, and non-governmental organisations.

- Create awareness through family health promotion that the responsibility for ones health rests squarely with the able-bodied individual as an integral part of the family.

7.1.2 Primary Health Care Services

(1) Primary Health Care

Primary health care (PHC) is the cornerstone of the National Health Policy in Tanzania.

PHC is based on practical, scientifically and socially acceptable methods. PHC aims at making health services available to all individuals and families in the community, so it should be affordable. Through the spirit of self-reliance, most countries should be able to provide PHC. It is part of the country's health system and the overall social and economic development of the community. PHC seeks to bring health services as close as possible to where people live and work. It is the first stage of a continuing health care process.

Primary health care emphasises the importance of prevention including provision of food, housing, water, sanitation and health education. When one is considering a health issue such as cholera outbreak, diarrhoea, lung cancer or maternal health; there are some fundamental questions that should be asked, to decide what role if any, health services can play. Therefore, community involvement in health is an essential prerequisite for the implementation of PHC. This involvement and participation should be voluntary. They should be involved in identification of problem, planning, implementation and evaluation of all health programmes from village to national levels.

For PHC to succeed, village health workers (VHW) who provide a good link between the people and the health system should be utilised as much as possible. In this context, the National Health Policy stipulates that every village in the country should have at least two (2) village health workers, one of them to concentrate on mother and child health activities while the other one should deal mainly with environmental sanitation.

(2) Primary Health Care Elements

Primary health care has the following elements:

- Education regarding prevailing health problems and methods of preventing and controlling them.

- Food and nutrition.
- Adequate supply of water and basic sanitation: When considering that water-borne diseases are among the major health problems in Tanzania, the Government strives to do the following:
- Provide sufficient quantities of water to households,
- Promote sound use of water,
- Encourage safe basic hygienic practices within families,
- Promote construction of latrines and their use in all households, health facilities and educational institutions,
- Provide water source within 400 meters to all households so as to lessen the workload of women,
- Encourage the maintenance of clean environment around houses and institutions within the village, and
- Provide water sources at all health facilities and primary schools so as to link this with health education.

In order to achieve the above mentioned aims, the Ministry of Water and the Ministry of Health have to work very closely together through conducting health education to villagers and by providing water to the villages and institutions.

- Maternal and child health including family planning which is an integrated curative, promotive and preventive services.
- Vaccination against major infection diseases through continuous sensitisation of mothers, communities and leaders at all levels about the importance of childhood immunisations and solicit their active support.
- Prevention and control of epidemic and locally endemic diseases. Communicable diseases are the commonest diseases in Tanzania and much effort are being made by the Government to prevent as well as providing adequate treatment of the diseases.
- Appropriate treatment of common disorders and injuries.
- Provision of essential drugs and equipment.
- Provision of mental, oral and eye health care.

(3) Primary Health Care Strategy towards Health for All

Community based health care (CBHC) will be strengthened as an objective and outcome of community involvement. The primary health care strategic elements for raising the level of community involvement shall include the sensitisation and orientation of leaders and technical

staff at all levels, reorientation of training of health staff, sensitisation of young groups for community health action, initiation of child-to-child and child-to-parent health programmes in all schools in the country, using of women groups as actors and leaders to PHC and establishment of national health competition and awards (Primary Health Care Strategy, 1992).

In order to strengthen the development of a national health culture, intrasectoral and multisectoral collaborations, as well as the coordination of planning, implementation and evaluation of all health related activities must a prerequisite for any success.

According to the primary health care strategy, this coordination shall be achieved through the primary health care committees which will be established at all levels. The first level is the village where the village health committee shall discuss health problems and set priorities for activities to improve the health situation.

Furthermore, in order to give impetus to rural community based health care, the Ministry of Health through the primary health care strategy has established a cadre of village health workers who deal with the preventive aspect of health care. The Government and NGOs have supported small CBHC projects in a number of villages.

Appropriate technology in its broadest sense is another requirement for health service delivery. It should be developed and applied in response to the identified health and health related problems in the community. The technology should be scientifically sound, simple to use, adequate to local conditions/situations, acceptable and affordable by the community. The appropriate technology embraces such diverse areas as home-made dehydration solutions and simple latrines, protected dug wells and locally made syringes.

7.2 Government Health Services

The structure of health services at various levels in Tanzania is summarised as given below:

7.2.1 Village Health Services

This is the lowest level of health care delivery in the country. The Government intends to establish a village health post in all villages which do not have health facilities by the year 2000 and beyond. According to the national health policy, the village health post services are vital for

all villages without a health facility. Village health posts do not require a permanent building because they provide essential preventive services which can be offered in homes.

All the village governments are required to have two (2) village health workers (VHWs) for each village health post. The VHWs are supposed to be chosen by the village government from among the villagers; and they should be given short training before they start providing services. The VHWs shall be paid by the village government concerned; and where possible, the district council should assist in giving incentives to the village health workers.

The services to be provided by the village health workers include:

- health education about diseases in the village,
- health education about clean and safe water, hygiene and environmental sanitation,
- advise on maternal and child health,
- advise on food and nutrition,
- treatments of minor elements,
- collection of statistics on diseases and immunisations, and
- identifying referral cases.

7.2.2 Dispensary Services

This is the second stage of health services. The objectives of the national health policy include the establishment of one (1) dispensary for each village to expand the scope of primary health care services. Each dispensary shall have facilities for out-patient departments, mother and child health (MCH) services, a maternity room with at least two (2) beds, toilet facilities for ladies and gentlemen, and rooms for the dispensary staff. Services provided by dispensaries include:

- health education to people being served by the dispensary,
- treatment of diseases,
- MCH and delivery services,
- treatments and immunisation services to children,
- health care services and health education to schools,
- continuation of treatment of TB, leprosy, mental and other chronic diseases in collaboration with other higher level facilities, rural health centre in particular,
- conduct visits to villagers for the purpose of identifying health problems and trying to solve them or refer them to a higher health facility,

- collection of statistics. The dispensary shall keep records.
- provide expertise and supervision to village health workers in the villages served by the dispensary,
- prepare progress reports about the dispensary,
- refer patients with complicated conditions to higher levels especially to health centres.

7.2.3 Health Centre Services

A health centre is supposed to serve 50,000 people or above, which is approximately the population of one (1) administrative division. The services provided by the health centres are similar to those provided by dispensaries, except that health centres offer more specialised services which include: inpatient department for patients who require short hospitalisation; supervision of dispensaries as well as provision of primary health care services in the division.

7.2.4 District Hospitals

It is the intention of the Government to concentrate its provision of health services at the district level. Also, each administrative district should have a district hospital. For those districts without a district hospital, the Government will negotiate with religious organisations to designate voluntary hospitals as district hospitals. On average, district hospitals should have between 60 and 150 beds. Services offered at district hospitals include the following:

- all medical services except for conditions which require specialist care,
- planning, organising and supervision of all health activities in the district,
- conducting on the job training for all medical staff in the district,
- identifying major health problems in the district and working out strategies to overcome them,
- preparing accurate district health services progress reports for circulation to the Ministry of Health and other related agencies,
- conducting operational research aimed at providing efficient health services in the district,
- to participate in the training of health staff of the district hospitals, and
- referring patients who require special treatment to regional hospitals.

7.2.5 Regional Hospitals

It is the government's policy that each region should have a regional hospital. The regional hospitals offer similar services like those offered by the district hospitals. Regional hospitals offer the following services:

- all services offered by the hospitals but with a higher level of expertise,
- specialised treatment of eye, dental and mental diseases,
- supervision and coordination of all health services in the region acting as a major link between regional administration and the Ministry of Health with regard to health care matters,
- attending referral cases from the districts and referring serious cases to the referral hospital, and
- conducting operational research to improve health services in the region.

7.3 Health Services in the Study Area

7.3.1 Regional Level

Arusha region has 14 hospitals, 11 health centres and 260 dispensaries. One (1) hospital caters for 126,914 people; whereas one (1) health centre caters for 161,527 people and one (1) dispensary serves 6,833 people.

In Singida region, there are 7 hospitals, 15 health centres and 141 dispensaries in which case one (1) hospital serves 137,291 people, one (1) health centre caters for 64,069 people and one (1) dispensary provide services to 6,816 people.

There are 7 hospitals, 11 health centres and 143 dispensaries in Tabora region; one (1) hospital serves 173,439 people, one (1) health centre serves 110,370 people and one (1) dispensary provides services to 8,490 people.

The major diseases are malaria (which is leading as a killer disease), diarrhoea diseases, typhoid, intestinal worms, eye infections, skin diseases, dysentery, pneumonia and bilharzia. The major reasons for frequent occurrence of these diseases are unsafe drinking water, poor sanitation and poor nutrition contributing to high rates of maternal morbidity.

The government policy is geared towards sensitising the rural population of Tanzania to assess their own local diseases, their causes and possible solutions. The Ministry of Health commissioned the regional and district health officers to take inventories of the common diseases prevailing in their respective areas of jurisdiction, the causes of those diseases, their periods of outbreaks, and suggest what measures should be taken.

In this respect, it has now become a common practice for those officials to compile annual reports based on surveys conducted in villages by the rural medical aids. These reports in turn assist those officials at the district level to use them while considering the type of strategies to be adopted in order to deal with the root causes of those common diseases. Two (2) annual reports prepared in 1996 for Arusha and Singida regions were so far available with the Study Team, based on which major diseases of three (3) districts are given below:

Table 7.3.1(1) Major Diseases in 1996

Diseases	Singida Rural	Manyoni	Hanang
Malaria	88,034	7,224	33,644
URTI	40,349	2,387	19,761
Diarrhoea	29,854	1,584	12,305
Pneumonia	12,793	12,102	17,208
Eye Infections	12,183	1,115	8,072
Intestinal Worms	8,161	121	5,710
Skin Infections	7,214	766	14,219
Minor Surgical	3,898	1,061	n.a
UTI	1,409	1,574	1,419

Notes: - URTI : Urinary Respiratory Tract Infection
- UTI : Urinary Tract Infection

Life expectancy and mortality as per 1988 are as follows (Health Statistics Abstract, 1997):

Table 7.3.1(2) Life Expectancy

Region	Males	Females
Arusha	57	58
Singida	54	55
Tabora	53	54

Table 7.3.1(3) Mortality

Items	Arusha	Singida	Tabora
Maternal Mortality	159/1,000	207/1,000	216/1,000
Infant Mortality	52/1,000	67/1,000	73/1,000
Child Mortality	78/1,000	106/1,000	116/1,000

7.3.2 Non-Governmental Organisations

(1) General

Apart from the Ministry's efforts to take inventories of the common diseases affecting residents of the target villages, and also by providing treatment to patients; the ministry has diversified its efforts to practically sensitise the local communities to deliberate on the prevalence and occurrence of the common diseases in their areas. The Ministry has emphasised the immunisation of children against the common killer diseases such as BCG, DDT, measles, polio, TB and tetanus so as to save the lives of infants and the under five's from the risk of death.

In addition, the Ministry of Health has emphasised the importance of mother and child health clinics which are now being introduced in the target villages. These efforts are being hampered by lack of transport coupled with poor roads and weather conditions.

The Ministry is being backed up by religious and non-governmental organisations in its bid to fight the common diseases affecting the majority of the population residing in the rural areas. Some of these are the Anglican Church, the Lutheran Church, the Roman Catholic Church, the Tanganyika Christian Refugee Service (TCRS) and the Health Projects Abroad.

For example, Imabi hospital is run by the Lutheran Church, whereas Kilimatinde hospital is administered by the Anglica Church and St. Gaspers hospital at Itigi is run by the Roman Catholic Church. TCRS is involved in providing water to the rural areas which supplements the efforts by the Ministry to see to it that people in the rural areas have access to safe and clean water; which in turn could reduce the rate of prevalence of the common diseases.

(2) Tanganyika Christian Refugee Services

Tanganyika Christian Refugee Services (TCRS) has a department known as health and sanitation. The department or programmes started since 1986 with the aim of helping the villagers to build individual household pit latrines by offering slabs and by helping them to

make slabs. TCRS transports materials and tools to building sites. TCRS also pays the mason and makes follow-ups through technicians stationed in the village.

(a) Contribution by Villagers

Villagers are required to dig the pits, make bricks and build the latrines using their efforts. They are also required to look for sand and gravels as well as paying for pit latrine's cover which costs Tsh 2,800 per unit. So far 15,000 slabs have been manufactured, being equivalent to 58% achievement in 75 villages: 36 villages in Singida Rural district, 6 villages in Manyoni district, 28 villages in Iramba district and 5 villages in Singida Urban.

(b) Sanitation in Schools

TCRS has built a total of 10 ventilated pit-latrines in primary schools. TCRS's input is to donate around 15 bags per unit and weld mesh 8 pieces per unit, pay the masons to build the units, and provide paints. Input by villagers includes digging the pits, to look for gravels, to burn the bricks and to look for sand. The total cost per unit is around Tsh 25,000.

(c) Health Education

This aspect has two (2) components of hygiene promotion and child-to-child health programme. Hygiene promoters are employed by TCRS but are based in villages in order to motivate households to adopt hygiene way of living; and the programme has been in existence for two (2) years now. Hygiene promoters also assist to check sanitary environment of water supply facilities and to offer advice on how to improve them. The emphasis is placed on hand-washing with soap or with plenty of water; and villagers are advised to have water in the toilets to enable people to wash their hands. The programme covers 13 villages: 7 villages in Singida Rural district and 6 villages in Iramba district. In June 1997, in collaboration with Health Projects Abroad, TCRS decided to embark on child-to-child programme. The programme focuses on educating children either by dealing with an individual or with a group of pupils; and later to extend the programme to parents; and later on, to the whole community. This programme is being conducted in nine (9) primary schools, i.e. five (5) primary schools from Singida Rural district and four (4) schools are in Iramba district. Their method of approach is partipatory rural appraisal (PRA). By using PRA, the programme involves pupils in full discussions between them and their teachers through use of role plays, drama, songs etc to encourage school cleanliness and environmental sanitation. Pupils are encouraged to look at the health problems facing them in the community.

(d) Training of Village Health Workers

The training programme for teaching village health workers (VHWs) started in 1990. However, before that time, an Italian NGO by the name of LVIA was performing the task at Ughandi in Singida Rural district. They used to train between 20 and 30 as compared to government policy of having two (2) VHWs per village and subsequently TCRS took over the activity and so far they are working in 95 villages including 57 villages in Singida Rural district, four (4) villages in Manyoni district and 34 villages in Iramba district. The training duration is two (2) months per village, i.e. one (1) month for theory and another one (1) month is set aside for practical work. The Government provides teachers/or trainers and TCRS gives them tools and equipment. Eventually, the trainees after completion of the training, they become health promoters. At the beginning TCRS used to conduct community diagnosis, and thereafter, tailored the programme to meet the needs of individual village; but now there is a uniform time-table on preventive health care. Also, the participants are introduced to soil conservation, nutrition and taming of small animals.

(e) Training of Traditional Birth Attendants

Training of traditional birth attendants (TBAs) has long-term experiences and do attend a one-month course per village. They are trained by medical and child health workers and TCRS gives them allowances and training materials. TBAs are required to assist in checking the pregnant women and advise them to go to hospitals or clinics for delivery and chekups; and also advise them on nutrition and immunisation.

(3) Health Projects Abroad

(a) Goals of Health Projects Abroad

Health Projects Abroad (HPA) is a British based organisation that was established in 1989 to provide support to community initiated, health related projects in developing countries and to provide young British volunteers with opportunity to be involved with a development programme. HPA is working in two (2) regions in Tanzania: Singida and Tabora.

HPA works to enable rural communities to maintain and promote their own health and development. HPA seeks to be a local needs-led NGO which works in partnership with community-based groups to develop innovative, appropriate and sustainable approaches for the maintenance and improvement of primary-level health and education. Working with community-based groups, HPA will support activities which build on the principles of inclusion, ownership by the primary users and democratic consultation.

The goals of HPA include:

- To improve the organisational and management capacity of individuals and community-based groups,
- To enhance the knowledge and understanding of primary health and education issues,
- To continue to support the development of health and education infrastructure in the community,
- To continue to develop HPA as a learning organisation,
- To encourage the sharing of experience between development actors,
- To develop a locally-based, sustainable NGO which responds to the needs of people.

(b) HPA in Singida Region

Since 1992, HPA has been carrying out research and preparation for a programme to be introduced in Singida region. A three (3) month study in 1994 established the need and desire for a HPA programme in Singida which was started in 1996 with a year of detailed research and planning. Rapid rural appraisals were undertaken in over 70 villages throughout the region followed by partipatory rural appraisal in 14 villages. The target areas for the programme were subsequently narrowed down to two (2) clusters of villages, in which HPA is working in 1997.

HPA is in the first year of operation and is working in two (2) clusters, i.e. Sambaru cluster in Singida Rural district and Kaselya cluster in Iramba district. In Sambaru village, HPA is building a dispensary and rehabilitating the borehole with a diesel pump.

(Health Education Programme)
HPA uses the community based health care (CBHC) approach to help the villagers to identify problems and seek solutions, and to encourage them to take responsibility for their own health. Hygiene education is being conducted in Sambaru village along CBHC approach, and will later on extend to Muhintiri village early next year.

(Child-to-Child Health Programme)
The programme is being practised in primary schools by teaching teachers about new techniques of teaching by imparting knowledge to pupils, and the programme has motivated pupils. In this endeavour HPA is working in conjunction with TCRS and the teachers' resource centre supported by Danish organisation called MS. HPA has trained teachers in Sambaru, Londoni, Mang'onyi and Mwau primary schools. Also, HPA is providing support for tree nurseries and environmental sanitation and school's cleanliness.

(c) HPA in Tabora Region

HPA has been running a development programme in Tabora region since 1991. The programme has provided support to 18 community initiated and government supported projects related to health infrastructure at village and ward level. Projects have included construction and rehabilitation of dispensaries and health clinics, provision of water supply and sanitation to health facilities and construction of staff quarters for health workers.

This year HPA will be involved with the following activities in Tabora:

- focusing the programme on improved participation of women in the development process,
- promoting CBHC in two (2) or three (3) clusters of villages,
- training teachers and trainers in the child-to-child approach to health education, and supporting a number of child to child programmes in schools,
- assisting with construction of two (2) village dispensaries and a number of classrooms at a village primary school,
- continuing to learn from evaluation and monitoring of HPA work and train staff accordingly,
- continuing to be pro-active in promoting sharing of experience between development actors, and
- registering HPA Tabora as a local NGO.

(4) Singida Rural District Health and Nutrition Programme

Singida Rural district is one of the beneficiaries of the World Bank's health and nutrition programme. The programme was introduced at Ilongero health centre in Singida Rural district; it was serving over 8,000 people from neighbouring villages. The Ilongero health centre was rehabilitated with the assistance of the World Bank. The centre has the capacity of admitting about 20 patients at a time; and it is now trying to improve its services to make it a conducive place to work.

Furthermore, with the assistance of the World Bank, Ilongero and Ihanja health centres and six (6) other dispensaries in Singida Rural district have been rehabilitated.

The health and nutrition programme also touched on public education and horticulture activities. Under the programme about 50 traditional birth attendants and 73 village health workers were

trained. Several villages in the area have undergone training on safe water and better food storage.

The health and nutrition programme was started in 1991/92 in 10 districts in the country. Its aim was to reduce mortality and morbidity rates of children and nursing mothers respectively. Other beneficiary districts are Iramba, Kilwa, Lindi, Nachingwea, Kasulu, Kibondo, Nzega and Igunga. Before the programme started, more than 130 new-borns in every 100,000 died every year in Singida Rural district before they reached the age of five.

With the expiry of the World Bank's support to Singida Rural district, the local governments concerned initiated another support in the rehabilitation of Singida regional hospital. The rehabilitation of the hospital already started. The district authorities are all out to ensure that the programme keeps on going.

The short-term measures include putting the rehabilitation aspect under control of ward leadership, while the village governments will have to set aside in their annual budgets, funds for rehabilitating the infrastructure. As for long-term measures, the district council will have to include maintenance expenses in its annual budget.

The district authorities preferred bottom-up approach because not only can it make people support the projects; but also will help to create a sense of ownership of the projects by the people; people would always be ready to develop and sustain the projects which were established on their choice.

7.4 Model Villages

7.4.1 Village Inventory Survey

The village inventory surveys, which consist of village surveys and sample household surveys, were conducted by the survey team organised by JICA Study team covering 284 target villages in the Study area. The major objectives of the survey were to take an inventory of all target villages regarding existing water supply facilities, current water use, public health facilities, health education, gender issues and others related to rural water supplies, and to collect detail information from households deemed necessary for planning of improvement of rural water supply. Detail surveys were also carried out by the JICA Study team for 29 model villages among which 12 pilot villages have been selected. General situation on health and sanitation of the model villages is given below:

7.4.2 Hanang District

(Public Health)

Health facilities are found in three villages only, i.e. one dispensary, mother and child clinic and delivery services in Bassodesh village, one dispensary in Masakta village and one dispensary, mother and child health clinic in Dirma village.

(Village Health Committee)

All villages except Bassodesh, Gawidu and Masakta have got no village health committee. Efforts to remind the village leaders to form them have failed due to the less importance they attach to health activities. The activities of the village health committees include:

- to oversee health activities in their respective villages.
- to ensure environmental sanitation; and also, to ensure that underfives are weighed and vaccinated monthly for BCG, DPT, polio, measles and tetanus; and that expectant mothers and all child bearing-mothers are given the tetanus vaccine.
- to sensitise parents to fight malnutrition of their children.
- to serve as liaison between health workers and community members.
- to assist to sensitise the villagers on human cleanliness and water and environmental sanitation.
- to ensure that all people have pit-latrines in the villages and make use of them effectively.
- to sensitise community on vaccinations, environmental sanitation, building spacious houses with ventilation, using pit-latrines and drinking safe and clean water.

(Common Diseases)

Malaria which ranks high is one of the three commonest diseases in the surveyed model villages; and their causes are due to mosquitoes breeding in swampy areas, ponds and bushy areas, drinking unsafe water and scarcity of water for bathing. Tuberculosis (TB) is due to drinking raw milk and eating raw meat. Typhoid is due to drinking dirty water.

(Immunisation Campaigns)

The campaigns are conducted in Bassodesh, Dirma and Masakta villages; these are the only villages with health facilities. BCG, DPT, polio, measles and tetanus are issued for underfives. Also, Tetanus vaccine is administered to expectant mothers and all child bearing mothers (20-45 years of age).

(Hygiene Education)

At Dajameda and Mureru primary schools, hygiene education is taught under domestic science for Standards III-VII, in Gawidu it is taught under sanitation subject to Standards I-II and under domestic science for Standards III-VII. The teaching of health and domestic science subject is done by applying theory and practice. Due to shortage of demonstration materials, greater emphasis is placed on classroom teaching.

7.4.3 Singida Rural District

(Public Health)

Nkuhi and Choda villages have one dispensary and one mother and child health clinic each; whereas Ilongero village has one health centre and one mother and child health clinic.

(Village Health Committee)

Four model villages have a village health committee; they are Choda, Ilongero, Mang'onyi and Nkuhi. The rest have none. Their activities are the same as for Hanang district.

(Common Diseases)

Malaria and diarrhoes/stomach ache are the leading common diseases within the model villages. However, malaria tops the list. Other minor diseases are pneumonia followed by trachoma and typhoid. Malaria is caused by mosquitoes breeding in ponds and dirty/bushy environments.

(Immunisation Campaigns)

Immunisation campaigns are carried out at three villages with health facilities mentioned above as well as at Mang'onyi village. Vaccinations are administered twice a month at Choda and Nkuhi villages, while vaccinations are administered twice a week at Ilongero and Mang'onyi villages. The vaccinations for the underfives are BCG and TB only; and the others are polio, measles, DPT and tetanus. Also the tetanus vaccine is given to expectant mothers who visit the clinic. Response rates are 55% for Nkuhi; 79% for Choda and 95% for Ilongero and Mang'onyi villages.

(Hygiene Education)

Hygiene education is taught as an independent subject in primary school curriculum in Tanzania. However, it is taught under domestic science subject at Mgungira and Nkuhi primary schools. At Choda primary school, it is taught under health and domestic science. Moreover, it is taught at Igombwe primary school under domestic science and science (nutrition) subject; at Ilongero

primary school under health (STDs I-II) , domestic science and AIDS (STDs III-VII), at Mang'onyi primary school the pupils are taught when they visit the dispensary.

7.4.4 Manyoni District

(Public Health)

Kitopeni village has one first aid services. Itigi village has one health centre and one mother and child clinic, whereas Majengo village has one health centre, one mother and child clinic and one hospital under the auspices of the Roman Catholic Church. Doroto village has one health centre, and Chikola village operates one mother and child clinic; but Mpapa village has no health facilities.

(Village Health Committee)

All villages except Mpapa have a health committee. Activities of the health committees are same to that of Hanang district.

(Common Diseases)

Malaria which ranks first is followed by diarrhoea caused by drinking dirty and unsafe water. The other common diseases are meningitis, skin diseases, measles and malnutrition. Meningitis is caused by lack of ventilated houses especially at Kitopeni village. Skin diseases are rampant at Itigi village due to poor sanitation, and malnutrition and measles are found at Majengo village due to low-incomes coupled with mothers failing to take their children to clinic regularly.

(Immunisation Campaigns)

These are carried out at all the model villages except Mpapa which has no public health facilities. The vaccinations are conducted twice a week at Itigi and Majengo villages, and once a month at Kitopeni and Doroto villages, while at Chikola village vaccinations are carried out every week on Friday. The vaccines which are administered to the under fives, expectant mothers and child bearing mothers are the same as for Hanang district.

(Hygiene Education)

This subject is taught under health for Standards I-II, and under domestic science for Standards III-IV at Kitopeni primary school. At Itigi, Majengo, Doroto and Chikola, it is taught under domestic science for Standards I-IV. At Mpapa the subject is taught under health subject for Standards I-IV and under domestic science for Standards V-IV. The teaching is done by theory

and practice coupled with practical demonstrations. Nevertheless, the teachers fail to conduct the practicals due to lack of required tools.

7.4.5 Igunga District

(Public Health)

Half of the model villages have health facilities; Igunga village has one private dispensary, one public health centre and one mother and child health clinic; Itumba village has one public dispensary and one mother and child health clinic; and Ndembezi village has one public dispensary and one mother and child health clinic.

(Village Health Committee)

All the model villages except Matinje village have formed village health committees. Activities of the committees are the same as described under Hanang district.

(Hygiene Education)

This subject is taught under domestic science subject for Standards I-VII at Matinje, Mwayunge, Ndembezi and Nguriti primary schools; while it is taught under health education for Standards I-II and under domestic science for Standards I-II and under domestic science for Standards III-VII at Igurubi and Itumba primary schools.