

THE UNITED REPUBLIC OF TANZANIA

MINISTRY OF WATER, ENERGY AND MINERALS



SEMINAR ON

REORGANIZATION OF THE  
MAKONDE PLATEAU WATER SUPPLY

PROCEEDINGS VOLUME ONE

April, 8 - 10, 1992

DAR ES SALAAM, TANZANIA

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### 3. SEMINAR OBJECTIVES

#### 3.1 Background

Makonde Plateau Water Scheme (MPWSS) is a National scheme which consists of 6 separate water intakes and partly interconnected piped water distribution systems in Newala District, Mtwara Region. It serves nearly 300,000 people living on the Makonde Plateau where no alternative sources of water exist.

Being a National scheme MPWSS has its separate management directly under the Ministry of Water, Energy and Minerals. Also the budget is provided by the Central Government through the same Ministry. The Government finds it increasingly difficult to finance the management of MPWSS.

During the last 15 years MPWSS has received considerable assistance from the Mtwara-Lindi Rural water Supply Project, mainly in terms of investments but also in terms of technical assistance and spare parts supply in support of the scheme's operation and maintenance.

The project will be phased out by the end of 1994. Now that the support by the project and Central Government will be reduced, considerable strengthening of the management and financial base of the scheme are required.

#### 3.2 Objectives

General aim is to reorganize the management of MPWSS, exploring the possibility of making it an independent and financially self supporting entity.

A study has been conducted and reported on the institutional and Financing Agreement of MPWSS in November 1991, which resulted in various alternatives and recommendations in this respect.

The seminar is to bring together engineers, planners and other experts, to discuss the conditions, feasibility and ways of establishing a new separate body for the management of MPWSS, and to specifically be conclusive with regard to:

- the basic principle of ensuring Government commitment to reorganize the management of MPWSS;
- the guidelines regarding levels of revenue collection and cost



sharing to MPWSS;

- the administrative arrangements of preparing all necessary proposals to the relevant authorities;
- the definition of the organizational, functional and financial principles for MPWSS;
- the arrangements, transition steps and schedule for the proposal of a detailed legislature.
- the transition procedure and period;
- the nomination of a task force for the preparation of a detailed action plan for the actual reorganization implementation.



## **4.0 FINAL SEMINAR RESOLUTIONS**

### **4.1 Background**

Makonde plateau water supply scheme (mpwss) is a national scheme which consists of separate water intakes and partly interconnected piped water distribution systems in newala district, mtwara region. It serves nearly 300,000 people living on the makonde plateau where no alternative sources of water exist.

Being a national scheme mpwss has its separate management directly under the ministry of water, energy and minerals. Also the budget is provided by the central government through the same ministry. The government is finding it increasingly difficult to finance the operation of mpwss.

During the last 15 years mpwss has received considerable assistance from the mtwara-lindi rural water supply project, mainly in terms of investments but also in terms of technical assistance and spare parts supply in support of the scheme's operation and maintenance.

The project support will be phased out by the end of 1994. As the result considerable strengthening of the management and financial base of the scheme is required. In view of the above the seminar recommended the following:-

### **4.2 INSTITUTIONAL ASPECTS**

4.2.1 Have a separate autonomous body with legal entity to run makonde water supply.

4.2.2 The composition of the body should have adequate representation of the consumers (majority shareholders) to control the activities of the waterworks. This should be studied further in phase ii.

4.2.3 As proposed in the phase I study the body would have the functions of production and distribution of water, finance and administration. In this respect further studies in phase ii should include among other things:-

- manpower issues such as staffing schedule, scheme of service and incentives, recruitment procedures etc.
- Financing arrangements.





- Institutional and administrative arrangements.
- Information systems.
- Customers services.
- Valuation of assets.
- How NGOS particularly newala development foundation may financially support makonde water supply.



#### 4.2.4 PLAN OF ACTION

##### TIME SCHEDULE

SN	ACTION	TIME	RESPONSIBLE
1.	Ministry of Water, Energy and Minerals commitment to organize running of Makonde Water Supply	June 1992	MAJI (DOMWL)
2.	Complete phase ii studies	December 1992 (4 months)	Consultant
3.	Final government approval on forming an autonomous- body	June 1993	MAJI (DP/State Attorney)
4.	Start Implementation - Grassroots mobilization(3 months - Formation of board of directors (one month ) - Appointment of key personnel including the chief executive (two months ) - Appointment of other personnel (2 months)	July 1993 to February 1994	PMO (Dept. Of Local Government and Regional Administration MAJI and Management adviser from FINNIDA).

#### 4.3 FINANCIAL MATTERS

4.3.1 The tariff structure should aim at full recovery of costs (capital and recurrent) a specified time period.

4.3.2 Tariffs should be reviewed within from time to time with view of ensuring



cost effective operation.

4.3.3 Water kiosks should be metered and managed by individuals or villages, who or which should sell water by buckets.

#### 4.4. **SOCIO - ECONOMIC ASPECTS**

4.4.1 Community participation must be emphasized and consumers be sensitized.

4.4.2 Those villagers unable to pay the water tariffs be mitigated upon by the village community.

4.4.3 Water rights to be granted to the organization/body.

4.4.4 The system of revenue collection should be decided by the consumers in collaboration with the body/organization.

#### 4.5 **TECHNICAL ASPECTS**

4.5.1 Long term adequacy of the water sources to be secured and protected including the catchment.

4.5.2 Cost effective operation to be secured by rehabilitation of the existing system including standardization of equipment, machinery and procedures.

4.5.3 Communication and transport should be strengthened.

4.5.4 Development of efficient procurement system should be studied.

4.5.5 Optimal combination of water sources, power sources and storage facilities should be developed to ensure continuous water supply.

4.5.6 Carry out staffing as per organizational structure and job descriptions.

4.5.7 Rainwater harvesting systems should be encouraged and improved as well as environmental sanitation be given due consideration.



### **ANNEX 3 Proposed Terms of Reference for Phase II Study**

The detailed contents of phase II study is envisaged to contain the following elements:

- Definition of the institutional and administrative arrangements of the Makonde Water Supply;
- Definition of the Organizational structure and manning schedule;
- Definition of the financing arrangements - short term and long term of Makonde Water Supply;
- Proposal for cost recovery structure including tariff structure and collection system;
- Proposal for the schedule of reorganization and definition of further steps to be taken for its implementation;
- Drafting of enabling legislation to establish the Makonde Plateau Water Supply Organization.

Specifically, the Consultancy Team will perform the following duties:

1. The Phase II Study should include among other things:-
  - Manpower issues such as staffing schedule, scheme of service and incentives, recruitment procedures, organizational structure and job descriptions, etc.
  - Financing arrangements
  - Institutional and administrative arrangements
  - Information Systems
  - Customers Services
  - valuation of assets
  - Transitional period arrangements and time table





- The composition of consumers representation in the autonomous body and shareholdings;
  - How NGOs particularly Newala Development Foundation may financially support Makonde Water Supply Organization.
2. Study the cost recovery structure including tariff structure and collection system.
  3. Study closely effective means of community mobilization for participation, organization and education.
  4. Study closely efficient transport, communication and procurement systems for Makonde Water Supply Organization.
  5. Study the appropriate technology of rain investing for water supply in the Makonde Plateau to be implemented as an alternative system of water supplies.
  6. Study the implementation of an appropriate environmental sanitation systems as an integral part of rural water supply development in Makonde Plateau.
  7. Draft legislation to enable the establishment of the Makonde Plateau Water Supply Organization.
  8. Prepare comprehensive phase II Study Report for review and implementation.



FILE No

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P.S.  
~~ITEM~~

U.P.s. DOMWL  
Ubungo-Maji

*Sent forwarded*  
*[Signature]* 01/07/92.

Dear Prof. Mwandosya,

Reference is made to the seminar on the Re-organisation of Makonde Plateau Water Supply Scheme which took place between 8 - 10 April, 1992.

The Secretariate wishes to express its cordial thanks to you for your valuable contribution which helped to make the seminar a successful one.

The Secretariate has now finalised the seminar proceedings and hereby wishes to hand over to you one copy of each of the two volumes.

The Mtwara - Lindi Water Supply Project phase VI document requires that a study of Makonde Plateau Water Supply Institutional and Financial arrangements be carried out. Phase I of the study has been completed in October 1991 by the Institute of Resource Assessment, University of Dar es Salaam. The study was the basis of the seminar whose resolution we are submitting to you now. The phase II study is scheduled to start as soon as the official request for funding from the Tanzania Government to the Finnish Government is forwarded.

Reference is also made to volume one of the seminar proceedings especially the seminar objectives (pages 9 and 10), the final seminar resolutions (pages 11 to 14) and the proposed terms of reference for Phase II Study (pages 25 and 26) which are enclosed here for your easy reference.

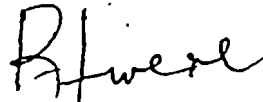


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The Secretariate wishes, therefore, to request the Ministry to quickly look at the proposal contained in the Seminar resolutions and thereafter if agreeable forward official request to the Finnish Government for funding phase two study.



R.N.A. Swere  
Chairman Organising Committee.

c.c. MNEM  
" DMNEM



THE UNITED REPUBLIC OF TANZANIA  
MINISTRY OF WATER, ENERGY AND MINERALS



SEMINAR ON  
REORGANIZATION OF THE  
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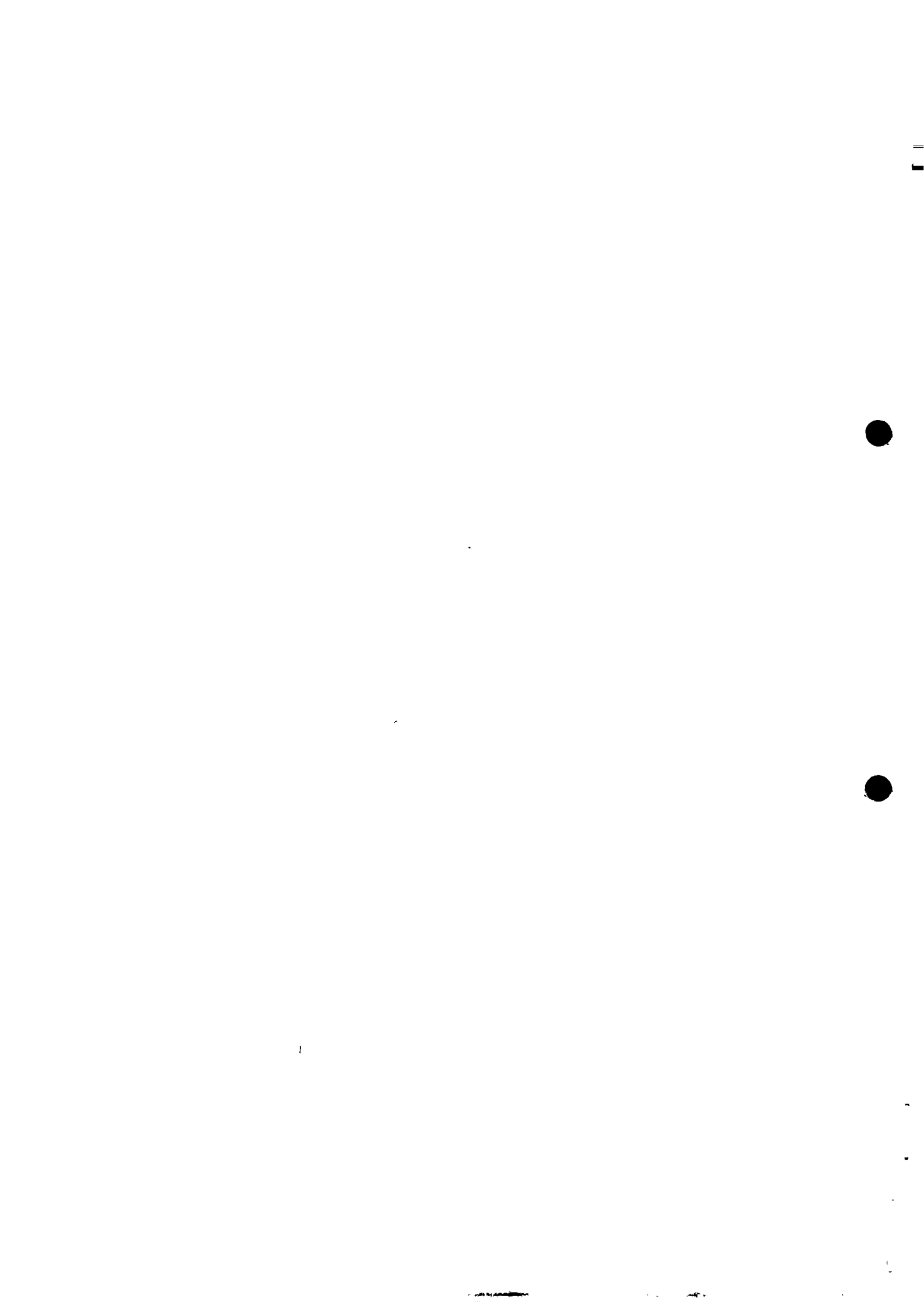
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VOLUME TWO  
INTRODUCTORY PAPERS AND  
WORKING GROUPS REPORTS



## LIST OF ABBREVIATIONS AND ACRONYMS

MWEM	-	Ministry of Water Energy and Minerals
SAT/UNDP	-	Sector Advisory Team
UDSM	-	University of Dar es Salaam
FINNWATER	-	Mtwara-Lindi Water Supply Project
FoE	-	Faculty of Engineering
IRA	-	Institute of Resource Assessment
O + M	-	Operation and Maintenance
UNDP	-	United Nation Development Programme
HTM	-	Handeni Trunk Main Project
NUWA	-	National Urban Water Authority
MP	-	Member of Parliament
DOMWL	-	Director of Operation, Maintenance and Water Laboratories
HMS	-	Head of Maintenance Section
RWE	-	Regional Water Engineer
DED	-	District Executive Director
RE	-	Resident Engineer
DWR	-	Director of Water Research
PICU	-	Project Implementation Co-ordination Unit
DANIDA	-	Danish International Development Agency
FINNIDA	-	Finnish International Development Agency
EKTM	-	Eastern Kilimanjaro Trunk Main
DWB	-	Director of Wood Bamboo
DP	-	Director of Planning
CCD	-	Commissioner, Community Development
DWD	-	Director, Water Department
DDCM	-	Director of Design Construction and Material Testing
PWRI	-	Principal Water Resources Institute
HOS	-	Head of Operation Section
FMIA	-	
DSD	-	Director of Sewerage and Drainage
NPC	-	National Planning Commission
HDS	-	Head of Design Section
DAP	-	Director of Administration and Personnel
UNICEF	-	United Nations Children's Fund
HCS	-	Head Construction Section
WD & ID	-	Water Development and Irrigation Division
ODA	-	Overseas Development Agency
CCT	-	Christian Council of Tanzania
TANESCO	-	Tanzania Electrical Supplies Company

NGO's	-	Non Governmental Organizations
MPWSS	-	Makonde Plateau Water Supply Scheme
RDD	-	Regional Development Director
MAKONDECO	-	Makonde Plateau Water Board
MAJI	-	Ministry of Water, Energy and Minerals
VWC	-	Village Water Committee
CP	-	Community Participation
DP's	-	Domestic Points

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ONE  
INTRODUCTORY  
PAPERS



7

1. THE NATIONAL WATER POLICY by S.S. Mambali

Director, Water Research,  
Ministry of Water, Energy and Minerals.

1.1 INTRODUCTION

Water is an essential input to virtually every sector of a country's economy. In other words, water is essential to the well-being of the people regardless of culture or nation. The abundance or scarcity of water can mean prosperity or poverty, life or death.

The availability of this resource both in space and time, is often not even distributed neither both in quantity and quality. The current developmental trend on this resource is that constraints on the supply are ever increasing, aggravated by droughts, depletion of aquifers and deforestation, WHILE demand is rising rapidly for irrigation, energy generation, industrial production and urban consumption.

These issues and conflicts do not depend on any particular history, tradition or ideology. They generally affect centrally-planned economies. To be able to control this kind of situation and thereby sustain life, development and the environment, it is important that water resources development objectives are clearly defined and that related policy and implementation strategies are well formulated.

1.2 HISTORICAL BACKGROUND

Before outlining how the sector has tried to address the policy issues, it is appropriate to briefly review how our water policies have evolved up to the present time, and the background against which this evolution has taken place. The first public investments in water supply in our country were made in the 1930s under the supervision of the Public Works Department. These investments reflected the urban bias of the colonial Government's development plans, as they served mainly townships, missions, large estates and trading centres. Although the Water Development Department was formed in 1946, construction of rural water supply schemes did not begin until the late 1950s. For example the old Makonde Water Supply was constructed in the 1950's.

Under the prevailing arrangements, local authorities were required to contribute 25% of the cost of water development projects before the Central Government released the remaining 75% as its contribution. This procedure, apart from delaying the construction of water projects, also resulted in unbalanced development, particularly between the richer and poorer rural areas. Operating and maintenance costs were met by water sales revenues collected by the local authorities.

After independence, the Government's water policies attempted to address the regional and urban-rural imbalances in water development which were largely a result of consumers having to contribute indirectly towards investment costs (through the local authorities) and directly towards operating costs (by paying fees for water supplied to them).

In line with these policies, in 1965 the Government began financing all new water investments. In 1970's it also started paying for operating and maintenance costs and providing rural water services free of charge. By that time the provision of Water Services was regarded as the exclusive responsibility of the Government. It is worth noting in here that this broad policy at that particular time emphasized only on the fact that Water is the basic right of all human beings to have access to clear water. The implementation of this policy is contained in the "20 - year rural water supply programme (1971 - 1990)" declared by the Government in 1970 with the objective of providing clean and potable water within a reasonable distance of every village by 1981 as a free basic service and to extend piped water supplies to within 400 meters of every rural household by the year 1991.

Strategies adopted in the implementation of this policy was first and foremost to assess the country's water resources potential. This was the beginning of Regional Water Master Planning in the country in 1971. Because of high costs involved and attractive and ambitious plans by then, the country witnessed a number of Donor agencies and consultants/contractors involvement in the country's water sector.

As more donors entered the rural water scene, the Ministry of Water became worried about the possible impact of

scattered donor involvement and urged them to concentrate on particular group of regions (Donor concentration policy). Under decentralization system by then, this went further to strengthen the relationship between the regions (RDDs) and the donors and inturn, to marginalise the Ministry Headquarters.

It should be noted that decentralization system was to have transferred responsibility and authority for the management of much of rural development activities, including water development from the Central Ministries to Integrated Regional Authorities.

The impact of the foregoing could be summarized as follows:

- the move was ill-prepared as the regions did not have the capacity to deal with donors and to absorb or supervise the amount of aid being injected by the donors,
- the whole programme implementation became project - oriented rather than programme-oriented as each donor was operating singly,
- as most schemes were being built by external consultants (contractors) the basis was "fast-completion of the work defying time to involve the beneficiaries,
- the water sector found itself a basket of varying specifications of equipment and technology in general as the Ministry was unable to coordinate the activities. The whole thing became outside the hands of the Ministry.

Whereas the objective of the water development programme adopted in 1970 was to provide 89% of the rural population with clean water, by the end of 1985 only 42% or 7.7 million out of a total rural population of 18.9 million had access to the envisaged water services. In fact, since many of the water systems that had been installed by that time were not functioning, the actual number of people served was even lower. Today it is estimated that 40% of these schemes are not functioning.

This can be concluded by saying that the question of sustainable development in the country's water resources development is not forthcoming.

The Government realized the above mentioned shortfalls among others and with the lessons learned, the need to have a well elaborated water policy was clearly seen.

It was with such a recognition in mind that the then Ministry of Water embarked on the formulation of a new National Water Policy in 1987. The Ministry appointed a full time committee to collect all the key material for the formulation of the policy, and a draft was discussed in the 1987 annual Water Engineers Conference which was held in Shinyanga. The draft policy paper was then distributed to all ministries, the CCM Party, and all relevant organizations for comments, before the final draft was presented to the Government and the Party for ratification. The Policy received the Party Blessing in 1990, and was officially launched in November 1991 during the 13th Annual Water Engineers Conference held in Tabora. Currently a detailed strategy of implementation of this policy is being worked out.

### 1.3 THE BROAD OBJECTIVE OF THE NATIONAL WATER POLICY

The broad objective of the National Water Policy is to give guidelines which will ensure the fulfillment of Government and Party objectives of providing every Tanzanian with clean and safe water within easy reach by the year 2002, through a sound development of the Water resources to cater for domestic, Industrial, tourist, agricultural and other uses for the present as well as future generation.

Furthermore the policy aims at ensuring that all water sources in the country are effectively utilized for the above mentioned uses and are protected, and sustainable managed, and do contribute towards social, economic and environmental services. It also aims at ensuring sustainability of the constructed water schemes.

### 1.4 SOME SPECIFIC OBJECTIVES

The broad objective would be achieved through researching and developing new water sources, to cater for the present

1

water demand for various uses as well as future demand, construction of new water schemes for the same purpose as well as sustenance of the already existing schemes.

In this endeavor the policy outlines some strategic issues which are based on the following aspects:

(a) Water sources:

The Policy stresses the aspect of water source protection against pollution and destruction, as well as effective utilization of the water sources for various uses.

(b) Technical and Technological aspects:

There are technical and technological problems existing in the sector, and the objective of the policy is to alleviate them through standardization of equipment and the use of appropriate and cheap technology.

(c) Human resources development:

The objective of the policy here is to achieve self sufficiency in water professionals in the sector by the year 2002, through training and proper manpower planning.

(d) External support:

The policy aims at achieving a coordinated external and internal efforts in the sector development. The sector gets support from external support agencies, both Governmental and non Governmental. Having these efforts coordinated would ensure sustainable development.

(e) Division of responsibilities:

The policy clearly define the responsibilities of each actor in the sector, from individual level, village level, district, regional and at national level. The responsibilities of other related sectors and actors is also clearly defined. Other actors include: The Party, Other Ministries such as Ministry of Health, MAENDELEO, PMO, MALIASILI, etc. The role of women in the Water development activities can not be over emphasized.

(f) Cost recovery and cost sharing:

The cost recovery and cost sharing are the core aspects of the policy. It is considered a guiding principle towards the attainment of sustainable water resources development and therefore has been well elaborated in the policy document. The idea here is to disembark from a notion of a "free water" concept to a concept of an "economic good". With this principle, however it is vital to recognize first the basic right of all human beings to have access to clean water at an affordable price. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources; and all these could be achieved by involving the lowest appropriate level.

The involvement of beneficiaries in all stages of project cycle, that is: planning, implementation and operation and maintenance is well covered in the new National Water Policy document.



2. Quick Guidelines on Tentative Legal Framework by DR. BERHANE M. ABRAHA.

UNDP CONSULTANT

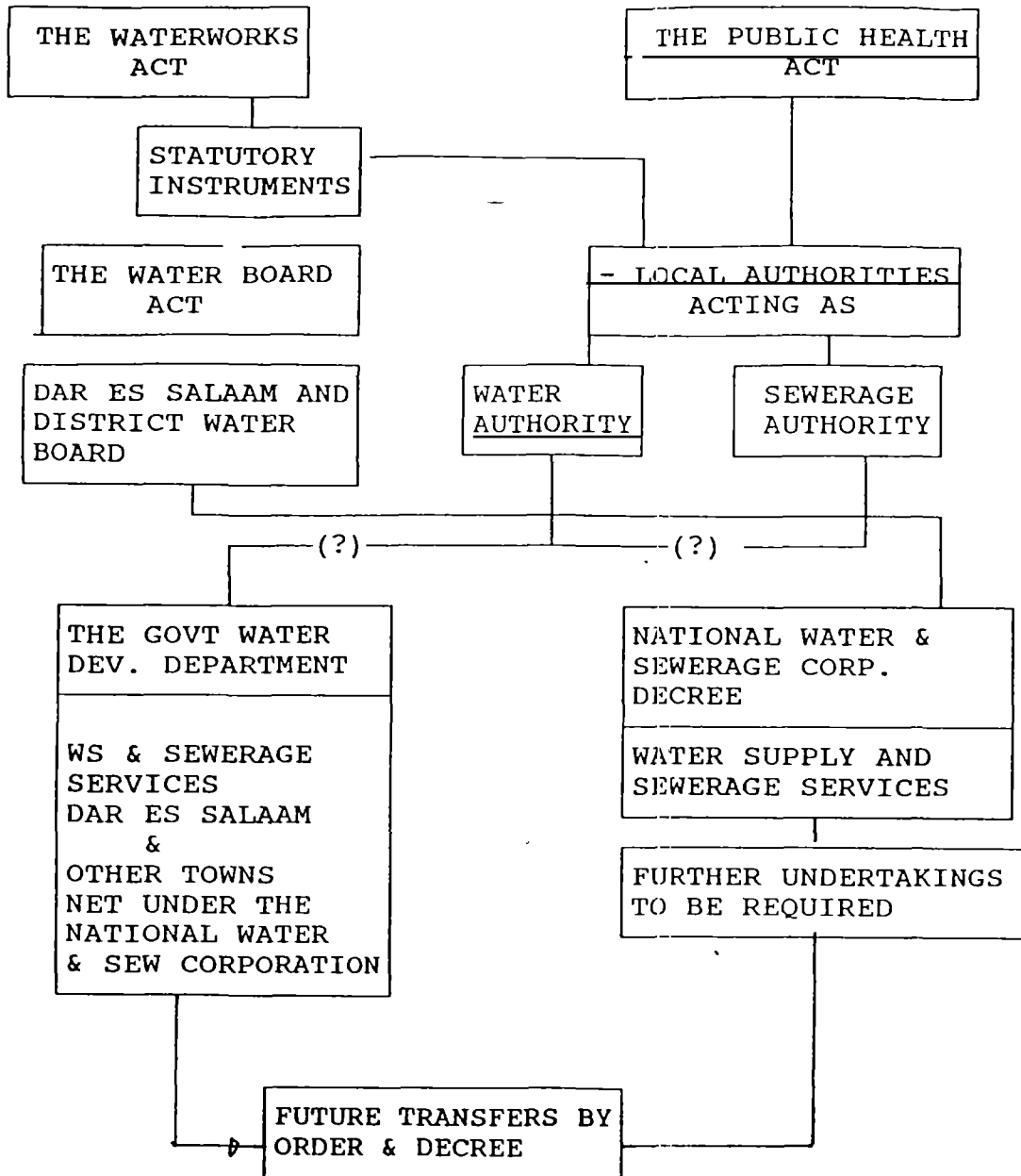
Enabling Legislation for the Establishment of Makonde Plateau Water Board (MAKONDECO)

- A decree or other statutory instruments authorizing the Establishment of Makonde Plateau Water Board (MAKONDECO) is urgently needed by the Govt. of the United Republic of Tanzania.
- Existing Legislation must be studied if it PROVIDES AND ENABLES a sound basis for the development and operation of WS & S Services or it INHIBITS the Establishment of Makondeco.
- The new National Water Policy provides a good environment for planning - HIGH PRIORITY FOR WATER DEVELOPMENT AND BENEFICIARY PARTICIPATION
- Enabling legislation should be introduced as soon as Practicable that will establish MAKONDECO as an Independent Organization for Administration and Management of the Makonde Plateau Water Program.
- The enabling Legislation can authorize the New Board
- The levying and collection of rates and charges
- The laying of water mains either in Public Places or Private Lands.
- The ownership of Assets taken from govt.
- Enforcement of the Provisions of the water works act, etc.

FIGURE 1 Depicts diagrammatically how the enabling legislation can be developed for the establishment of the Board.

ESTABLISHMENT OF MAKONDE PLATEAU WATER BOARD (MAKONDEKO)

ESTABLISHMENT OF MAKONDE PLATEAU WATER BOARD (MAKONDEKO)



IMMEDIATE ACTION - PHASE 2 LEGAL FRAMEWORK

UNDP CONSULTANT WITH THE MWEM (MAJI) LAWYER

1. To study the Existing Legislation
  - . Investigations if Existing Legislation needs minor revisions, updating.

- . The Essence or the presence of statutory Authority to Establish MAKONDEKO.
- 2. Draft recommendation for enabling Legislation
  - . A statutory order is needed to empower the Makonde Plateau Water Board/MAKONDECO
  - . Provisions for the Transfer of Water Dept. Activities to the Makonde Plateau Water Board

### 3. Presentation of the Seminar Topic by J. Saavalainen.

Manager FINNWATER

#### PREFACE

Makonde Plateau Water Supply, especially the reorganization, there is the topic for discussion in this seminar. The present difficult financial situation has given the initiative. The New Water Policy is giving guidelines for this kind of planning.

Reorganization of the management of the Makonde Water Supply and making it to an independent and financially self supporting entity has been seen as one possibility.

When starting the seminar, questions are asked hoping that there would be answers at the end. This paper will give some background information and place questions. It is up to the participants to work out solutions.

#### 3.1 BACKGROUND INFORMATION

##### 3.1.1 LOCATION

The Makonde Plateau area is in Newala District of Mtwara Region, in the South of Tanzania. Its altitude varies between 400m - 800m above sea level forming a plateau, named after the Makonde Tribe occupying Newala, Mtwara District and part of Mozambique.

The District is surrounded by Mtwara District in the East, Lindi District in the North, Masasi District in the West and in the South shares the Ruvuma river boundary with Mozambique.

The Makonde Plateau covers an area of approximately 3500 sq. km. The population of the area was 307000 people in 1984 according to the census. Since 1984 the growth of the population has declined and the census of 1988 shows a population of 308000 people. In the projections as annual growth rate of 1.4% has been, however, applied till 2010.

##### 3.1.2 COMMUNICATION

The project area can be reached by road from Mtwara or Lindi towns. The road is passable throughout the year. There is also an airstrip at Newala town where small planes of up to 10 people capacity can land. Mtwara town is the coast of the Indian Ocean with a port capable to handle several cargo ships. There are regular cargo ships from Europe anchoring at Mtwara Port. There is also an airport at Mtwara town with regular Air Tanzania Corporation flights from and to

Dar Es Salaam.

Also by sea using the local cargo and passenger ships. Mtwara and Newala towns are served with STD telephone system to communicate with other parts of the country.

**3.1.3 HISTORY OF THE MAKONDE TRIBE**

The inhabitants of Newala district who call themselves Makonde are not indigenous to the area but originated from Portuguese East Africa. It is believed that they moved into their present area as a result of inter-tribal warfare early in the Ninth Century. As almost all the interior of the Makonde Plateau which comprises of Newala District is without water for two thirds of the year, the Makonde tended to make their homes on the Southern and South - Western edges of the Plateau. Thus they be near the water which flowed out into the Ruvuma valley from the foot of the escarpment in a series of springs.

**3.1.4 HYDROLOGICAL AND HYDROGEOLOGICAL INFORMATION**

Mtwara Region belongs to the wet and dry tropical climatic region. The inter-tropical convergence zone affects the climatic factors. The meteorological circumstances are affected by two major air streams, the south - eastern monsoon during the summer months of the northern hemisphere and the north - eastern monsoon during the norther winter. The annual and daily variations in temperature are relatively small. The mean temperature of the year in Newala District is 24°C with a minimum of 20 °C and a maximum of 28°C. The rainy season starts rather regularly at the end of November or in December and ends in May or June. The period from May to November is practically without rain. The mean annual precipitation varies mainly between 850 mm to 1000 mm per year.

The geological structure of the area consists of a thick series of rock sedimentary origin mainly comprising different sand, silt, clay and limestones. The main part of geological formations close to the ground level are more or less solid. Only a thin layer of soil, material covers the biggest part of the area. Thick soil layers occur in valleys especially in the big river valleys.

The Makonde Plateau in Newala belongs to Mesozoic sedimentary zone. The strata are thus composed of sediments, the vertical permeability of which is at least in places so good that a deep going percolation is possible. The ground water level in the plateau is normally at about 250 m - 300 m below ground.

Water is estimated to occur abundantly, but its utilization in the actual plateau area is difficult due to the depth.

### 3.1.5 WATER PROBLEM

The Makonde Plateau is not susceptible to any such easy treatment of water supply which can be observed in other Regions. The Plateau is large in area and except in very few places there is no water on the plateau. All water is over the edge and a thousand feet down. The nature of soil is such that even when it rains the water has gone by the time the rain has stopped the water falling on the surface. The only water that can be obtained is what people catch while it is actually raining and that means that every drop of water for every purpose must be fetched from a long distance.

In Newala district there are no rivers or streams with a long period of water flow and there are no surface water storage like dams, charcos, natural ponds etc.

Each household on the Plateau has embarked on constructing underground water storage tanks which are filled during the rainy season using roof catchment system or by directing the run off into the tank.

### 3.1.6 MTWARA-LINDI WATER SUPPLY PROJECT

The Makonde Plateau is a part of the Mtwara-Lindi Water Supply Project area. The Project area, Mtwara - Lindi Regions in Tanzania is of 83,000 sq. km. woodland, bush-land and grassland. A population of 1.5 millions living in the two regions, 90% of it is around 900 villages in rural areas.

The Project was started in 1972 under the agreement of Technical Cooperation between the Governments of Finland and Tanzania. It was to support the planning and implementation of the rural water supply development in Mtwara and Lindi Regions. Up to the end of 1987 the following phases were completed:-

-	Feasibility Study During	-	1972	-
			1973	
-	Housing Project	-	1973	-
			1974	
-	Water Master Plan	-	1974	-
			1978	
-	4 Phases of implementation	-	1978	-
			1987	

By the end of the implementation phase, Phase IV, around 2500 handpump wells and 13 piped water supply schemes were completed by the Project. 17 springs were protected as well. A sanitation component with health education, attached to the programme in 1985, has produced some 30 demonstration latrines and assisted in construction of some 200 family latrines.

Phase V concentrating on integration and institution building took place 1988 - 90, Phase VI, the Phasing out Phase started in the beginning of 1991. The phase is to complete the integration of the Project organization and the activities into those of the Ministry of Water, Energy and Minerals.

The responsibility for construction and maintenance of water supplies as well as trained groups with necessary tools and equipment have been transferred into the organizations of the Ministry of Water during Phase IV 1985 - 1987. The training programme of the Project has emphasized the development of the operation and maintenance capability on all levels from the regions to the villages.

The Community Participation is organized for full scale utilization of the local community development organizations. The policy of having a water committee in every village, to be incharge of all issues concerning water, was adopted. Today this committee is required before any actions on construction or rehabilitation of water supplies in the village can be commenced. The village well caretakers, two trained for each village, work under this committee. A district level water committee is doing the follow-up of the work of village committees and assisting in forming new ones as well as in technical matters.

To achieve a continuity of the water supply, after the Project will be dissolved, the Project is putting the biggest efforts on training. A comprehensive training programme covering the regions and districts of the Ministry of Water's organization is followed by the Project. The programme is based on task and skill analyses to show the actual needs for training. Local training institutions are utilized in long term training while the Project personnel is giving short courses and on-the-job-training.

In physical improvements to increase water supply, the main emphasis in ground water sector is to rehabilitate the existing handpump wells and to replace the broken handpumps with the new ones. In waterworks sector the main emphasis is to rehabilitate the most sustainable waterworks.

The Project is emphasizing strengthened operation and maintenance capabilities of MAJI including the generally improved financial and manpower resources management, also proper operation and maintenance practices and well organized procurement, storage and distribution of spareparts.

The final target is to help MAJI to be selfsufficient in water supply sector both at regional and district level in developing the above mentioned skills with a viable system of cost recovery from the consumers of water through taxes, fees and payments for spareparts etc. and allocating

sufficient funds for operation and maintenance of existing facilities and rehabilitation in the future.

### 3.1.7 PREVIOUS SYSTEMS IN MAKONDE PLATEAU

The public water distribution was first established during the colonial rule and was organized under the Makonde Water Supply company. The system consisted of water intakes, pumping stations and the distribution network. The users paid for the water. In middle 1960's the company was taken over by the Government of Tanzania.

In the beginning of 1980's an extensive ground water source with an estimated safe yield at 21 000 m<sup>3</sup>/d was discovered in Kitangari Valley. The other discovered water resources are at the lower areas along the edge of the Plateau and at the Ruvuma Valley.

As a part of the Mtwara-Lindi Water Supply Project, Kitangari scheme was introduced in early 1980's and started to supply the area using partly the old Makondeko network system.

There are presently 6 separate water supply schemes constructed to supply the area. Kitangari and Mkunya-Makote schemes form the core for the future supply. The rehabilitation of the Mkunya-Makote scheme serving the urban areas of Newala has been completed during 1990. The Kitangari system consisting of some 350 km of transfer pipelines serves approximately 100 villages in the area. The distribution in villages takes place through public standposts.

The water supply system of Makonde Plateau has been studied in connection with the Water Master Plan 1977, Revision of Water Master Plan 1985 and Engineering Study on the Old Makonde Water Supply in 1986. The expansion of the distribution network that has been undertaken during the Mtwara-Lindi Rural Water Supply Project has been based on assessments and recommendations of the above mentioned studies. The technical design has been worked out case by case involving network calculations to the extent required for each individual extension. Makonde plateau water supply distribution network study, 1991, gives the long term guidelines for improving the Makonde water supply.

The decisions on future development of the distribution system, including the operation and maintenance practices as well, call for a detailed technical calculation of the network. The growth of the population, rehabilitation of Mkunya-Makote as well as the serious damages caused by floods in 1990 affect the decisions on any extension of the distribution area.

The Makonde Plateau has no surface water. Due to this



geographical factor, Newala was one of the first districts to establish a Local Authority in order to solve their severe water problems in 1954. Thus the Makonde Water Supply Corporation was formed and the Local Authority managed to get a loan from the British Government to build a water supply for the district.

The Mkunya-Makote Pumping Station were built and started providing water to the villages and district headquarters. Problems began again in 1969 when the operation and maintenance of the Makonde Water Supply was taken over by the Central Government. People no longer paid for their water nor to maintain the system. Funds were insufficient and there was little foreign exchange, so the system began to deteriorate.

The water problem in Newala should be treated differently from any other place. This is because the cost of producing and pumping the water is very high, especially if one considers the pumping required from below the escarpment - Mkunya, up to the booster station, Makote, and then onto the plateau which requires enormous inputs.

During the time when the Makonde Water Corporation was in existence people in Newala used to pay three types of taxes ie:-

- The Poll Tax (Tax Per Head)
- A Share to Makonde Water Corporation (10.- TAS)
- The Fee of Purchasing Water by Bucket

This experience has been different from any other place and during that time people used to get sufficient water, and the corporation had no financial problems

**3.1.8 STUDY 1988**

It became increasingly apparent that water continued to be a severe problem particularly after the Health and Nutrition campaign in November 1987. It showed that Newala had the highest percentage of young children with severe malnutrition in the region. This malnutrition is directly caused by the very long distances which women must travel in search of water. This meant mothers had little or no time to feed and care for their children.

Study team from the WASH (Water and Sanitation for Health) Project came to Newala to help investigate possibilities for village-based cost recovery. The team arrived in Tanzania in July 1988.

The Study had three objectives:-

1. To determine if beneficiaries were willing to contribute towards meeting operation and

maintenance costs,

2. To determine how much they could contribute, and
3. To determine what type of cost recovery system they prefer.

The results clearly showed that villagers are indeed willing to contribute to meeting the running costs. If Kitangari scheme functioned as planned, roughly 240,000 more man-months per year would be freed up for child care, agricultural production and other activities.

Regarding the problems faced by villagers, between January and July 1988, the Kitangari scheme did not pump for two and a half months (72 days) and during the 1988 dry season (May-July) it did not pump for 36 days.

The impacts were quite severe on the majority of women. Per capita water consumption dropped from 18 liters/day when the system, worked to 8 liters/day when it did not function. One third of the respondents said they used only 4 liters/day per person, regarded as the bare minimum for life. The World Health Organization had set the minimum water required for good health to be 30 liters/day/person. The time spent daily in travelling, que and walking home average between 7 - 11 hours during the dry season.

For those who did not want or could not spend so much time there were two options, to buy from rainwater tank owners or to buy from vendors.

Towards solving these problems, the study clearly showed that villagers were willing and able to cover at least the fuel costs. The great majority also believed it was their responsibility to cover the operation and maintenance costs.

The results from the study carried out last year by the Team of Institute of Resource Assessment, University of Dar Es Salaam, will be later explained in this seminar by the Team.

### **3.2 QUESTIONS TO BE HANDLED**

#### **3.2.1 PRESUMPTION**

The topic of the seminar is quite large, a high number of aspects should be handled. In the seminar tentative program four working groups have been suggested. When preparing the seminar, one basic question was placed: Shall we try to create a system to collect water revenues at the Makonde Plateau to cover the water production expenses? It has been supposed, that the answer to this question is affirmative.

The questions here are to promote discussion in the working groups. It is hoped, that more

questions will be formed and solved during the discussion.

**3.2.2 EXPENDITURE**

This set of questions does touch money involved in water supply.

- Shall the water production costs be covered by water revenue in full or partly only, is the main question cost-sharing or cost-covering?
- Does the answer to this depend on the people's ability to pay?
- Tariff structure questions: price per bucket, flat rate, sales tax, a combination tariff?
- Can water revenue cover only fuel and electricity costs, perhaps chemicals and spareparts?
- Shall salaries, allowances and travel costs of technical staff be covered?
- Administration costs and revenue collection costs compared to administration costs at the moment?
- How the capital costs should be estimated. Amortization time? Rehabilitation costs?
- Which rate of interest should be used to calculate the capital cost for the whole investment?
- Extension of the system to new areas?
- How to cover the construction costs?

**3.2.3 ADMINISTRATIVE ARRANGEMENTS**

- Which one of the presented alternatives will be feasible and accepted?
- What is the procedure in decision making step-by-step?
- How much time will be needed for decision making?
- What are the formalities, when government property will be handed over to a private enterprise?

- What will happen to the existing organization?
- What will be the procedure and by whom in electing the executives to the new organization.
- Will the organization be free to decide the employment conditions eg. salaries and incentives?
- Will there be access to hard currency for spareparts purchasing?
- How the auditing of the new corporation should be arranged?

Legal aspects concerning the transfer of the property and the establishment of the new organisation.

- Will the organization be independent so that policies are not involved in its function.
- Would it be possible to make a step-by-step schedule for the reorganization?

#### **3.2.4 ALTERNATIVE**

Should the people be encouraged or discouraged to construct rainwater harvesting storage tanks? What about existing ones? Rainwater tanks could function as stand-by, if piped water supply fails. On the other hand, people having rainwater tanks may not be willing to buy water from taps as long as there is water in the tank.

#### **3.2.5 SERVICE LEVEL**

It may be accepted, that it will not be possible to run the Makonde Water Supply so effectively, that there would be water available in every DP 24 hours a day and 365 days a year. Some minimum and maximum service level targets should be placed.

What is the minimum service level, so that the people will rely on the water supply organization?

What is the maximum service level, which can be reached within two years?

### **3.3 THE EXPECTED RESULTS OF THE SEMINAR**

#### **3.3.1 RESOLUTIONS**

It is hoped, that the seminar would be able to produce such resolutions, which could help to start necessary

actions in the process needed. The first step might be Phase II of the Study on the Institutional and Financing Arrangement of Makonde Plateau Water Supply, as suggested in the Project Document for Phase VI. Guidelines for the whole process can be also worked out, details could be prepared during Phase II of the Study.

### 3.3.2 PHASE II OF THE STUDY

- The seminar may put a review of Phase I, prepared by the Team from the Institute of Resource Assessment, University of Dar Es Salaam.
- Terms of Reference for Phase II could be prepared.
- Recommendations for selecting the consultancy team for Phase II could be presented.

### 3.3.3 REARRANGEMENT OF THE MAKONDE ADMINISTRATION

- The functioning principles of the new organization can be worked out.
- New institutional set-up can be presented.
- Responsibilities of the organization can be listed.
- Proposal for cost recovery structure including tariff structure and collection system.
- The organizational structure and ownership of the organization.
- Financing arrangements of the organization separating recurrent costs and capital costs.
- The schedule of reorganization.

#### **4.0 PROBLEMS AND CONSTRAINTS AT PRESENT FACING THE MAKONDE WATER SUPPLY**

by M. Riti Resident Engineer/Makonde

#### **4.1 INTRODUCTION**

The Makonde Water Supply is in Newala District of Mtwara Region in the Southern of Tanzania. Newala District is situated between Latitudes 39 ° and 40 ° East and between Longitudes 10 ° and 11 ° South. With the exception of some villages in Ruvuma River valley (basin), the district is at an average altitude of 800m above mean sea level, forming the famous Makonde Plateau. The district has a population of about 310,000 people based on 1988 census. The average annual rain fall for the district is about 900 mm and its average temperature is 20 °C.

##### **4.1.1 SHORT HISTORY**

The present Makonde Plateau Water Supply Project started as Makonde Water Corporation which was established by the Makonde Water Corporation Ordinance 1954. The major construction work for the scheme was carried out in 1956 and the official opening of the Makonde Water Scheme was on 14th August 1957 by the then the Governor of Tanganyika Territory. During those times the corporation (Makonde Water Corporation) was producing water from only one source, that is from Mkunya Springs. The corporation was basically business oriented as it was producing water and selling the same to the consumers. It continued functioning on that basis till soon after Tanganyika Territory independence (December 1961) when it was taken over by Tanganyika Government. It was since then when the Government decided to supply water free of charge to consumers.

##### **4.1.2 PRESENT STATUS**

The present Makonde Plateau Water Supply hereinafter called the Project comprises of five working schemes, namely (with the year of commissioning in brackets) Mkunya/Makote (1957) - this scheme was rehabilitated in 1990, Mahuta (1972), Kitangari (1982), Mbwinji (1985) and Chiwambo (1985). The sixth scheme (Luchemo/Mkalenda - built in 1977 was swept away by April 1990 flood which hit the two southern regions, Mtwara and Lindi.

The Project's present pipeline length is about 800 kilometers, the pipes being of different diameters (ranging from 25 mm to 250 mm) and of different materials such as steel pipes, cast iron pipes, PVC pipes and polyethylene. The pipe network covers almost the entire Newala District and parts of Mtwara Rural District.

The total population at present served by the Project is

about 303,800 people and the total water production is 6200 cubic meters per day.

#### 4.1.3 ORGANIZATION SET-UP

(see appendix 1)

As seen in the aforesaid appendix, the present Makonde Plateau Water Supply is run directly by the Ministry of Water, Energy and Minerals. The relationship of the Project with the Regional and District authorities are shown in the said chart, as indicated it is clear that there is only an advisory relationship between the Project and the said authorities and not direct management relationship.

#### 4.2.0 PROBLEMS AND CONSTRAINTS AT PRESENT FACING THE MAKONDE WATER SUPPLY

##### 4.2.1 Generally affecting the whole Project

##### 4.2.1.1 FINANCE

The funds available to meet Operations, Maintenance and Administrative costs of the Project are inadequate. This results in intermittent operation of the Project to the extent that only 40% of the normal (intended) working hours are met. The major part of this downtime is due to the shortage of fuel to run the three diesel engines operated schemes.

These schemes with daily diesel consumptions are as follows:-

Kitangari/Mtongwele scheme - 1600 liters/day (16 hours/day)  
Mbwiji scheme (3 pumping stations) - 340 liters/day (8 hours/day)

Chiwambo scheme (3 pumping Stations) - 220 liters/day (8 hours/day)

With exception of Kitangari scheme which is still being supported by FINNIDA for the procurement of spare parts for the Finnish made plants (generating sets and pumps), Mbwiji and Chiwambo schemes suffer from the shortage of spare parts for the maintenance of pumping plants due to lack of funds for purchasing the required spare parts (for both breakdown maintenance and preventive maintenance)

For the two electrified schemes, namely Mkunya/Makote and Mahuta, the main problem is unavailability of enough funds to pay for the electricity bills as the funds issued are very much below the actual requirements. Taking an example of funds issued so far this financial year (July 1991 to March 1992) for the payment of electricity bills is TAS 8.2 m. as against TAS 26.8 m. which is the amount required to settle the electricity bills up to January 1992. That means there is a total outstanding bill to the tune of TAS 18.6 m.

#### 4.2.1.2 TRANSPORT

The Project is facing the problem of transport. The existing Project's fleet of vehicles is lacking proper maintenance and repair due to inadequate funds. This causes most of the vehicles to be off the road quite often and result operation and maintenance activities hindered. As said earlier the Project comprises 5 different schemes which are scattered all over Newala District and some parts of Mtwara Rural District. The distance from the Project's Head Office to the most remote scheme is 60 km and pipelines extend up to 90 km from the Head Office. Therefore reliable transport is necessary in order to reach different schemes and pipelines to carry out maintenance and repairs. Transport is also needed to ferry other Project's inputs such as chemicals, lubricants, spare parts and equipment from Mtwara and Dar Es Salaam to the Project site.

Apart from lack of funds for maintenance and repair of the Project's vehicles, the problem of transport is aggregated by the fact that most of the Project's vehicles are very old hence very expensive to keep them on the road.

The Project has a total of 17 vehicles - 10 lorries, 6 Landrovers and 1 tractor with a trailer. Out of these - 1 lorry, 3 landrovers and the tractor are on the road. The remaining vehicles are very old (over 10 years), in poor condition and very expensive to maintain. These vehicles were earlier used during the construction of Kitangari and were handed over to us after the construction or when it was found it was uneconomical to maintain them.

#### 4.2.1.3 COMMUNICATION

##### a) Within the Project

As it has been said this Project's schemes are far apart, for example Mbwinji scheme is about 60 kilometers from the Project's Head Office at Makondeko. In order to have proper monitoring of operations and maintenance activities of every scheme there is a need of having a radio call communication at each of the schemes. This will facilitate timely reporting of pumping plants breakdowns and rising mains leakages thus reducing downtime due to these problems. At present we have radio sets at 3 pumping stations, that is at Mkunya, Makondeko and Kitangari. Thus there is a need to install 3 more radio call sets at each of the other station ie. at Mahuta, Mbwinji and Chiwambo schemes.

##### b) Between the Project and Ministry Headquarters

The Present communication between the Project and the Ministry Headquarters in Dar Es Salaam is not very easy as in most cases, to get the telephone communication is very difficult - being the most fast way of communication as far as the Project location is concerned. The other only fast



communication is by telex, bearing in mind that the Project has no such a facility we have to go to Mtwara (about 140 km) to get such a service. Hence to facilitate timely support from the Ministry's Headquarters, radio call communication between the project and the Ministry Headquarters is very essential.

This is particularly important during emergency breakdown of the plants as the spare parts for KSB pumps and Lister diesel engines which are the plants mostly installed in this Project's schemes are available- in Dar Es Salaam, in particular at Kurasini Maji Central Stores, UAC, Jos Hansen & Soehne (T) Ltd. For this case there is a need to install a radio call set at MAJI - Ubungo for the Director of Operations, Maintenance and Water Laboratories Office to link the Project's Head Office with the Director's office. This will not only be for efficient running of this Project but also for the whole of Mtwara and Lindi Regions as there are radio calls at every district and regional headquarters for the said two regions with similar frequencies.

#### 4.2.2 PROBLEMS AND CONSTRAINTS PARTICULARLY AFFECTING CERTAIN SCHEMES

##### 4.2.2.1 Mkunya-Makote Scheme

This scheme was partially rehabilitated in 1989 - 90. It was originally built in 1957 and was serving the whole of Makonde Plateau, the source of water being Mkunya springs. The partial rehabilitation which was carried out during the said period included the following, face uplift of Mkunya and Makote pump houses, and installation of new pumping sets at both pump houses (motors coupled with pumps)

Actually this rehabilitation was carried out as a crush programme to alleviate the acute shortage of water for Newala township and the surrounding villages. Thus the rehabilitation did not consider the future and the present actual water demand. This means that the infrastructures (ie. intake, rising mains, tanks and distribution systems) which were being used before this rehabilitation are the same which are being utilized to date. This was necessitated by unavailability of enough funds to carry out the complete rehabilitation (redesigning) considering the present and future water demand.

Currently the existing installation meets about 100% (taking minimum water demand as 25 lcd) of the present intended demand. The water demand for the served area stands at 1850 m<sup>3</sup>/day while the actual production is 1880 m<sup>3</sup>/day when the pumps are working for not less than 20 hours per day. The present installation consists of 4 pumps at the source ie. Mkunya pumping station. Of these 3 pumps may be run at ago of which the production will be about 2820 m<sup>3</sup>/day working for 20 hours daily, the remaining pump will act as a standby. It is not possible to operate at this capacity as the existing rising main can not withstand the pressure as the pipes are more than 30 years old (this has been practically proved). At present we are running 2 pumps at a time while the remaining 2 acts as standby sets. In order to get sufficient water 2 pumps should be run at 24 hours daily.

It is not possible to run this scheme for 23 hours as the power supply from the TANESCO is sometimes available for 20 hours/day and sometimes for only 6 hours per day. There are many other factors that cause power interruptions, the main factor being power shedding during rainy season due to the problem of fuel transportation from BP Mtwara Depot to Masasi power plant. The other factors are the breakdown of the synchronizing unit at the TANESCO's power plant at Masasi, and also sometimes there is lack of fuel at Mtwara BP Depot.

#### 4.2.2.2 Constraints at the Kitangari Scheme

This scheme which has been in operation since 1982 is serving over 75% of the rural population in Newala District.

The scheme has 2 Wartisilla generating sets with a rated capacity of 600 KVA each and 1 Rolls Royce generating set rated at 125 KVA, both generating sets are run by mineral oil (diesel). The power generated at Kitangari power station cum pumping station is also used to run Mtongwele Boosting station pumps. Due to old age the power output has dropped considerably to about 360 KW instead of the rated power of 480 KW.

Due to this fact and also that generating sets are not synchronized, the power generated is not sufficient to run all the intended pumps at the same time. The present power demand to run the scheme in full operation is about 600 KW (at present installed pumps and not maximum utilization of the source).

Apart from all the aforesaid hindering forces including unavailability of enough funds to purchase the fuel required, the smooth running of the scheme is also affected to some extent by the non-availability of our own fuel tanker to ferry diesel from Mtwara BP Depot to Kitangari pumping station.

#### 4.2.2.3 Constraints at Luchemo and Mbwinji Schemes

Both these schemes were heavily damaged by April 1990 floods. Considering Luchemo/Mkalenda scheme, the intake weir and the pumphouses were washed away the result being that a very deep and wide valley was formed at a place where the pumphouse and the intake weir were constructed. This damage was so severe that it is actually impossible to reconstruct the same infrastructure at the same place, for this reason this scheme has altogether been abandoned.

The plan is now on the way to connect the population which was formerly being served by this scheme to Mbwinji scheme.

On the other hand the Mbwinji scheme's intake weir and suction mains were also damaged by the said floods, this also included a portion of the rising main. The rising main was effectively repaired, but the intake weir and the suction mains were only temporarily re-constructed. Even though presently the scheme is operating but the operation is intermittent as the temporary intake weir is not able to retain enough water for the intended period of pumping hours. It takes a very long time to re-fill the sump after it has been emptied during pumping which takes quite a short time. It takes only about 4 hours to empty the sump as the sump input is not equal to the output (capacity).

On top of all that have been said the road from the first boosting station to the source station is inaccessible (presently) to any type of vehicle, this makes the repair of the plants and transportation of the fuel to this place very difficult. The road linking this scheme's stations (there are 3 stations) was destroyed by 1990 floods, thus to reach the source station from the first boosting station the only means of transport is by foot encountering very difficult terrain (steep slopes, uneven paths etc), sometimes carrying working tools, spares and or diesel.

#### 4.2.2.4 Constraints on Chiwambo Scheme

Chiwambo scheme like Mbwinji scheme has been in operation since 1985. This scheme has frequent plants breakdowns due to ageing of the plants and unavailability of spares to maintain and repair the same. The plants at Chiwambo are similar to that of Mbwinji scheme (KSB Movi pumps coupled to Lister Diesel engines).

The other problem with Chiwambo scheme apart from frequent breakdowns source (two boreholes) is not sufficient to meet the demand. To solve this problem RDD - Mtwara is looking for funds to add one more borehole as this scheme is going to be rehabilitated in the near future (UNICEF has already purchased 2 boreholes pumps and one Lister generating set to run the pumps). There is also a plan to electrify this scheme by Ms TANESCO power. This to a great extent will eliminate fuel transportation problem as there is no proper

road to reach one of the scheme's station (ie first boosting station) the only means is by foot.

#### 4.2.2.5 Constraints at Mahuta Scheme

The main problem with this scheme is inadequate of pumping units and poor condition of the presently installed pump, presently there is only one operating plant - electric motor couple with KSB Movi 65/6 pump, the pump is actually very old thus there is quite frequent breakdowns. As there is no standby set once there is a breakdown the operation of the scheme comes to a stand still.

On top of the aforesaid problem, there is also a problem of getting spares for the pump, some spares are sometimes not available at Maji stores Kurasini Dar Es Salaam and or to private dealers. We have tried to communicate with Ms Jos Hansen & Soehne (T) Ltd regarding (complete overhaul) of our old pumps (KSB Movi pumps), one was successfully, repaired but two are still with them in Dar Es Salaam.

#### 4.3.0 MANPOWER

This Project is supposed to be self sufficient in all categories of manpower, namely, technical, clerical etc. This is due to the size of the Project, and its location being quite remote from the Regional and Ministry's Headquarters.

The project like other institutions in this southern part of Tanzania (Mtwara and Lindi Regions) suffers from under staffing of professional manpower eg. in our case there is a shortage in Accounts Section where an Accountant has no qualified sub/ordinate (Account Assistant) and also in stores we do not have qualified storekeepers.

#### 4.4.0 INSTITUTIONAL SET-UP

At present the Makonde Water Supply Project is run jointly by the central government through the Ministry of Water, Energy and Minerals and the local government through the District Executive Director - Newala.

The Ministry is responsible for water production and transmission to the terminal reservoirs. This involves the operation and maintenance of all pumping stations, pumping mains and terminal reservoirs. The distribution of the water from the terminal reservoirs to the consumers lies with the District Executive Director (DED). He is responsible for the operation and maintenance of the distribution system.

This set-up has the advantage of cost sharing between the two ministries but has the disadvantage of lack of total accountability over the whole water supply system. Also

there is confusion when it comes to cost recovery for example who should collect the revenues. At present the revenue for Newala town are being collected by the District Executive Director. The Ministry which is incurring the production cost is not collecting anything (revenue).

#### **4.5.0 FUTURE OPERATIONS, MAINTENANCE AT THE KITANGARI SCHEME**

As said earlier Kitangari-scheme started working in 1982 that means the scheme is 10 years old to date.

It is obvious that after such a long time most of the plants parts will need replacement. This is exactly what is now facing Kitangari generators and pumps. At present we are getting material support, (in terms of spares parts for Finnish made plants in particular Wartisila engines) from Finland through FINNIDA. Even though at the moment we are getting this kind of support, it is actually unknown for how long this will continue but certainly it is not for ever.

To get this scheme running after the cease of spares supply for the Finnish made pumps, there is a need of replacing these pumps with pumps that are commonly used in Tanzania such as KSB pumps.

This kind of replacement will simplify the process of spares acquisition in the sense that such a firm has its branch in Tanzania, and their products spares are also available within the country.

In the case of Wartisilla generating sets the problem of getting spares will not be of great impact as there is a plan of electrifying this scheme by power from the TANESCO. This means that the existing generating sets will be standby sets and not basic power source.

## 5.0 Water Tariffs Evolution in Tanzania

by A. R. Mutalemwa,  
Director General,  
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and A. Senguo,  
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Ministry of Water, Energy and Minerals.

### 5.1 INTRODUCTION:

The concept of self supporting and self financing water utilities or projects has of late gained a lot of popularity not only for urban water supplier but also for rural water supply in developing countries. In this respect the issue of appropriate water tariffs and efficient collection have become key and important issues in the running of water schemes. Donors have contiguously emphasized this outlook in all the project they have been involved in. The question of water tariffs is however a very sensitive one as water is tied to public health and social and political considerations have played a key role in decisions regarding the levels of tariffs especially in developing countries where people who receive the services are still very poor.

As such although tariffs could be said to have remained low especially in Tanzania, for both urban and rural areas, considerations on the level of tariffs and mode of collection have always differed between these two areas. However there have been changes lately and the language used is now that of full payment and contribution towards running of services in Urban and rural areas respectively.

This paper tries to explore the formulation of water Tariffs in Tanzania and to see how they have evolved over the years.

### 5.2 CONSIDERATION IN TARIFF FORMULATION - A THEORETICAL OUTLOOK

#### 5.2.1 PRICING POLICES

There are a number of factors that should be born in mind in developing an appropriate pricing policy for water supply. However in principle the primary guiding factor should be that of providing and allocating water in an economically efficient manners so that the net benefits that the community can derive from the use of water resources are maximized. This is what is known as allocative efficiency. This will not only mean that the water supply system would be used at its economic optimum rate but that in the long run the supply system would be constructed and maintained at its optimum scale.

In other words for example, a policy of maintaining artificially low water prices could encourage overuse of water and wastage thereby creating a need for construction of unnecessary water storage facilities or treatment plants and could influence excessive use of water. Apart from the foregoing key consideration, pricing policies should be responsive to the following factor.

#### 5.2.2 EQUITY AND FAIRNESS

This is a factor which introduces considerations of the need for water to be available to every one irrespective of ability. In this respect issues of "Social Equity" and "income redistribution" become key issues that determine the pricing policy. Therefore no consumer should be prevented by income considerations from enjoying the benefits of water. This is where issues of cross subsidization among consumers has to be considered if complete recovery of costs for offering the service has to be achieved. Apart from this the issue of subsidizing for costs of offering service to those who cannot afford needs to be addressed correctly.

#### 5.2.3 FINANCIAL REQUIREMENTS

This is also a key factor that needs to be considered. In this case a water authority may need to recover all the costs for offering the service or a bigger part of these costs. In principal the financial sums to be recovered revolve around elements which include:-

- (i ) Operation and maintenance costs
- (ii ) historic or current cost depreciation
- (iii) interest charges or outstanding debts
- (iv ) financial target and
- (v ) taxation.

Not all elements need to be included in working out the total financial cost to be recovered and sometimes slight variations to those listed above may take place.

#### 5.2.4 CONSUMER ACCEPTABILITY

This a very import factor as it determines also whether the set tariffs are collectable or not since mostly the willingness to pay is primarily dictated by the acceptability and ability. In this respect the charging system must be easily understood by the consumers and should command a broad acceptance among them. It should at least reflect "rough justice".

#### 5.2.5 PUBLIC HEALTH

Charging system should not be designed or operated as to put public health in any significant danger. therefore excessive tariffs should be avoided as they may force customers to be unduly economical to the detriment of their own and the public



health.

**5.2.6 ADMINISTRATIVE COSTS**

The tariff systems should not be over loaded with administrative costs unless there are clear gains to efficiency, equity, revenue generation or public health. It should be borne in mind that mostly there costs do not contribute directly in the production of water are thus overheads which need to be kept low.

**5.2.7 ENVIRONMENTAL CONSIDERATION**

The pricing systems should also where possible reflect ecological recreational and environmental uses of water. Mostly more visible commercial and urban uses of water had traditionally taken precedence over these environmental and aesthetic uses.

**5.2.8 OTHER GOVERNMENT POLICIES**

As with the development of all policies it is necessary to pay due regard to other government policies (economic, agriculture labour and energy) to minimize the occurrence of conflicting policies.

**5.3.0 FORMS OF TARIFFS**

**5.3.1 Flat Rates**

In this case water charges are mostly not directly related to quantities of water used. These fees may relate to number of residents, number and type of rooms, number of taps, size of inflow pipe, ground area or property value. However in other instances these relate to average costs for supply of water to a particular category of consumers.

Flat rate systems are not in line with allocative efficiency and may required regular review to ensure that they match with time. Many of the factors used in the determination of flat rates change with time while the rate once determined may remain static for a considerable period of time.

However merits of flat rates include simplicity in administration, ease of understanding by consumer and little need of policing and cheapness in the collection of revenue.

**5.3.2 DECLINING BLOCK TARIFFS**

This tariff system consist of fixed/minimum charge per billing period (usually high) determined on a certain basis and relating to a certain amount of water consumed after which succeeding blocks of units of water are sold at lower and lower prices. The advantage of this system is that high cost of running the system can be recovered even when the water consumed is low.

and contributions towards a sinking fund. No provision was made for expansion of services. In this respect the average cost per unit of water produced is worked out and formed a basis for the rate to be charged for metered supplies for every 1000 gallons with a minimum charge per month of shs.5. Flat rates were charged on the basis of area of property and consumers using more than 100,000 gallons or more per month were charged special industrial rates on the basis of decreasing block charges (see table 882). Water from fountains and public kiosks were charge 1 cent to 2 cents for a four gallon container.

The above procedure was followed in the 1960's, particularly during the determination of water tariffs in 1962. Although there is no indicative data to substantiate the basis for subsequent tariff reviews in 1972 and 1980 it is assumed that the same basis as the earlier one was employed. The only main difference being that in both reviews there were no distinction anymore between payments for the different consumers (domestic and industrial). In 1972 for example metered consumption was fixed at shs.10 for 1000 gallons for both domestic and industrial consumers. Likewise the rate was raised to shs.13.50 for 1000 gallons in 1980 both domestic and industrial consumers. In both cases no charges were levied for agricultural consumption.

Water tariffs were again revised in 1988, and this time the tariffs were, geared towards meeting the costs for operation and maintenance. This time differential tariffs were set for different consumers namely domestic, Institutional, commercial and Industrial consumers, and the rates were fixed on the basis of charges for every 1000 gallons of water consumed. Again like before the charges were determined on the basis of the average costs for water production. At the time these new tariffs were introduced (1988), they for the first time, allowed charging for water used in irrigation. However no charges were introduced for use of water from kiosks.

Although up to now, no new tariffs have been introduced, with the approval of the water policy and especially after the write ups of the policy were first prepared, the approach as mentioned previously, changed. The concept of free water even in the rural areas was disbanded in favor of contributions from water users towards running of water services.

In the presentations of proposals for new tariffs since 1989, proposals were made to start charging for water from kiosks at a rate of 1 shilling for a four gallons container. This charge was also expected to cover the rural areas where according to the water policy collections would be banked by the village water committees in order to fund for minor operation and maintenance for water schemes.

Although the procedure for developing the tariffs is still on the average costs basis, the total costs involved are now worked out in different scenarios including repayment of debts, provision for minor works, new developments and expansion of services to cater for new areas. As such different tariff

proposals are put forward to cover the different scenarios.

#### 5.5.0 PAST EXPERIENCES AND THE WAY FORWARD

It is now clear from the past presentations that considerations for "Social equity" have dictated the formulation of tariffs in Tanzania. In this respect social and political considerations have outweighed economic and financial considerations in the setting of water tariffs. As such the time between tariff review has always been very long necessitating the tariff being charged for most of the time to be uneconomic. Sometimes the reasons advanced for maintaining low tariffs are self defeating. The arguments put forward that by raising tariffs one is hurting the poor, for example, is not completely true. In urban areas for example, the poor cannot afford a water connection, as such they buy water from the neighbour who can afford. Ironically the neighbour charges a rate which bears no relationship to the cost of water but rather to his own financial needs. As such the poor person continues to pay dearly for water. If the neighbour paid an appropriate tariff, the responsible Authority could raise adequate funds to build a water kiosk in the neighborhood to enable the poor consumer to have access to cheaper water supplies.

In the rural areas people have enjoyed free water for a long time, such that to change and feel obliged to contribute towards water services may take a lot of effort in terms of educating them and getting them fully involved especially in areas where access to spring water or well water has traditionally not been a problem. However experiences have shown that in areas where water has always been difficult to come across, people are ready to pay good sums of money to get it.

#### 5.5.1 PROPOSALS AND RECOMMENDATIONS

At this juncture, bearing in mind what has been taking place in Tanzania, it would be meaningless to propose what type of tariff form should be adopted. It is even more difficult to start advocating for marginal cost pricing for water in Tanzania while we cannot even review our tariffs regularly. However it is important to emphasize that the time has now come for every consumer, especially in urban areas to contribute as pay for water services. The "User pays" principle needs to be applied now if we have to expand and/or run our water services efficiently. The Government should allow for annual reviews of water tariffs so that they are in line with the prevailing economic conditions so that authorities running water supplies can run then profitably. Short of this the Government should be prepared to provide "adequate" subsidies to run the services.

In the rural areas, the situation is different. As mentioned previously the unit costs for supplying water are very high and as such it would be unfair to charge the economic costs for running water supplies. In this case contribution using the

principles advocated in the water policy should be implemented. However not all people in the rural areas cannot afford to pay. People who can afford an individual water connection should be made to pay meaningfully towards running the services.

With the above in mind, it is clear that there will continue to be considerable shortfall in terms of financial requirements for running the water services in the rural areas. As such the government will for quite sometime, continue to subsidize the services in this regard. BUT there is a need for a clear determination of this subsidy. There is a need to adequately know what are the actual financial needs, what can be collected from the consumers and what is actually the shortfall, that would come in the form of Government subsidy.

**TABLE 1: 1962 WATER TARIFFS (Selected Towns)**

Town	Rate/1000 gallons
Dar es Salaam	6/=
Utete	2/=
Mzumbe Schools	6/=
Tanga	2/=
Iringa	3/=
Iringa Aerodrome	2/50
Mbulu	3/50.

Industrial charges (consumers above 100,000 gallons/months)

Standard Rates	Gallons per Menses	
	100,000/500,000	Over 500,000
2/=	2/=	2/=
2/50	2/50	2/25
3/=	3/=	2/50
3/50	3/25	2/75
4/=	3/50	3/=
4/50	4/=	3/25
5/=	4/25	3/50
5/50	4/75	3/75
6/=	5/=	4/=

Flat Rates for Unmetered Supplies

Water Supply	Areas of premises Sq. Ft	Rate per Shs.
All	Over 2,100	20/=
All	1401 to 2,100	15/=
All	351 to 1,400	10/=
All	under 350	6/50

Rate for supply from Public Fountains two cents per four gallons.

TABLE 2: WATER TARIFF DETERMINATION (1962)  
(Selected Towns)

	Consumption	Capital value & 30/6/61	Interest & Sinking fund	Operating Costs & 61/62	Operating Costs + overheads	Total Costs	Costs / 100 gallons
Dar es Salaam	1058.14	2,733,545	189,545	95,000	114,000	33,545	5/74
Utete	7.64	166	166	300	360	556	1/38
Mzumbe School	3.56	816	816	350	420	1,256	6/94
Tanga	307.510	15,531	15,531	10,975	13,170	28,701	1/87
Iringa	88.87	6,151	6,151	4,975	5,970	12,121	1/73
Iringa Aerod.	0.28	109	109	190	228	337	1/41
Mbulu	8.28	934	934	325	390	1,324	3/20

Note: Interest is 6% of Capital value  
Sinking Fund is 4% accumulation over 40 years (equaling 0.934%)  
Overheads 20% of the Operating Costs.

TABLE 3: WATER TARIFFS (1980)

1. Rate for Metered supply in any Part of Tanganyika Shs.13.50/1000 gallons.
2. Flat rates - unmetered supplies:-
  - (a) area of premises does not exceed 32.515 sq. m shs.15/=
  - (b) over 32.515 and up to 130.06 m<sup>2</sup> " 25/=
  - (c) over 130.06 up to 195.09 sq. m " 35/=
  - (d) over 195.09 m<sup>2</sup> " 50/=.

**TABLE 4: WATER TARIFFS (1988)**

Domestic Shs. 57.22 per 1000 gallons or minimum charge  
Shs.200 per month.

Institutional - Shs.90.00/1000 gallons

Commercial - Shs.192.00/1000 gallons

Industrial - (including irrigation over 1/4 acre) Shs.248.00/  
1000 gallons. o- 3

6.0 STUDY ON THE INSTITUTIONAL AND FINANCING AGREEMENT OF  
MAKONDE PLATEAU WATER SUPPLY: A REPORT PREPARED FOR  
FINN WATER MTWARA (A SUMMARY OF THE REPORT)

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ABBREVIATIONS

CP	-	Community Participation
DP's	-	Domestic points
DWE	-	District Water Engineer
MPWS	-	Makonde Plateau Water Supply
RE	-	Resident Engineer
RWE	-	Regional Water Engineer
VWC	-	Village Water Committee



## 6.1 INTRODUCTION

### 6.1.1 BACKGROUND

In July, 1991, Finnwater Office in Mtwara requested the Institute of Resource Assessment of the University of Dar es Salaam to undertake a study on the Institutional and Financing agreement of the Makonde Water Supply. The study is categorized as phase one of the Makonde Water Supply institutional arrangement, management and financing aspects. This phase is a broad overview of administrative and financial issues with a view to present proposals for arranging its future management and financing.

The Makonde Water Supply is one of the four major national water supply schemes in the country. This scheme is located in Newala District in Mtwara region. The other schemes include the Wanging'ombe water scheme in Iringa, the Handeni Trunk Main in Tanga Region, and the National Capital City Water supply in Dodoma.

Initially, the Makonde Plateau Water Scheme comprised of six water schemes namely Mkunya - Makote, Mahuta, Kitangari, Mbwinji, Chiwambo and Luchemo water schemes. Only five schemes are still operative. One scheme (Luchemo) has been abandoned due to flood damage. The remaining five schemes are supposed to serve a population of about 292,000 residents of the Makonde Plateau. However, the schemes actually serve about 277,790 people, about 95 percent of the population of the Makonde Plateau, about 89 percent of all the people in Newala District. Newala District has a population of about 307,998 people (based on 1988 population census).

### 6.1.2 OBJECTIVES OF THE STUDY

The objectives of the study as stipulated in the terms of reference were as follows:-

- 6.1.2.1 To assess the organization, administration and managerial system of the Makonde Plateau Water Supply.
- 6.1.2.2 To review the present operational and maintenance costs of the Makonde Plateau Water Supply
- 6.1.2.3 To estimate the future financing requirements
- 6.1.2.4 To define the approximate level of the cost of water in terms of operation, maintenance and capital costs and to present different scenarios for the cost recovery including the requirements for the outside financing in each option.
- 6.1.2.5 To study the different possibilities in organizing the Makonde Plateau Water Supply taking into consideration the prevailing situation and the present legislation and regulations. One specific alternative should be co-operatives.
- 6.1.2.6 To formulate and compare different alternatives to manage and finance the makonde plateau water supply

and to propose the alternative to be adopted.

#### 6.1.3 STUDY METHODOLOGY

Field work for this study was completed during the first two weeks of August 1991. Data for this study was collected using the following methodology:

##### 6.1.3.1 Review of Documents

The study team reviewed organizational charts, project documents and various reports provided by Finnwater, the Resident and the District Water Engineers of the Makonde Plateau water Supply.

##### 6.1.3.2 Dialogue

A dialogue was held between the study team and government officials at National level (Ministry of Water), Regional level (Mtwara) and at district level - those working with the Resident and District Water Engineers in Newala district. Other officials involved in the dialogue, were the party and District Council Officials, the division, ward and village government leaders, a few selected households pump/scheme attendants as well as the former employees of the old Makonde Water Supply Corporation.

##### 6.1.3.3 Observations

During fieldwork survey to the water schemes and to the villages, on-site observations were made. This included observation of the working conditions of the workers, scheme facilities such as chemical treatment plants, pumping house and booster stations, the distribution system of pipes, the village water tanks and domestic points (DP's). Furthermore, environmental sanitation around DPs body hygiene and water handling habits at Dps and at home were also noted.

Aspects related to space and working facilities, management of information, transport and distribution of responsibilities between the RE and the DWE offices were also reviewed.

##### 6.1.4 SAMPLING

Both Party and Government extension workers were consulted by virtue of their position with the Makonde Plateau Water Supply which had direct or indirect bearing on the existence of the water supply system.

Due to the limited field time which was allocated for the study (two weeks) it was not possible to visit all the Makonde Plateau Water Supply Schemes, villages and the institutions served by the schemes. Therefore, the number of schemes visited, particularly, the number of villagers

consulted was limited. Qualitatively, the sample size was representative due to the characteristic features used in selecting water schemes, villages to visit, and householders to dialogue with. These characteristics were scheme source of power and technology. Other characteristics were village performance i.e. villages with good and poor performance in the MPWs were selected. Good and poor performance of a village was measured in relation to the villages response on community participation, operation and maintenance guidelines given by the RE and the DWE in particular. Also, villages were picked depending on whether they had or had no water supply. Eight villages, seven with a functioning water supply system and one without were selected and visited. This was done to gauge people's perceptions on responsibility in community based maintenance oriented water supply. Furthermore, households close and far from DPs were selected to find out to what extent the households were benefiting from water as well as to determine awareness of their responsibilities (Community Participation) in operation and maintenance of the water schemes.

#### 6.6.2 INSTITUTIONAL ARRANGEMENTS FOR THE MAKONDE PLATEAU WATER SUPPLY

Through the initiative of the Newala District Council, the British Colonial administration commissioned the Makonde Water Supply System in 1957. The aim was to provide clean water to the indigenous people living on the plateau (300-800 ft above sea level). The Makonde water supply operated like a private utility company selling water, per bucket through water kiosks. Water was sold at 5 cents per bucket (20 litres). The charge/fee had risen to 10 cents, 15, and finally 20 cents before the corporation was nationalized.

In 1961, the government nationalized the Makonde Water Corporation and entrusted to the Regional Water Engineer's office (RWE). From then water was provided for free. After decentralization in 1972, the District Water Engineer (DWE) under district council, took care of water distribution.

In 1986, the water ministry realized that big water schemes in the regions and districts were difficult to run due to high operational costs which the RWE and the DWE could not afford. Thus in July 1986 the Central Government took over the four major water schemes which became national schemes with the Makonde Plateau Water Supply being one of them. This exercise was followed by a transfer of responsibility such as the handling over of staff, office building and shift of equipment from the DWE to the Resident Engineer (RE), a ministerial representative sent to manage water production on behalf of the ministry. However, the DWE continued to handle water distribution and maintenance of the distribution system. The two offices although housed in one structure, are autonomous, with each executing

specific functions. Dualism exists because some of these functions overlap.

#### Limitations of this Arrangement

The limitations of this arrangement can be categorized as administrative, financial and technical.

(i) Since the DWE is understaffed and has limited funds the RE is forced to repair burst distribution lines, tasks which fall under the jurisdiction of DWE. However, despite the RE is good will to assist through curative maintenance, he faces difficulties in getting authorization of funds to purchase small diameter pipes needed for such work from MAJI in Dar es Salaam. Under such circumstances, the distribution of responsibilities on maintenance between the central and local government becomes fuzzy. This frustrates efforts to provide quality water services.

Furthermore, the above problem is compounded by the fact that reporting on leakages to the DWE is normally effected through the REs keymen, who lack transport facilities. Moreover, these keymen report on water leakages only when they have other agendas to deal with at the RE's office in town at Makote. The fact that the keymen are paid by the RE but reports to the DWE creates supervision problems which undermine efficiency and effectiveness.

#### (ii) Financial

The RE is faced with budget limitations since funds provided by MAJI Dar es Salaam are meagre and cannot suffice for purchase of diesel, oil, spare parts, pay for transport costs and electricity bills. The Ministry itself acknowledges that allocations to MPW/s in 1990/91 undermined water services by 40%. Therefore, although the MPW/s is supposed to service 292,000 residents (i.e 280,000 villagers plus 12,000 Newala Town residents actually only 277,790 people are served).

Moreover, although RE requested for at least Tshs. 60 million for electricity the ministry approved only Tshs 24.4 million or about 40.6% of requirement. This means that pumping stations would have to work for less hours. Furthermore, the 1991 approved budget for the RE's office i.e., Tshs. 79.1 million is only about 49.6% of estimated total water production costs of about T.shs. 159.6 million per year. To sustain the Makonde Plateau Water Supply and provide acceptable service levels, an alternative source of funds has to be explored.

It has also been observed that, although the RE produces water at mega costs, the revenue from water is negligible. Moreover, this revenue is collected by DWE. This is an anomaly, where the producer is not same as the distributor.

This anomaly should be removed if efficiency is to be attained.

(iii) Technical

Spares for the Finnish machines have to be procured in Finland by Finnwater Mtwara. This sometimes takes up to six months, a factor which also affects efficiency, particularly in the Kitangari Water Scheme. Moreover, neither the Ministry, the RWE, the RE nor the DWE actually knows precisely the exact cost of these spares. The RE technical staff needs additional technicians with full technician certificate (FTC). This is critical to ensure efficient management of water production activities.

It was further observed during field visits that there was poor working condition among workers. For example, workers were seen lacking proper uniform and protective gear at pumping stations. Those at chemical treatment plants also lacked rubber boots and gloves which are necessary when handling corrosive chemicals. Pump house machine operators lacked insulated helmet for noise reduction. Transport and telephone services in case of emergence were also lacking.

(iv) Other observations

During the visits, the team observed a lot of water leakages on the village distribution pipe system, problems which the DWE's office was not informed. This would have not been the case if the MPW/s was under one management. Furthermore, information/data which was available in the RE's office was not properly stored. The same could be said of the DWE's office as result, there was disagreement between RE and DWE office related to data on village and population served by the MPW/s. Some villages were double counted. This indicates the need to strengthen data collection, analysis, its use and storage. In short, there is need to improve the management of information system for MPW's preferably, under a single management team, rather than through the two rival offices.

### 6.3 COMMUNITY PARTICIPATION AND THE ROLE OF VILLAGERS.

Community Participation (CP) is required to ensure sustainability of water services through involvement of users before starting any rehabilitation or new construction. The users should also be involved in cost-sharing. The immediate objectives of the CP in phase six are aimed at: First to improve sustainability and reliability of water schemes through involvement of users in each stages of the scheme development. Second, to promote

the use of safe water and hygienic habits in making improvements in the health of the people.

Community Participation at village level was assessed on villagers participation in:

- (i) Construction/rehabilitation of water scheme i.e. to participate in all stages
- (ii) Cost-sharing i.e., Contribution of water fund which covers repairs of DP/hand pump and other maintenance as agreed upon from time to time
- (iii) Daily up-keep of DP/hand pump wells and fencing of DP sites.
- (iv) Remunerating pump/scheme attendants
- (v) Repair of DP/hand pump i.e. physical work
- (vi) Formation of a village water committees (VWC) of 3 men and 3 women.
- (vii) Formation of a water fund and banking of the money
- (viii) Participation in water related interventions such as health education and training meeting.

### Observations on CP

It was observed that CP has not disseminated information wide enough at household level. Villagers who lived far from the village office particularly women were less informed on the beneficiaries role and the existence of scheme attendants, water funds and the VWC in their respective villages. The integrated approach of training and utilizing local government staff who are not part of MAJI staff, (CCM, UWT, ward and village leaders) has not worked effectively in mobilizing villagers for their responsibilities.

It was also observed that, in two out of eight villages, the village water committee members were not democratically elected by their fellow villagers. Instead, they were either hand picked by the village government i.e by the chairman and secretary. This has resulted in selecting uncommitted relatives and or friends. Moreover, some committees have not met since they were formed. Women were involved at latter stages when the VWC had received training for the project, rendering women committee members disadvantaged. The VWC files could not be verified, an indicator of their non-existence. Furthermore, poor sanitary conditions at and around DPs/hand pump wells and lack of water funds indicates that the VWC have not yet fully internalized their role.

In most villages visited, water funds collection were only meager. In addition, the money was not even properly banked as required. Rather, the water funds were kept at home by the VWC treasurer. Collection of water funds was in most cases performed by one or two members of the VWC without involving the ten cell leaders. Hence, the difficulties in getting money from individual households.

It was further observed that the level of responsibility for maintenance is still low among the village governments and individual villagers. Thus, their sense of ownership and commitment in safeguarding the water scheme needs to be built up and checked from time to time through monitoring of the functioning of a village water system. It was further observed in most of the villages visited that there were numerous cases of vandalism. Plastic pipes were cut to make rubber rings for ornaments. Pipes were often damaged to increase easy accessibility to water particularly by villagers living far from the DPs.

Finally, it was further observed that many villagers with shallow wells (Mpalu, Mitema) and where a new water scheme was being developed (Milumba) had pump attendants. Except in Mpalu village, pump attendants in the villages with hand pump wells were selected by their village governments. These attendants have undergone some training on pump repair, mobilization and health education. The pump attendants admitted to have very limited influence on the

proper use and care of the handpump site.

#### 6.4 POPULATION AND WATER DEMAND

According to the 1988 census the population of Mtwara Region was 889,494 inhabitants with 307,998 people in Newala district. This was an increase of 117,676 since the last census in 1978. The population growth rate in Newala district is negligible. According to the 1978 census, Newala Population increased by 648 people only, from 307,365 people in 1978 to about 308,033 people in 1991. However, population in the study area, that is in the Makonde Plateau increased from 291,394 people in 1988 to about 291,400 people in 1991. This represented an average population growth rate of about 0.019 percent. Water policy makers have to take this factor into consideration in preparing their plans.

The policy of the government of Tanzania regarding water supply to rural areas without house connection is 25 litres (0.025 m<sup>3</sup>) per capita per day. Given this requirement and a population of 308,033, the domestic water demand for Newala district is about 7700.0 m<sup>3</sup> per day. The Makonde Plateau Water Scheme is supposed to serve about 291,400 people with a water demand of about 7,285.0 m<sup>3</sup> per day.

As already mentioned the Makonde Plateau Water Supply actually serves a population of about 277,790 people with a water demand of about 6,944.8 m<sup>3</sup> per day. For details see table 1. Moreover, a population of about 4,600 people with a water demand of 115.0 m<sup>3</sup> per day is not served following the abandonment of the Luchemo-Mkalenda water scheme due to flood damage. Furthermore, a population of about 9,010 people living in 20 villages with a water demand of about 225.2 m<sup>3</sup> is served by hand pump shallow wells.



Table 1: Estimates for Domestic Water Demand 1991

	SCHEME	POPULATION	WATER DEMAND M <sup>3</sup> /DAY
1.	Mkunya-Makote	80,360	2,009.0
2.	Mahuta	21,060	526.5
3.	Kitangari	157,000	3,925.0
4.	Chiwambo	9,350	233.8
5.	Mbwinji	10,020	250.5
	Population served by 1-5	277,790	6,944.8
6.	Luchemo-Mkalenda (abandoned due to flood damage)	4,600	115.0
7.	Shallow Wells (20 villages)	9,010	225.2
	Makonde Plateau - Population Served	291,400	7,285.0

Source: Compiled from RE's office, Makote, Newala August, 1991.

The Makonde Plateau has a substantial population of cattle, goats, sheep and poultry. This livestock population, or about 63,866 units has an estimated water demand of about 1,596.6 m<sup>3</sup> per day as per table 2. Normally, total water demand is calculated as the sum of the domestic, institutional and livestock water demands. In addition to this, water losses of about 20% of the total water produced are included. In this report, institutional water demand for the Makonde Plateau has not been established due to insufficient information. From table 3, the 1991 water demand for the Makonde plateau is estimated at 10,657.9 m<sup>3</sup>/day.

Table 2: Estimates for Livestock Water Demand 1991.

	LIVESTOCK POPULATION	LIVESTOCK UNITS	WATER DEMAND M <sup>3</sup> /DAY
1. Cattle	3,722	3,722	93.0
2. Goats	83,639	16,728	418.2
3. Sheep	6,645	1,329	33.2
4. Poultry	1,262,625	42,087	1,052.2
TOTAL		63,866	1,596.6

Source: Newala District Livestock Office, 9th August, 1991.

Table 3: Total Makonde Plateau Water Demand

	WATER DEMAND M <sup>3</sup> /DAY 1991
1. Domestic	7,282.0
2. Institutional	-
3. Livestock	1,596.6
Sub-Total	8,881.6
Losses 20%	1,776.3
TOTAL WATER DEMAND	10,657.9 M <sup>3</sup> /DAY

Source: Derived from Field Observation, Newala, August, 1991

Observations:

The Makonde plateau water supply is supposed to serve about 292,000 people with a total water demand of 7,275 m<sup>3</sup>/day.

In reality however the MPW/s produces and distributes only 5,779.3 m<sup>3</sup>/day. This means that the MPW/s meets only about 79.3% of the domestic water demand and 54.2% of all total water demand in the Makonde plateau. Thus, although about 94% of the population live within a public water supply service, only slightly over half of this population is actually served by the MPW/s. Indeed only a small proportion of the villages visited receive a regular supply up to the standards prescribed by the National Water Policy.

The National water policy stipulates that water must be made available within 400 meters of population served and that each person needs to be served 25 litres per capita per day. The MPW/s is only able to provide 20 litres per capita per day to some of the people and not to every villager.

Apart from constraints due to flood damage of some of the water schemes inadequate the main constraint to effectively serving the Makonde plateau due to capacity under utilization of water schemes. Kitangani W/S for example has a safe yield capacity of about 12,000 m<sup>3</sup>/day. However, given the approved budget, the scheme produces only 7200m<sup>3</sup> per day, due to inadequate diesel supply.

#### 6.5.0 OBSERVATIONS ON FINANCING OF MPWS

Financial constraints of the Makonde Plateau Water Supply can be appreciated when the cost of producing and distributing water are compared to the budget allocation to the Resident Engineer and the District Water Engineer. The cost of water has been computed taking into account the operation costs, rehabilitation costs, maintenance and administrative costs (interest & depreciation) are excluded because of the teams inability to secure the cost of spare parts. Therefore, the study focussed on total water production costs rather than full cost recovery.

Water production costs incurred by the RE for the five schemes were Tshs. 13,258,607.00 per month. This money was spent by the RE in efforts to produce an average of 173,280 m<sup>3</sup> of water per month, serving about 277,790 people in the Makonde plateau. The unit cost of water was Tshs. 76.60/m<sup>3</sup> per month or about Tshs. 1.60 per bucket (20 litres). On the other hand, the per capita cost of the Makonde plateau water supply added up to Tshs. 47.70. For a good summary of RE water production costs see Table 4.

Table 4: Total Water Costs Per Month (RE)

	population served	Average production m <sup>3</sup> per month	Operation costs (excludes administrative costs)	Rehabilitation (capital) costs Tshs	Maintenance costs Tshs	Administrative costs (spread) Tshs	Total water production costs Tshs
1. MKUNYA-MAKOTE	80,360	49,200	1,934,490.00	1,311,687.50	-	189,105.75	3,435,283.25
2. MAHUTA	21,060	12,000	338,560.00	20,000.00	-	189,105.75	547,665.75
3. KITANGIRI	157,000	96,000	4,276,162.00	2,511,767.50	427,616.25	189,105.75	7,404,651.50
4. CHIWAMBO	9,350	6,480	576,195.00	-	57,619.50	189,105.75	822,920.25
5. MWINJI	10,020	9,600	780,089.00	-	78,089.15	189,105.75	1,048,086.40
TOTAL	277,790	173,280	7,906,298.50	3,843,455.00	563,324.90	945,528.75	13,258,607.00
Water Cost per m <sup>3</sup>	-	-	45.60	22.20	3.30	5.50	76.60
Price per bucket (20 ltrs)	-	-	0.90	0.45	0.10	0.15	1.60
Per capita water cost Tshs	-	-	28.50	13.80	2.00	3.40	47.70

The cost of providing water to the residents of the Makonde plateau are incomplete without taking into consideration DWE's operational costs. The study team was unable to gather adequate information regarding the District Water Engineers' maintenance costs per scheme. It was therefore decided to estimate the DWE; pipe network maintenance costs using DWE's 1990/91 budget estimates. The assumption is that DWE received all funds requested and utilized them to maintain the distribution pipe network.

Estimates, for maintenance of the distribution pipe network i.e. pipes and other accessories clearing bush on pipeline, construction and or maintaining village distribution points indicates that the task would cost a total of Tshs. 982,993.00 per month. For details see table 5. The per unit distribution pipe network maintenance costs is Tsh. 5.80/m<sup>3</sup> or about Tshs. .10 per bucket (20 litres). Meanwhile, the per capita distribution pipe network maintenance cost is Tshs. 3.55 per capital per month.

The district water engineer finances the pipe network maintenance from funds disbursed by the Newala District Council. The DWE also receives funds from the central Government in the form of grants for salaries/capital expenditure. In addition, DWE also collects funds from water bills and water connection fees. In 1990/91 about Tshs. 393,907.00 (about 3.0% of total DWE's revenue) was collected from water bills and connection fees.

It may also be added that the DWE also employs technicians, and operates a garage and maintenance workshops, and storage facilities, similar to those of the RE. This obvious duplication of staff and facilities undermines the cost effectiveness of producing and distributing water at the Makonde plateau.

Table 5: Distribution Pipe Network: Maintenance Costs (DWE)

Since actual District Water Engineers' maintenance costs were not available the Team decided to use DWEs' 1990/91 Budget Estimates as per Estimates File DWE/NEWALA M.ws/E.40/2.

		TSHS/YRS	TSHS/MONTH	PER UNIT COST	PER CAPITA M3/MONTH	TSHS/MONTH
<u>1. Administrative Costs</u>						
1.1	Transport & Transportation	1,212,800				
1.2	Vacation	180,000				
1.3	Vehicles	2,025,000				
1.4	Office General	134,600				
1.5	26 Workers	1,484,460	6,571,320.00	547,610.00	3.20	2.0
1.6	Others	50,000				
<u>2. Maintenance of Village Schemes costs</u>						
2.1	Pipes & other Accessories	2,044,000				
2.2	Labourers (Clearing bush on pipe line)	1,000,000				
2.3	Fuel for vehicles	1,377,600	4,421,600.00	368,466.67	2.20	1.30
<u>3. Capital Costs/Rehabilitation Costs</u>						
3.1	Construction of 10 DPS Shs.	803,000	803,000.00	66,916.67	0.40	0.25
TOTAL DISTRIBUTION PIPE NETWORK MAINTENANCE COSTS			11,795,920.00	982,993.35	5.80 M3	3.55
Pipe Network	Shs. 5.80/m <sup>3</sup>					
Maintenance costs	Shs. 0.10 price per Bucket (20 litres)					
Per Bucket						
Per Capita			Shs. 3.55 per capita per			
month						

6.6.0 PRICE OF WATER AT THE MAKONDE PLATEAU

To obtain the cost of producing and distributing water to the villagers, the DWE's distribution pipe network maintenance costs have to be added to the RE's, total water production costs. According to table 6, the costs per capita for operation, rehabilitation and maintenance including administrative costs amount to T.shs. 47.70 (RE) and T.shs. 3.55 (DWE), a total of Tshs. 51.25 per capita per month.

Since the MPW/s produce and distributes 173,280m<sup>3</sup> of water per month serving about 277,790 people at a cost of T.shs 14,241,600.00 a month the unit cost price of water is T.shs 82.40/m<sup>3</sup> per month or about sh. 1.65 per bucket.

Table 6: Costs per capita for Makonde Plateau W/S

	Total Water Production costs	Operation costs Tshs/ per capita/ month	Rehab. tation costs Tshs/ per capita/ month	Mainte. nance costs Tshs/ per capita/ month	Administra tive costs Tshs/per capita/ month
RE	47.70	28.50	13.80	2.0	3.40
DWE	3.55	-	0.25	1.30	2.00
TOTAL	51.25	28.50	14.05	3.30	5.40

Source: Study Calculations

The above prices ie., a per capita price of shs. 82.40/m<sup>3</sup> per month should recover at least shs. 14.2 million against RE and DWE's cost of T.shs. 14.2 million. No surplus remain for contingencies. Meanwhile, the price of shs. 1.65 per bucket should recover T.shs. 17.1 million, leaving MPWSS a surplus of about T.shs. 2.9 million for contingencies.

### 6.7.0 ABILITY OF WATER USERS TO COST SHARING

The economy of the Makonde plateau is based on small scale agriculture. The principal cash crop is cashew nuts, while cassava serves both as a cash crop and a primary food crop. Statistics from the Newala district co-operative office, indicates that the district sold 12,173.0 million tons of cassava worth Tshs. 97,384,160.00 in the 1990/91 crop season. The union also bought about 8,061.1 million tones of mixed crops worth about Tshs. 886,806,140.00. Given a population of about 308,033 people (90/91), this indicates an annual average per capita income of about T.shs. 2,879/-. This means an average household per capita income of Tsh. 14,396/- in a family of 5. The actual per capita income may be higher, given that, most people also keep a sizable population of goats and poultry. Moreover, the value of crops purchased by private business people was not included in our estimates.

The teams' dialogue with villagers indicated a wide disparity of income. These disparities range from T.shs. 5,000 and 100,000/- per annum. These disparities are between villagers in one village and between villages. This means that most residents would afford to purchase water although some would bear a higher burden than others.

Since total water production costs of MPW/S was estimated at Tshs. 51.25 per capita per month, an average family of 5 would have to depart with Tsh. 256.25 per month, or about T.shs 3,075 per year. This means that the cost of water is about 21.3% of the annual income of the average household. At this price, water would be too expensive for many households. WASH and ADB suggests that cost recovery (operations and maintenance) should not exceed 18% of the household income (IRC No. 8, 1988). However, if villagers were required to cover only operations and maintenance, the cost of water would be Tshs. 31.80 per capita per month, or about 13.2% of the average household income.

### 6.8 SCENARIOS FOR COST RECOVERY

Two types of water tariffs can be considered. A flat per capita water tariff or a per unit i.e., per bucket price of water. Normally, a flat rate is recommended when all households have access to more or less the same level of water services and when there are no perceived great variations in water use or in the wealth of users.

The team observed great variations both in water use and in income. These variations are caused by family size and income, with an average household of 43 members. Family size can go as high as 12-15 members per household. This discourages flat rates.

A dialogue with village governments and individual households in the studied villages revealed that villagers preferred a per unit price (price per bucket) of water rather than a flat rate. They found it easier to relate water charges to actual consumption, as a villager would pay for the water service as and when they need and acquire it.



Although cheating cannot be ruled out a system of water coupons, each coupon worth a bucket i.e. shs 1.85 can be introduced to minimize this problem. Villagers have to be encouraged to purchase the coupons in advance and present them to water kiosk attendants. Kiosk attendants have to be screened and women should be encouraged to take part as women have less incentive to abscond with water collections. Meters should also be purchased and used.

**User fee (price per bucket) without subsidy**

Since the community has a history of purchasing water per bucket under former Makonde Water Corporation, reintroducing the system should not be too difficult. In all villages visited, residents were in favour, so long as the prices were affordable and if water will be guaranteed.

Under the current system, a per unit water cost of Tshs. 82.40 or shs. 1.65 a bucket would recover operation maintenance, rehabilitation and administrative costs. This system will need a kiosk, calculated at shs. 9.90/m<sup>3</sup> or about Tshs. 0.20 per bucket. The kiosk per capita cost is calculated at shs. 6.20. With these additional costs, per unit cost of water becomes Tshs. 92.30/m<sup>3</sup> or Tshs. 1.85 per bucket (20 litres). For details see table 7.

At a price of shs. 1.85 per bucket, the cost of producing and distributing water (shs. 15.9 m) can be recovered. Thus, given a population served of 277,790 x 1.25 x 1.85 x 30 = Tsh. 19,271,681.00. This leaves a surplus of about 3 million shillings. This price is reasonable, as it is lower than what villagers pay for a bucket of water from private vendors. Private water vendors sell a bucket of water at a price of between sh. 30/= and 50/= a bucket. Village governments sell water at shs. 5/= (Milumba) and sh. 10/= (Nandwahi) per bucket (20 litres). A price of shs. 1.85 per bucket is 3 to 27 times lower than that charged by private traditional vendors. Moreover, it is only about 9.2% of household income, much lower than the WASH and ADB recommendation that water cost recovery on construction cost should not exceed 10% and maintenance not to exceed 8% (IRC, No. 8, 1988).

**User fee (price per bucket) with subsidy**

If the government was to request villages to pay for only operations and maintenance the price per bucket of water would be much lower. This would make a price of water per bucket of Tshs. 1.20 The government would be forced to subsidize water by shs. 0.65 per bucket. The subsidized price of water Tshs. 1.20 per bucket is about 6% of the household income. At this price, the government will subsidize about 3% of household income i.e. releasing household income for other uses. The disadvantage of government subsidy is that little resources are left for improvement of the water system. Expansion effort program to cover non served population or to provide a minimum of 25 litres per person per day within 400 meters will have to be shelved. A government subsidy undermines sustainability and should be discouraged.

Table 7: PRICE OF WATER PER UNIT AND PER BUCKET WATER COST - MAKONDE W/S

	OPERATION COSTS TSHS/PER UNIT/MONTH	REHABILITATION (CAPITAL) COSTS TSHS/PER UNIT/MONTH	MAINTENANCE COSTS TSHS/PER UNIT/MONTH	ADMINISTRATIVE COSTS TSHS/PER UNIT/MONTH	TOTAL PRODUCTION/ DISTRIBUTION COSTS TSHS/PER UNIT/MONTH
1. RESIDENT ENGINEER	45.60	22.20/m <sup>3</sup>	3.30/m <sup>3</sup>	5.50/m <sup>3</sup>	76.60/m <sup>3</sup>
2. DISTRICT WATER ENGINEER	-	0.40/m <sup>3</sup>	2.20/m <sup>3</sup>	3.20/m <sup>3</sup>	5.80/m <sup>3</sup>
TOTAL PER UNIT WATER COST	45.60/m <sup>3</sup>	22.60/m <sup>3</sup>	5.50/m <sup>3</sup>	8.70/m <sup>3</sup>	82.40/m <sup>3</sup>
3. KIOSK					9.90/m <sup>3</sup>
PRICE OF WATER PER UNIT					92.30/m <sup>3</sup>
PRICE OF WATER PER UNIT					92.30/m <sup>3</sup>
PER BUCKET (20 Litres) (RE + DWE) PRICE	0.90	0.45	0.10	0.20	1.65
ADD KIOSK PER BUCKET					0.20
PER BUCKET PRICE OF WATER (20 Litres)					1.85

Source: Study Calculations

**Flat Rate**

Table 7.2 indicates a per capita cost of water of Tshs. 51.25 (production and distribution) per month.

Given: RE & DWE's

: Water Production & distribution costs of Tsh. 14.2 m

Tshs. 51.25 x 277,790 pop served ..... Tsh. 14.2 m

This flat rate means that the MPW/s would fail to pay salary for some auxiliary staff. To recover all the costs and leave a reasonable margin for contingencies, a flat rate of Tsh. 60 per month would have to be charged. At this rate of Tshs. 60 per month (about 5% of household income) Tsh. 16.6 million would be recovered giving a surplus margin of Tsh. 2.4 million. This flat rate is low. However, given income disparities and contested household water uses, this system would not work. Moreover, a flat rate looks much like a water tax, a perception which discourages compliance. Furthermore the question of free riders cannot be ignored. It would be difficult to exclude households that do not pay the monthly fee, thus discouraging others to comply.

The only advantage of the flat rate is that administrative costs are much lower than for the per bucket price of water. However, follow up time and free loading outweighs this advantage.

**6.9 SOCIAL CULTURAL FACTORS**

Social-cultural factors of the Makonde plateau water supply is related to the preferences and perception on the ownership, care and use of water which determine the realization of the benefits and sustainability of water supply schemes. The factors were also related to customer satisfaction with the services. People have also to be satisfied with the colour, taste and smell of water.

Basing on these socio-cultural factors villagers have neglected two hand pump wells in Mitema village due to bad smell and bad taste of water. Villagers said that they were also not happy with sharing distribution line/hand pumps with adjacent villages. This was seen to be reflected in the meager water funds in Mpalu and other villages visited during this study. Willingness to pay for water was also influenced by the villagers' perceived benefits of water, gender division of labour close proximity to alternative traditional sources of water and the desire for good neighborhood relations. Thus, when asked for reasons for their decision to pay for water, the villagers referred to direct benefits of water-time savings for women, gardening and hygiene.

Although fetching water is considered a womans' responsibility, men reiterated that they would give money to women to purchase water if paying for water would guarantee an easy access to a reliable source. This would free men from performing domestic chores. Men perform the chores when women have to walk long distances for water. But provision of a reliable supply of water through a system of water tariff would partly reduce the woman's workload. The workload in the cassava farms would still be a

hindrance in their full participation in hygiene and water affairs. There should be a community based plan to rich the women at all times.

Table 7.2 PRICE OF WATER COSTS PER CAPITA FOR MAKONDE PLATEAU W/S

	OPERATION COSTS TSHS/PER UNIT/MONTH	REHABILITATION (CAPITAL) COSTS TSHS/PER UNIT/MONTH	MAINTENANCE COSTS TSHS/PER UNIT/MONTH	ADMINISTRATIVE COSTS TSHS/PER UNIT/MONTH	TOTAL PRODUCTION/ DISTRIBUTION COSTS TSHS/PER UNIT/MONTH
1. RESIDENT ENGINEER	28.50	13.80	2.00	3.40	47.70
2. DISTRICT WATER ENGINEER	-	0.25	1.30	2.00	3.55
PRODUCTION/DISTRIBUTION TOTAL PER CAPITA WATER COSTS	28.50	14.05	3.30	5.40	51.25

Source: Study Calculations

## 6.10 ALTERNATIVES TO MANAGE AND FINANCE THE MAKONDE PLATEAU WATER SUPPLY

Three alternatives were identified. The first alternative is to retain the present set up. Investigations by the study team indicates that a good cost recovery system for the MPW/S is a viable possibility. Since the present system has managed to provide water to about 95% of the residents of the Makonde plateau, it qualifies as a candidate to collect water charges. However, the study team observed a number of disqualifies. Namely, duplication of facilities and manpower, as well as inadequate financing. Moreover, villagers were also quick to voice their concerns regarding the present organizational set up.

In particular, under the current set up, water connection fees are collected by the DWE on behalf of the District Council. They distrust their district council. The Resident Engineer, representing the ministry was considered too remote.

The second option is that of a co-operation union to collect water fees. Villagers ruled out this option on grounds that co-operatives are notorious for not paying for their crops and misuse of funds. The last option considered is that of forming a private company to collect water charges. This has advantages in that a private company would be keen to satisfy customers, and work efficiently to maximize profits. However, some of the schemes are very expensive to operate. A purely private company will be forced to close some schemes.

The study team recommends a water board, to be drawn on similar lines of the former Makonde Water Corporation. Community Participation is necessary. In dialogues with villagers, villagers supported the idea, but emphasized that they wanted only a company in which they would have a say to manage the water tariff as well as produce and distribute the water.

### Recommendations

The study team is of the opinion that, the current arrangements are rife with problems. That the duplication of facilities is unnecessary and uneconomic when the system operates under capacity due to lack of funds. The team recommends that the responsibility for the management of the entire Makonde Plateau Water Supply (the schemes) should fall under one organization. It is further recommended that this organization be a utility board rather than purely private company or a cooperative.

The study team also recommends that a per bucket price of water (tax) of about Tshs. 2.00 be introduced.

However, the team is of the opinion that community participation should be strengthened to improve the

community contribution on operation and maintenance of the distribution network in their respective villages. This should leave both the central and local government to concentrate on capital and rehabilitation, to expand and maintain quality water services.

As an interim measure, the team recommends that working conditions at pump stations be improved. Proper uniform and protective gear must be provided. Furthermore, it is recommended that the management of information system for the Makonde Plateau Water Supply be streamlined and strengthened.

## **7.0 DEMOGRAPHIC AND FINANCIAL IMPLICATIONS OF THE NEW WATER POLICY IN TANZANIA: LINDI AND MTWARA REGIONS**

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### **7.1.0 INTRODUCTION**

It needs no saying that adequate supply of clean and safe water is a human right, as it ensures the very physical existence of man. Descending down from the cardinal ideal to the practical, it is that learning from the history of e.g. England and Wales, it was public health measures (i.e. better water and sanitation) that caused the second demographic transition of a decline in mortality beginning in the 18th Century. Coming to the home ground, the epidemiology of Tanzania and cause of death structure is concentration of infectious mostly water-borne diseases, e.g. cholera, diarrhoea, typhoid, etc. The need therefore to know the population dynamics, at least size and growth pertaining to an area one would like to plan for cannot be emphasized.

This paper gives plausible ranges of estimates of the population that will be expected for the next 25 years from 1993 (i.e. the period 1993-2018) for the regions of Lindi and Mtwara, and their implications for water supply needs and its financial cost on the basis of the ideal of 30 liters per person per day in the rural areas of Tanzania. First consideration of sources of data and methods as a gauge for the reliability and plausibility of estimates made. Subsequently alternative population projections within which the actual population is likely to fall and the associated water demand and financial implications are presented.

### **7.2.0 DATA AND METHODS**

The basis for projecting (forward) the population of the two regions is the latest officially released census data. Up to now available data from the 1988 Census are totals for geographical areas, and 1978/88 inter census growth rates. While estimates could be based on the latter, and certainly comparisons will be made with those from alternative and more refined methods, it is the latter that are expected to give more accurate estimates. It is the component method of population projections: these utilise the level and age patterns of the components of population growth, namely fertility, mortality, migration and the age structure.

Data on the components of growth from the 1988 Census are unfortunately yet to be released; thus we rely on the 1978 data. Comfort can however be had as the latter was as of high quality as the recent ones. Further, fertility and mortality are not expected to have changed significantly,



if at all; importantly, as a process of projection the levels, age-patterns and trends of these components of growth that reproduce the actual 1988 Census figures will be used as a further reliable basis.

#### 7.2.1 THE POPULATION PROFILE OF LINDI AND MTWARA REGIONS

The 1978 and 1988 Census estimates of the populations and related variables for the two regions are given in Table 1.

Table 1 The Population Profiles of Lindi and Mtwara Regions

	Lindi 1978	Mtwara 1988	1978	1988
Size		474,433	646,550	771,817 889,494
Density (persons/sq. km)		8.0	-	46.2
- Annual growth rate (%)		2.6	2.0	2.0 1.4
Net migration (per person/yr)				
-males			-.12	- .12
-females			-.05	- .11
- Household size (persons)		-	4.6	- 4.4
Total Fertility rate		6.8	-	6.8
- Expect. of life at birth		42.0	-	40.0

Sources: 1978 Population Census Vol. VII (Central Bureau of Statistics, 1982).  
 1978 Population Census Vol. VIII (Central Bureau of Statistics, 1983).  
 1988 Population Census: Preliminary Report (Central Bureau of Statistics, 1989).

Each of the two regions' population constitute less than 3 percent of Tanzania's total population of 17.5 million in 1978 and 23.1 in 1988. Their populations are also growing at slower rates than the national rate of 2.8 to 3.2 percent per annum due to net outmigration of about -.12 percent per year among males of both regions and -.05 and -.11 percent among females of, respectively, Lindi and Mtwara regions.

### 7.3.0 POPULATION PROJECTIONS (QUINQUENNIAL) TO 2018

Assumptions used to project the populations are presented first, then the projections.

### 7.3.1 ASSUMPTIONS FOR PROJECTIONS

The way to arrive at reliable population projection estimates, what is done in the first place is finding a combination of fertility, mortality and migration levels and patterns that projects the 1978 Census population to a figure as near as possible to the 1988 Census actual count, and the 1978/88 intercensus annual growth rate. This is because both the 1978 and 1988 Censuses were of equally high quality, hence also the estimates are reliable. Thus achievement of nearness to the census figures ensures the projection being on the right path.

The optimal combination of the vital rates used in the projections, and the 1988 Census and projected figures with the difference between the latter two are shown in Table 2.

Table 2 The combination of vital rate projection assumptions that reproduces the 1988 Census figures.

	Lindi	Mtwara
Mortality: linear decline: (years, average expectation of life at birth)		
-males	42-65	40-65
-females	42-70	40-70
Fertility: constant TFR:	6.8	6.8
Migration: constant (per person/yr)		
-males	-.104	-.130
-females	-.044	-.060
Population:		
-Census 1988		
-Total	646,550	889,494
-males	310,637	423,774
-females	335,913	465,720
-Projections 1988		
-Total	646,625	889,472
-males	310,736	423,973
-females	335,888	465,499
-Difference: Proj.-Census		
-Total	+ 75	- 22
-males	+ 99	+199
-females	- 25	-221

Note: TFR is Total Fertility Rate: the average number of children a woman would have in her lifetime if she experienced a given set of age-specific fertility rates

It can be noted in the table that the net migration rates used to reproduce the 1988 figure are lower than the 1967/77 estimates, except for males of Mtwara where it now higher. It is plausible that the significant social and economic development it could also be impediments that took place in these regions reduced the need for out-migration to other regions.

Mortality would be expected to decline given national endeavours to combat disease. As to gender differences, at first the levels are similar as women have been left behind; but later women would exceed males as their emancipation takes place to reach the genetic difference generally observed in other populations. However a conservative assumption of linear decline is adopted given the hurdles likely to be encountered as in the past and present.

Projections beyond 1988 are done for three alternative assumptions on trends in fertility, namely initial rapid and slow decline, with the third one being constant at the 1978 level total fertility rate of 6.8. For mortality the linear decline, and constant net outmigration rates shown in Table 2 above with their explanations are maintained. The population projections follow below.

### 7.3.2 POPULATION PROJECTIONS

The population projections based on the foregoing assumptions, and estimates of water supply needs and associated financial implications are given at the end of the paper, pages 10 and 11, in Tables 3 and 4 panels (a) for, respectively, Lindi and Mtwara regions for the period 1978 to 2018 (effectively 30 years after 1988). A visual impression of the alternative paths as per the above assumptions can be seen on pages 12 and 13 in Figures 1 and 2, panels (a): though shown for population growth alone, the growth paths for water needs are similar to that for the population because they were arrived at by multiplication by constants, namely 30 litres per day. For financial costs adjustment for inflation is added as will be explained later, thus these rise faster than populations.

TABLE 3 LINDI: POPULATION PROJECTIONS AND WATER DEMAND AND FINANCIAL IMPLICATIONS FOR THE PERIOD 1978-2018

Year Rapid fert. fall Slow fert. fall Constant fertility

(a) POPULATION

Year	Rapid fert. fall		Slow fert. fall		Constant fertility	
	Populat- ion (000's)	Growth per yr (%)	Populat- ion (000's)	Growth per yr (%)	Populat- ion (000's)	Growth per yr (%)
1978	525.8	-	525.8	-	525.8	-
1983	580.8	2.0	580.8	2.0	580.8	2.0
1988	646.6	2.2	646.6	2.2	646.6	2.2
1992	697.1	1.9	712.0	2.5	712.2	2.5
1993	710.3	1.9	732.7	2.5	733.1	2.5
1998	771.6	1.7	842.5	2.8	848.2	2.9
2003	843.9	1.8	975.8	2.9	999.2	3.3
2008	929.6	1.9	1,114.0	2.7	1,190.1	3.5
2013	1,024.3	1.9	1,248.7	2.3	1,426.4	3.6
2018	1,119.4	1.8	1,374.0	1.9	1,720.5	3.8

(b) WATER SUPPLY NEEDS (mill. cu. metres)

Year	Rapid fert. fall		Slow fert. fall		Constant fertility	
	Water Needs (mill. cu. m)	Infla- tion (%)	Water Needs (mill. cu. m)	Infla- tion (%)	Water Needs (mill. cu. m)	Infla- tion (%)
1978	5.8	-	5.8	-	5.8	-
1983	6.4	2.0	6.4	2.0	6.4	2.0
1988	7.1	2.2	7.1	2.2	7.1	2.2
1992	7.7	2.2	7.8	2.2	7.8	2.2
1993	7.8	1.9	8.0	2.5	8.0	2.5
1998	8.5	1.7	9.3	2.8	9.3	2.9
2003	9.3	1.8	10.7	2.9	11.0	3.3
2008	10.2	1.9	12.2	2.7	13.1	3.5
2013	11.2	1.9	13.7	2.3	15.7	3.6
2018	12.3	1.8	15.1	1.9	18.9	3.8

(c) FINANCIAL COST (mill. T.Sh.)

Year	Rapid fert. fall		Slow fert. fall		Constant fertility	
	Cost (mill. T.Sh.)	Infla- tion (%)	Cost (mill. T.Sh.)	Infla- tion (%)	Cost (mill. T.Sh.)	Infla- tion (%)
1992	99.50	-	101.63	-	101.67	-
1993	136.86	30.0	141.18	30.0	141.25	30.0
1998	540.09	23.0	589.72	23.0	593.71	23.0
2003	2,103.39	22.0	2,432.14	22.0	2,490.46	22.0
2008	7,244.69	20.0	8,681.78	20.0	9,274.85	20.0
2013	27,584.84	18.0	27,532.65	18.0	31,450.76	18.0
2018	63,184.71	16.0	77,555.65	16.0	97,113.89	16.0

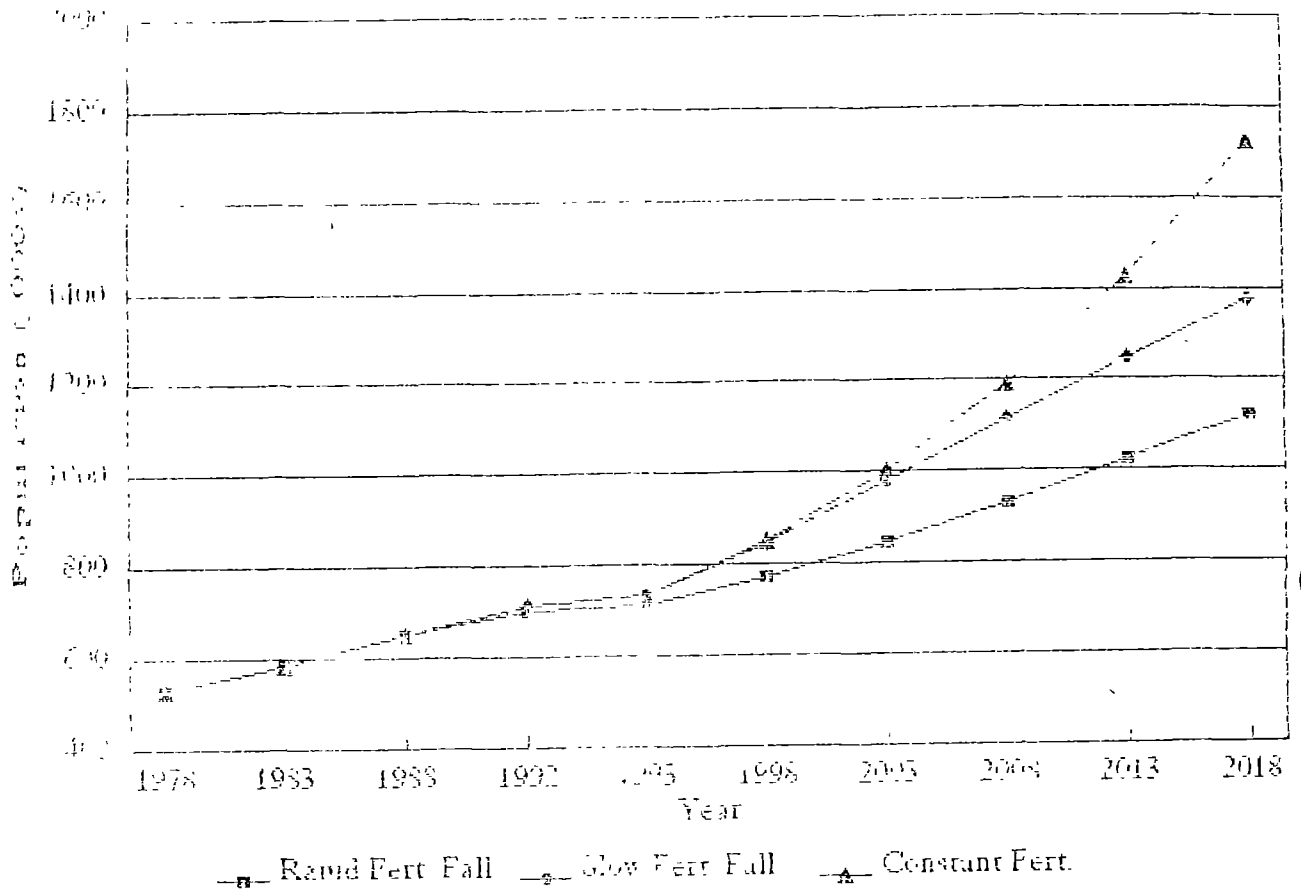
Notes: 1. Rural water needs: 10 litres/capita/day  
2. Cost: T.Sh. 13.00/cubic metre

TABLE 4 MTWARA: POPULATION PROJECTIONS AND WATER DEMAND AND FINANCIAL IMPLICATIONS FOR THE PERIOD 1978-2018

Year	Rapid fert. fall	Slow fert. fall	Constant fertility			
(a) POPULATION						
	Population Growth per year (000's) (%)		Population Growth per year (000's) (%)		Population Growth per year (000's) (%)	
1978	768.9	-	768.9	-	768.9	-
1983	828.3	1.5	828.3	1.5	828.3	1.5
1988	889.5	1.4	889.5	1.4	889.5	1.4
1992	926.1	1.0	943.0	1.5	943.3	1.5
1993	935.0	1.0	960.0	1.5	960.5	1.5
1998	980.4	1.0	1,046.0	1.7	1,052.5	1.8
2003	1,037.1	1.1	1,149.5	1.9	1,175.6	2.2
2008	1,109.6	1.4	1,268.8	2.0	1,339.4	2.6
2013	1,196.0	1.5	1,395.9	1.9	1,548.9	2.9
2018	1,283.0	1.4	1,513.6	1.6	1,808.9	3.1
(b) WATER SUPPLY NEEDS (mill. cu. metres)						
1978	8.4	-	8.4	-	8.4	-
1983	9.1	1.5	9.1	1.5	9.1	1.5
1988	9.8	1.4	9.8	1.4	9.8	1.4
1992	10.2	1.0	10.4	1.5	10.4	1.5
1993	10.3	1.0	10.5	1.5	10.5	1.5
1998	10.8	1.0	11.5	1.7	11.6	1.8
2003	11.4	1.1	12.6	1.9	12.9	2.2
2008	12.2	1.4	13.9	2.0	14.7	2.6
2013	13.1	1.5	15.3	1.9	17.0	2.9
2018	14.1	1.4	16.6	1.6	19.9	3.1
(c) FINANCIAL COST (T.Sh. mill.)						
1992	132.19	-	134.60	-	134.65	-
1993	180.15	30.0	184.97	30.0	185.07	30.0
1998	686.24	23.0	732.16	23.0	736.71	23.0
2003	2,584.93	22.0	2,865.08	22.0	2,930.13	22.0
2008	8,647.49	20.0	9,888.19	20.0	10,438.40	20.0
2013	26,370.66	18.0	30,778.27	18.0	34,151.77	18.0
2018	72,419.14	16.0	85,435.38	16.0	107,108.65	16.0

Note: 1. Rural water needs: 30 litres/person/day  
2. Cost: T.Sh. 13.00/cubic metre

Figure 1. Land Population and Water Cost Projections 1978-2018  
 (a) Population



(b) Water Cost

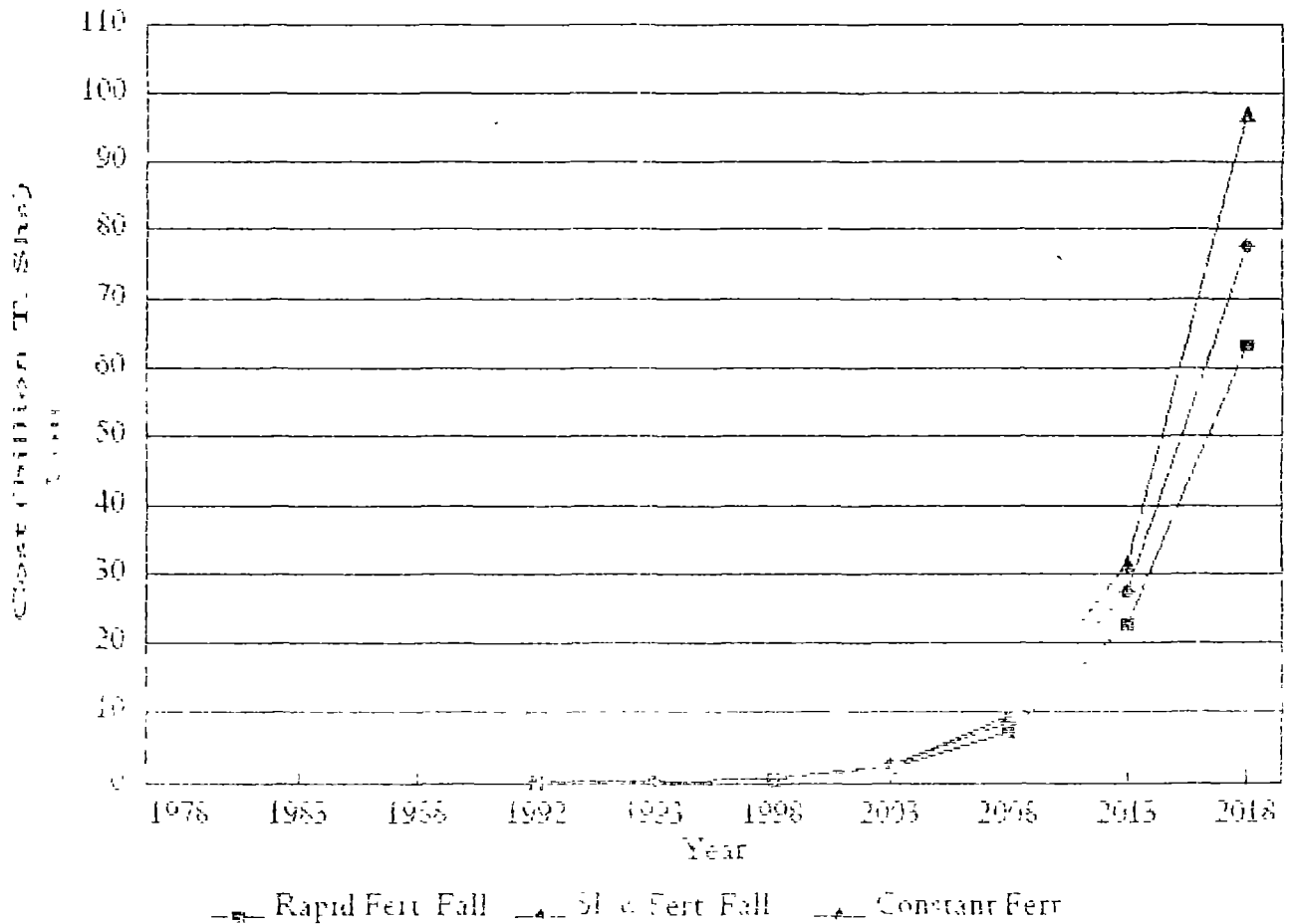
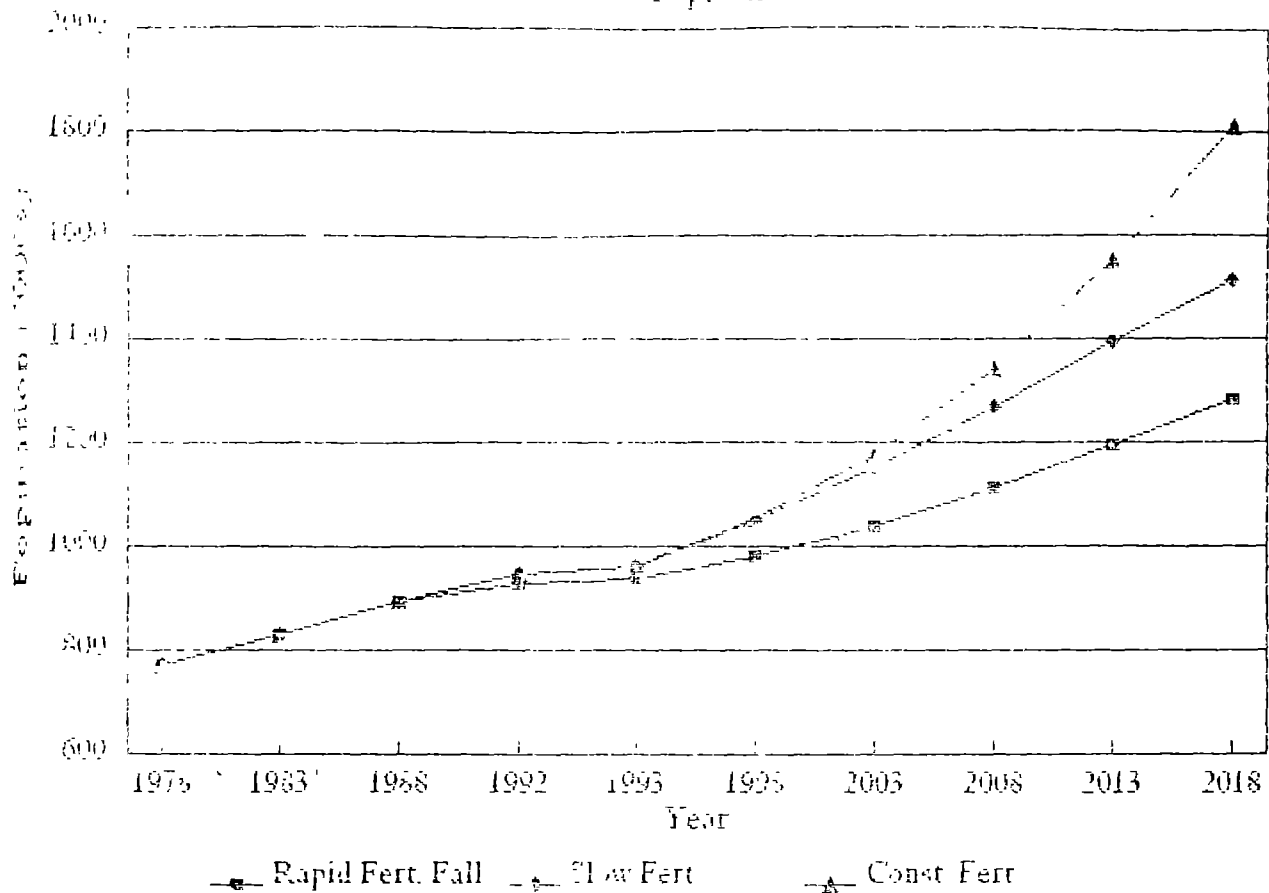
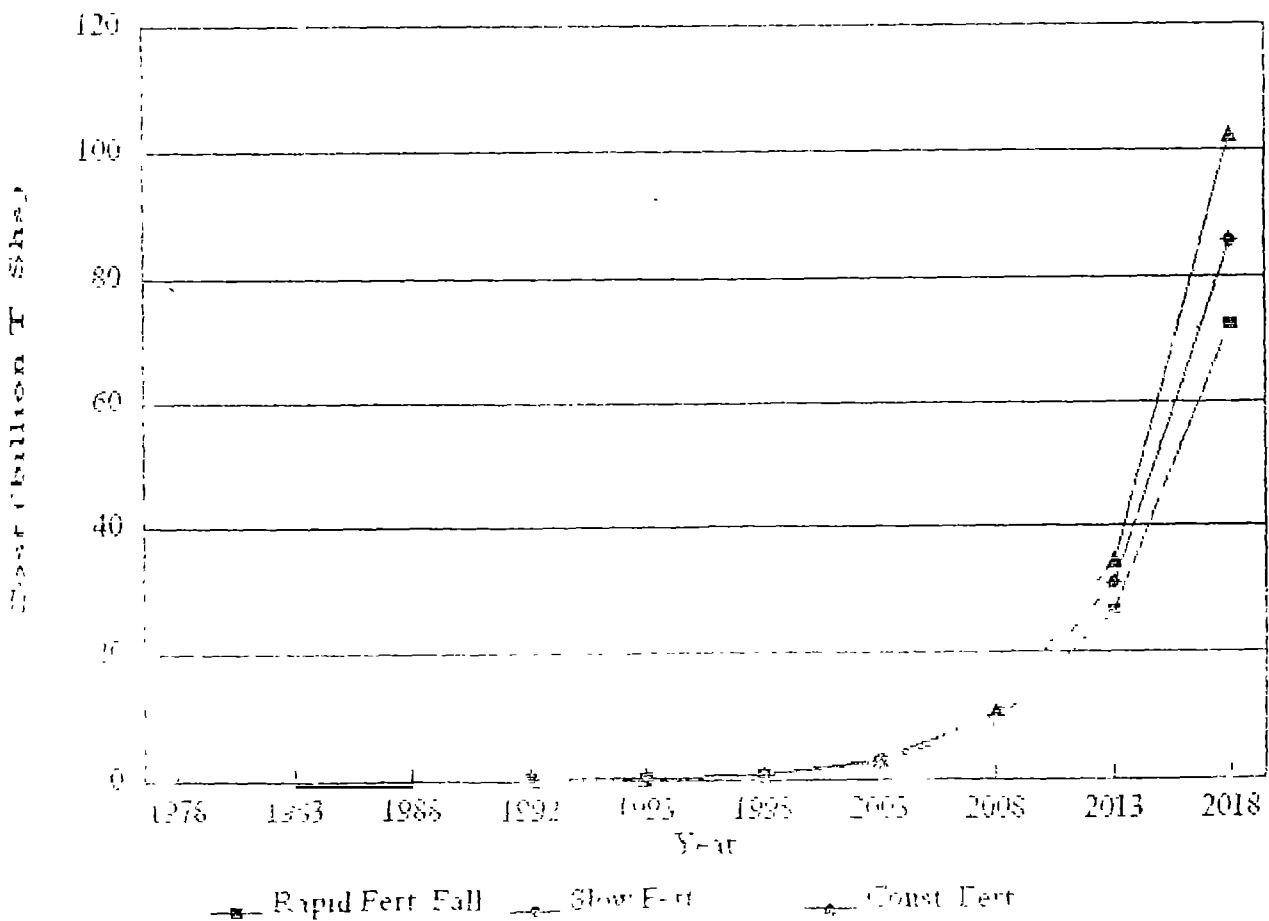




Figure 3. Missouri Population and Water Cost Projections for Population



(b) Water Cost



The best estimates to select for planning are suggested as the ones in the middle, based on slow fertility decline. The main reason for decline is what is now widely observed across Africa in the Demographic and Health Surveys (Studies in Family Planning, 1990-92); slow though rather than rapid because of still strong pronatalist cultures as observed e.g. in Bukoba District (Kamuzora, 1991), and the hurdles to adopt effective methods of fertility limitation. Further why people have curtailed fertility to lower levels after avoidance of large excess fertility is not known (Cleland and Wilson, 1987).

Thus the estimates based on rapid declines and constant fertility can be seen as lower and upper bounds between which actual populations are likely to be.

Looking at the selected middle estimates the expected population can be seen in Tables 3 and 4 in panels (a) and water supply needs in panels (b), with their financial implications for water supply in panels (c). The respective populations of Lindi and Mtwara regions are expected to rise from the 1993 estimate levels of about 732,700 and 960,000 to 1,374,000 in year 2018, annual growth rates ranging between 2 to 3 percent per annum for Lindi, and 1.5 to 2 for Mtwara. Based on the recommended rural supply of 30 litres per person per day, water needs would rise at the above corresponding growth rates from a total of 8.0 and 10.5 million cubic metres (cu.m.) in 1993 for the two regions respectively to 15.1 and 16.6 million cu.m. in year 2018.

The financial implications of these needs can be observed in the tables, panels (c). Though the costs are derived from application of the current (1992) estimated cost of T. Sh. 13.00 per cu.m. (panels (b) multiplied by 13.), an inflation factor is applied to account for rise in prices/fall in the value of the shilling. The trend in the inflation rate is shown along the cost figures in panels (c): it is assumed that the inflation rate, following economic recovery being registered in the country, would decline steadily (almost linearly) from the current (1992) understood level of 30 to 16 per cent per year by year 2018. The adjustment factor used is an average of the current (1992/93 30%) rate and the figure shown for a given year as the inflation rate for the period. Thus a given year's cost estimate is arrived at by the current cost at 13 shillings per cu. m. multiplied by the exponential of the average inflation rate and number of years elapsed since 1992.

The costs therefore, looking at the plausible middle column, would for Lindi Region rise from T.Sh. 141.2 million (about US\$ 470,600) in 1993 to T.Sh. 77,555.7 million (US\$ 258,518,830) by year 2018. For Mtwara Region it will be a rise from T.Sh. 185.0 million (US\$ 616,600) to T.Sh. 85,435.4 million (US\$ 284,784,650) for Mtwara Region.

The per caput cost figure in 1993 is T.Sh. 192.70 (US\$ 0.65) per person per year. At a per caput income of T.Sh. 3,000.00 per year, the estimate for the two regions to-day in 1992 (worth therefore 4,050 in 1993); this amount is in no doubt affordable to an ordinary person. The problem is the future: per caput cost in year 2018 will be about Shs 56,445; if it is to maintain

its current worth/value the 1992 per caput income of Shs 3,000 should rise at a rate nearly equal to inflation, to Shs 1,186,322 by year 2018. Then water would still be affordable.

The problem is that normally income lags behind inflation. Even if it could rise at 10 per cent per year, it would only be Shs 40,392 in year 2018, still below the above per caput cost of Shs 56,445.

#### 7.4.0 CONCLUSIONS

This is a background paper on water supply needs, and financial implications; they are however minima as the basis is 30 liters (one-and-half buckets) per person per day. The question is what actual performance/supply by the water authorities or so has been, availability of resources for provision of the above minimal needs, and supplements from indigenous sources.

A larger question is, as the country moves towards cost-sharing indeed to the ideal of self-sustenance would a system be developed in time to have production and producer prices rise enough to ensure income levels that meet the estimated escalating costs of water supply?

#### 7.5.0 REFERENCES

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Kamuzora, C.L., 1991: "Impending fertility decline at low levels of development in Kigarama village, Tanzania" Proceedings of the Second Annual Seminar of the Demographic Unit, July 11-13, 1991 (University of Dar es Salaam).

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**8.0 POTENTIAL PROBLEMS IN AFFORDABILITY AND WILLINGNESS TO PAY FOR WATER IN MAKONDE PLATEAU: CONSUMER' POINT OF VIEW**  
-----

by DR. ALEX KHALID

"We must welcome the future, remembering that soon it will be the past; and we must respect the past, remembering that it was once that was humanly possible."

- George Santayana.

**8.1 BACKGROUND**

8.1.1 Before an attempt is made to analyze the potential problems in affordability and willingness to pay for water by consumer in Makonde Plateau the following social economic issues must be addressed to in great detail:-

- \* What percentage of the existing population witnessed the functioning of Makonde Water Corporation, they paid for water. They were then told to drink freely and will now be told to buy again - and what percentage of the population has never heard of water being a sellable commodity.
- \* The efficiency and reliability of water supply during the time when water was paid for and the time when water was given free.
- \* The change in total population in Makonde Plateau over the period of the past 3 decades.
- \* The change in household disposable incomes and variation between various groups - workers, agricultural laborers, cashew crop peasants etc.
- \* Total demand for water with increased population.
- \* Alternative sources of water - What happened when free piped water was completely unavailable.
- \* The pricing of Water, and installation charges:

8.1.2 Many more questions could be asked, any attempt to answer each of those questions would require a filled survey and separate papers. It is not the intention of this short paper to present a comprehensive report on the potential problems in affordability and willingness to pay in the event that water is sold in Makonde Plateau. It will suffice to highlight potential problems in the framework of the anticipated charges. As clearly seen in the subheadings above, one predominant word which is overriding all other aspects in CHANGE. The issues surrounding affordability and ability to pay by consumers is dictated

by the changes in the parameters outlined above. This is particularly so because of the unique situation of piped water in Makonde Plateau. Except for rainy season makeshift water tanks and surface dams, piped water remains a single dependable source of water for over 90% of the 400,000 plus population of Makonde Plateau. A unimodal rainfall pattern and six month drought presents a unique situation in a plateau devoid of rivers, and as flat as a table.

8.1.3 Without the need for empirical data, it is apparent and conclusive that since water was declared a free commodity, Makonde Plateau consumer has been subjected to a substandard water supply regime characterized by the following factors:

- \* Intermittent, unreliable water supply.
- \* Insufficient water quantities
- \* Constant breakdowns of machines and pipes - sometimes beyond local repair.
- \* Poor service by workers, no replacement or preventive maintenance.
- \* Uncertainty and a risky life in the form of disease, malnutrition and poor health in general. Travelling long distances in search of water.
- \* Paid for water from vendors at very high prices which were ironically affordable.
- \* Falling production of food and cash crops - this is accounted for due to over-dependence on women for farm labour - which spent more time searching for water.
- \* Migration of consumers from Makonde Plateau to neighboring districts especially Masasi and Nachingwea where water is plentiful in rivers.
- \* Change in Makonde cultures - such as drinking "Pombe" made out of cassava flour and water during "Unyago" celebrations.
- \* School attendance by primary school children dropped substantially.
- \* Fall in the quality of life.

8.1.4 There are many more problems endured by the consumer as an outcome of a substandard free water supply to the extent that any attempt to introduce payments for water bill not create any resistance on the part of the consumer provided enough water is available as and when he wants it at reasonable price and within a short distance from his homestead. The issue is therefore how and with what institutional arrangements could water be available at short distance from homesteads and at what price. Affordability and willingness to pay is more of an issue of

change of attitude on the part of consumers. It is a question of adaptation to change which could easily be approached by the Government in some way as other issues related to public services which are being privatized. At this point, it is worth examining how versatile is the Makonde consumer in accommodating change which affects his economic base but improves his quality of life.

**8.2 UNDER WHAT CONDITIONS MAKONDE CONSUMER ACCOMMODATE CHANGES FROM FREE WATER SUPPLY TO PAID FOR WATER SUPPLY**

8.2.1 It is nowadays easy to fall prey to the band-wagon of advocates of deregulation, de-confinement and privatization who blame the past socialist - egalitarian macroeconomic policies in respect of changes instituted by the government in recent years. Some people say .... "It was wrong to have free water supply" - This is typical and relevant to our current topic. The quotation from George Santayana appearing at the start of this paper presents a philosophical argument in support of past mistakes.

8.2.2 It is the position of this short paper that, water in Makonde Plateau should be sold at affordable prices. Affordable in this sense could be vague but as outlined below, a sequence of events in the action plan could lead to an appropriate programme of an affordable pricing of water without consumer prejudice or indifference. The biggest question is how and under what conditions should the change be instituted so that the consumer is willing and can afford without much problems.

8.2.3 **CHANGE.** No other single word so completely captures the essence of contemporary society of Makonde Plateau and poses more demanding problems from the policy makers rather than from the Makonde Water Consumers. Current studies by UNICEF (1988) revealed that 97% of Makonde plateau inhabitant were willing to pay for water if it was available at continuous and sustainable quantities. The inhabitants of Makonde Plateau have a great capacity to embrace and participate in any change that improves the quality of their lives. This has been demonstrated on the adoption of the rise of costly inputs in reviving the cashew nut industry which was threatened by fungal disease. Previously there were no costs in maintaining cashew nut groves except for family labour for weeding. Today a requirement for blowers and costly sulphur powder to prevent diseases has pushed up the cost of maintaining cashew groves. The Makonde Plateau inhabitants spend a lot of money in this respect. The willingness with increased cash earnings. This signals one important element in the overall planning process, water costs should not be taken in isolation from other economic services. There is need to integrate social services and economic services in the process of privatizing water supply.

8.2.4 The biggest challenge on setting water is therefore not the willingness to pay or affordability by the consumer it is the planning for change on the part of the policy

makers and especially in meeting the demands of the consumer.

The following conditions constitute the major factors which must be considered in meeting the demands of the consumer as water services becomes privatized and sold:

- \* How many villages will be covered in supply network. Will the private non-government organization build capacity to cover the whole plateau?
- \* Will the need of individual consumer be met? This is important when the consumer pays for what he uses. He must see clearly the connection between the amount he uses and the cost he pays.
- \* The link between use and payment keeps use in check. Free water was misused, taps were left open - but consumers will be willing to pay more in order to have services which they value.
- \* Regulations must be set to standardize quality of services.
- \* A programme of education, retaining of operators must be worked out to address to the new set up.
- \* There should be no direct involvement of the Government in running a privatized sold water supply. A respectable association would be by the consumers in one form or other is commendable.
- \* Each village unit must have a reliable and dependable cash collection mechanism to instil confidence in consumers that cash collected is not misdirected or misappropriated.

### **8.3 ACTION PLAN TOWARDS RE-INTRODUCTION OF PAID FOR WATER IN MAKONDE PLATEAU.**

- \* Review the operations of Makonde water supply - Institutional set up, financial arrangements, staffing and materials management.
- \* Assess social economic changes that have taken place during the past 3 decades. These would include demographic, per-capital incomes, cash crops production, marketing systems, levels of disposable income and competing uses for cash.
- \* The "effective demand" for water, i.e. those who are capable to pay as opposed to all those who want to use water or "Total demand".
- \* Identify an NGO which is participatory by water consumers and assess its capability to handle and manage a sustainable paid for water supply.



- \* Educate consumers on the implications of the change.
- \* Evaluate the cost-benefit of the entire project, social costs and economic and financial viability.
- \* Evaluate a pricing mechanism for water that will be easy and acceptable.
- \* Lay down the rules of the usage of water and educate consumers.
- \* Fix timetable for gradual transition from free - to paid up water supply.

8.3.1 The list is endless, and in conclusion it suffices to mention that - The affordability and willingness to pay for water by Makonde Plateau consumers is dependent on how the Government institutes the changed from free water supply to paid up water. The consumers are willing and will afford to pay for water as long as it is available as much as they want at the appropriate distance. The price factor wont be a big factor as long as they are participatory in ownership and are incorporated in the price setting machinery.

## 9.0 MOST IMPORTANT INSTITUTIONAL ELEMENTS IN WATER SUPPLY

by Mr. Martti J. Roth /FINNWATER

### 9.1 General Observations of Institutional Development

- difficult and more complicated
- output or activity oriented projects easier (to construct road, install sewerage immunize children
- focus on development of comprehensive organizational systems and people, that make them work.
- overall purpose is institutional learning (or sustainability) - ability to continue to operate and solve problems even, when people and systems change.
- primary target in institution development phase is the institution itself.
- secondary, but important target are the consumers
- when the institution is in operation, its primary function is to serve the consumer.
- the secondary function is to develop the institution.

### 9.2 Most Important Institutional Elements in Water Supply

- administration and organization
- personnel management
- budgeting
- water tariffs and charges
  - charge collection system
- accounting and finance
- operation of system
  - regular servicing and maintenance
  - leak detection and repair
  - spare parts supply and storing
- other factors
  - consumer information and training
  - training of personnel and consumers
  - consumer information and health education
  - community participation
  - women's participation
  - other contacts to society

### 9.3 Some "Musts" in Institutional Development

- sound legislative background
- realistic financial and economic background
- firm commitment from all important parties
  - government
  - water authorities
  - Finnida
  - Finnwater
  - project personnel
- self reliance(confidence)
- honesty
- technical capability
- efficient and just water charge collection system
- hard work
- monitoring of performance (not evaluation)

- intensive training.

#### 9.4 Vicious Circle in Water Supply

- unreliable water supply
- low willingness to pay water charges
- poor cost recovery
- less funds for operation and maintenance
- poor condition of water supply system

#### 9.5 Management Culture

- sample organization
- clear responsibilities and work descriptions
- work delegation system
- Team work
- team work
- work planning
- objectives and priorities set and understood
- monitoring and follow up system to get works done
- free information, open communication
- work performance evaluation keeps people accountable
- commercially, but also consumer oriented systems and personnel
- technical capability maintained
- good contacts to society
- internal public relations noticed.

#### 9.6 Vicious Circle in Water supply

- unreliable water supply
- low willingness to pay water charges
- poor cost recovery
- less funds for operation and maintenance
- poor condition of water supply system.

#### 9.7 Example of Good situation

- well maintained waterworks
- good water quality
- cost effectiveness
- just water charges
- good charge collection system
- satisfactory cost recovery
- consumer satisfaction
- qualified management
- trained staff
- good contacts to society
- possibilities to extend and improve



TWO  
SUMMARY  
OF  
PLENARY  
DISCUSSIONS



## 10.0 SUMMARY OF PLENARY DISCUSSIONS

- There was some confusion on the use of the word/statement 'Appropriate technology' and 'cheap technology'.

It was agreed to use the word/statement 'Appropriate technology' instead of 'cheap technology'.

- It was realized that the Ministry of Water, Energy and Minerals has shortage of different professionals.
- It was suggested that the Ministry should liaison with the UDSM Faculty of Engineering in regards to the curriculum changes being instituted at the UDSM.
- It was emphasized that Village Water Committees (VWC) should own, manage and run their own water schemes and more than 50% of the members in the VWC should be women.
- Users must contribute towards the cost of producing water and sustainability of the schemes.
- Establishment of a Legal Board to run the Makonde Plateau Water Supply to be established.
- Legal aspects of establishing MAKONDECO.
- It was agreed that the role of women in Water Supply cannot be over emphasized.
- The seminar was told by the Resident Engineer that the annual allocation of funds from the Government are below the requirements for Operation and Maintenance of the Makonde Water Supply Project.
- Due to inadequate funding a Project has got an outstanding bills to TANESCO. Sometimes the Management of the project is forced to reduce the pumping hours if funds to buy fuel are not available.
- The Resident Engineer for Handeni Trunk Main (HTM) project informed the Seminar participants that, the project has got a Single Water Source (ie. Pangani River) a system of storage tanks and is partially pumping and partially gravity as compared to Makonde Water Supply which has different types of sources and requires extensive pumping.
- A problem of inadequate funding for Operation and Maintenance was explained. Unstable power from the National Grid is a problems which causes some of the motors to blow very regularly.
- The paper on 'Water Tariffs' has mentioned rural tariffs which are non existent. Is it possible for the presenter to elaborate a bit on the rural tariffs issues: Proposals related to the topic of the seminar are also missing.

### Response

Issues of rural water tariffs have been mentioned in the paper. They include some aspects of cost sharing and partial cost recovery proposals.

With regard to the relevance of the paper on Makonde Water Supply, the author concurred with the observation and stated that they omitted it deliberately knowing that there was a study on the Makonde which would come out with water tariffs issues.

- The paper on tariffs has not taken into account the efficiency in the management of the urban water supply systems. Is it fair for consumers to pay for deficient systems.

### Response

Definitely its not fair and in no way has the paper proposed a structure that takes into account deficient services. The proposed structures assume a situation where the system is operating normally.

- Discussions from Phase One Study on Makonde Plateau Water Supply if water is to be sold, will they afford to pay for it and sustain it.

### Response

Yes, the study observed that the people were ready to pay the proposed amount of 2/= per bucket, an amount which could sustain the service.

- Were they given an option of a flat rate, instead of the 2/= per bucket.

### Response

The issue of the flat rate was communicated to them. The proposal was not favored due to variations/disparities in incomes. They found the proposal being similar to the development levy system through which the low income groups were made to pay a bigger % of their annual incomes than the well offs. After lengthy discussions the majority of the villagers opted for 2/= per bucket system.

- Was a consideration of forming a cooperative to manage the project communicated to the people interviewed.

### Response

The issue was discussed lengthily but not favored due to unions long time experience of inefficiencies. They also insisted that, the organization to be formed should have a high representation of the consumers. It should be an organization they will have a say in it. A WATER BOARD was therefore proposed to them and it seemed they favored it.



- Did the study take into account a group of people who have undergone all adjustments i.e. from the time they paid for water to the time water was free and now in the transition to reintroduce the paying system.

**Response**

Yes, a representation of the views of the group was interviewed and was very positive on the issue of paying for as long as the system will operate well.

- On the paper of Financial and Demographic implications of new Water Policy in Tanzania there was a question on how did he arrive at a cost of 13/= for a litre of water.

**Response**

It was corrected to be 13/= per cubic metre and not per litre.

- From the paper of consumer's point of view there was a question on what sort of consumers are being represented from the paper?

**Response**

The paper represents all sorts of consumers including the author who was born and brought up in the Makonde Plateau. Given the problems of water in the area, he has no doubts on the acceptability of the new system by the people. He however, cautioned that the rates should not be very high due to the nature of the economy of the area, for the majority of the people fall in the low income group.

- Do you think the people will afford to pay 2/= per bucket given their low income levels.

**Response**

The people there are willing and can afford to pay. The problem is the institutional arrangements to sustain the change. This is what should Phase II of the study concentrate on.

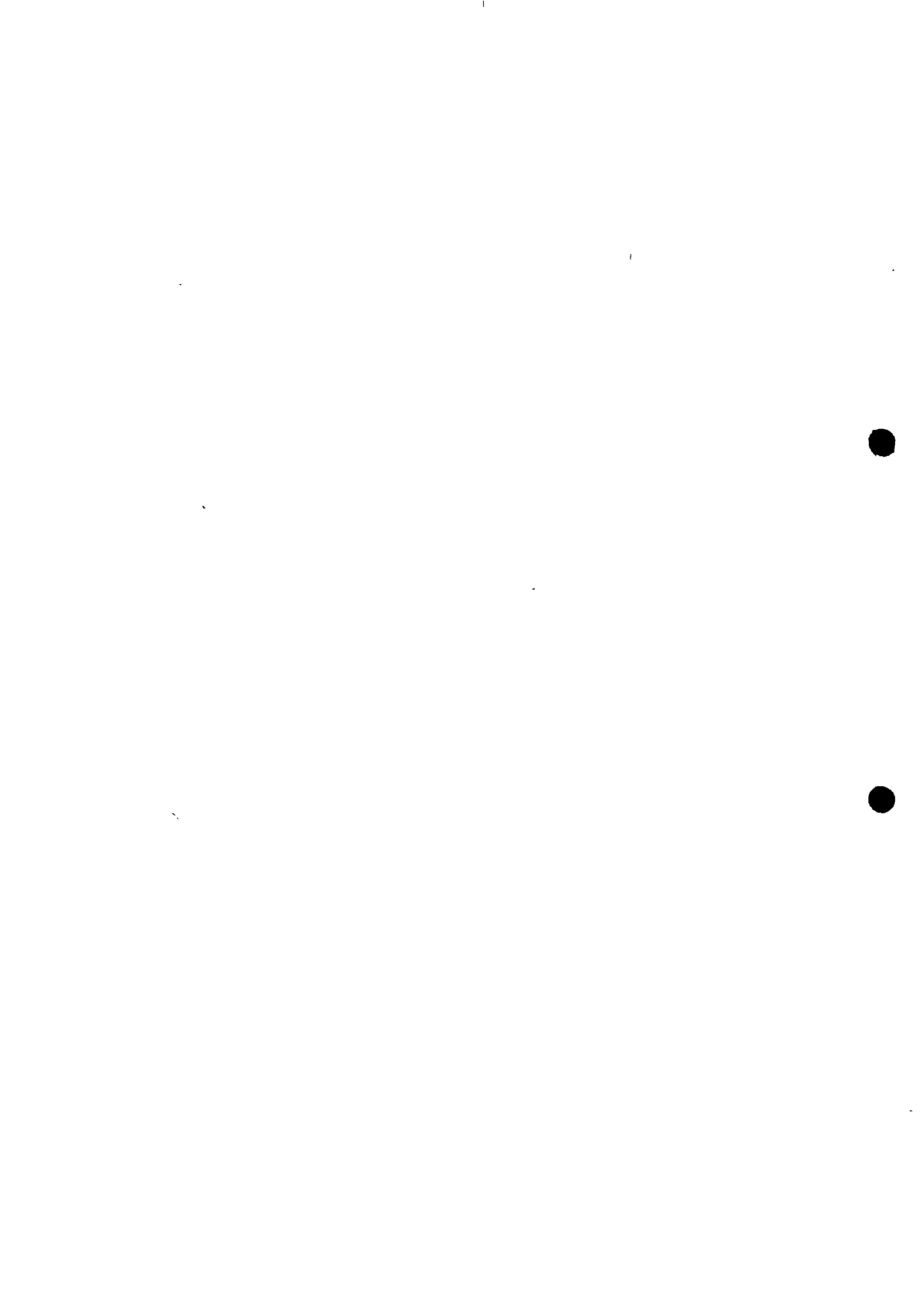
The following issues were raised by Dr. Khalid on the improvement of the Study I findings:-

- The Makonde people are well known for not only water conservation but also for economic use of water. Pricing of water should take this into account, since it can happen that the water drawn could be less than anticipated by the 'body'.
- The water to be provided must be reliable and sustainable, otherwise people will lose trust on the body.

- The change from a system where water is free to a one where water is to be paid for needs a number of preparations and intensive sanitization of the people. Much as it stands logic and easy, the people still will require to be educated on the approach.
- Newala District's economy depends on one major crop i.e. cashewnuts. The tariffs should be expected to fluctuate in case of a crop failure.
- The low incomes of Newala people are confronted with a number of competing demands. Rates should therefore not be based on assumptions that it is only water that is to be paid for by the community. An integrated approach to the issue was therefore suggested.
- The body to be formed should take the kiosks as the lowest level of the organization structure kiosks should be taken as administrative entities.

THREE

WORKING GROUPS REPORTS



## 11.0 REPORT FROM WORKING GROUP I

### INSTITUTIONAL ASPECTS

11.1 The group first looked into the existing set-up which consist of basically the Resident Engineer who is answerable to the Ministry and the District Water Engineer under the District Council.

11.1.1 Short-Falls of the Existing set-up include:-

- Finance - Revenue collection
- Tariff structure
- Use of funds for other purposes
- Administrative - Overlapping roles between RE and DWE, lack of accountability.
- Inadequate operation and maintenance causing shortage of water.

11.2 Proposed Reorganization.

The Report by the IRA University of Dar es Salaam was used to guide the discussions on the needed institutions and structure in the reorganization. It was observed that the study recommended a Board with 18 members drawn from the Government, Water Authorities, Local Authorities and the Consumers. The main questions raised were who would appoint the Board Members and who should own the water works. It was generally agreed that the body to be formed should be based on shareholders who will appoint the board. As regards to the ownership of the water works it was agreed that the body should be the owner. As regards to the initial capital it was agreed that the Government should make arrangement to guarantee a loan from financial institutions to facilitate the consumers to have majority shares in the body. The government should not have majority of share lest the consumers will feel it is a government parastatal.

11.3 Recommendations

- (i) Have a separate autonomous body with legal entity to run Makonde Water Supply. This body should be owned by shareholders.
- (ii) The composition of the body should have adequate representation of the consumers so that they may control the activities of the waterworks and make the consumers (feel they really) own the scheme.

This should be studied further in phase II.

(iii) As proposed in the phase I study the body would have the functions of production and distribution of water, finance and administration. In this respect further studies in phase II should include among other things:-

- Manpower issues such as staffing schedule, scheme of service and incentives, recruitment procedures etc.
- Financing arrangements.
- Institutional and administrative arrangements
- Information systems
- Costumers services
- Valuation of assets
- Transitional period arrangements and timetable
- How NGOs particularly Newala Development Foundation may financially support Makonde Water Supply.

#### 11.4 PLAN OF ACTION

##### TIME SCHEDULE

<u>ACTION</u>	<u>TIME</u>	<u>RESPONSIBLE</u>
1. Ministry of Water, Energy and Minerals Commitment to organize running of Makonde Water Supply	June 1992	MAJI (DOMWL)
2. Complete Phase II studies	December 1992	CONSULTANT
3. Final Government approval on forming an autonomous body/reorganization	June 1993	M A J I (DP/STATE Attorney)
4. Start implementation	July 1993	PMO DEPT. OF LOCAL GOVT. AND REG. ADMINISTRATI ON

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- Inadequate operation and maintenance causing shortage of water.

### 11.2 Proposed Reorganization.

The Report by the IRA University of Dar es Salaam was used to guide the discussions on the needed institutions and structure in the reorganization. It was observed that the study recommended a Board with 18 members drawn from the Government, Water Authorities, Local Authorities and the Consumers. The main questions raised were who would appoint the Board Members and who should own the water works. It was generally agreed that the body to be formed should be based on shareholders who will appoint the board. As regards to the ownership of the water works it was agreed that the body should be the owner. As regards to the initial capital it was agreed that the Government should make arrangement to guarantee a loan from financial institutions to facilitate the consumers to have majority shares in the body. The government should not have majority of share lest the consumers will feel it is a government parastatal.

### 11.3 Recommendations

- (i) Have a separate autonomous body with legal entity to run Makonde Water Supply. This body should be owned by shareholders.
- (ii) The composition of the body should have adequate representation of the consumers so that they may control the activities of the waterworks and make the consumers (feel they really) own the scheme.

This should be studied further in phase II.

(iii) As proposed in the phase I study the body would have the functions of production and distribution of water, finance and administration. In this respect further studies in phase II should include among other things:-

- Manpower issues such as staffing schedule, scheme of service and incentives, recruitment procedures etc.
- Financing arrangements.
- Institutional and administrative arrangements
- Information systems
- Costumers services
- Valuation of assets
- Transitional period arrangements and timetable
- How NGOs particularly Newala Development Foundation may financially support Makonde Water Supply.

#### 11.4 PLAN OF ACTION

##### TIME SCHEDULE

<u>ACTION</u>	<u>TIME</u>	<u>RESPONSIBLE</u>
1. Ministry of Water, Energy and Minerals Commitment to organize running of Makonde Water Supply	June 1992	MAJI (DOMWL)
2. Complete Phase II studies	December 1992	CONSULTANT
3. Final Government approval on forming an autonomous body/reorganization	June 1993	M A J I (DP/STATE Attorney)
4. Start implementation	July 1993	PMO DEPT. OF LOCAL GOVT. AND REG. ADMINISTRATI ON



11.5 Transition

July 1993

to Feb. 1994

PMO (DEPT.  
LOCAL GOVT.  
AND REG.  
ADMINIST.  
MAJI AND  
MANAGEMENT  
ADVISER FROM  
FINNIDA.

- Grassroot mobilization(3 months)
- Formation of board of Directors (1 month)
- Appointment of key personnel including the Chief Executive (2 months)
- Appointment of other personnel (2 months).

## 12.0 REPORT FROM WORKING GROUP 2

### FINANCIAL MATTERS

#### 12.1 Capital Costs Components

Life span of a capital investment is greater than 1 year with a major cost, eg.

- Pumps (10 yrs)
- Pipes (50)
- Vehicles (5)
- Power lines (50)
- Roads (10)
- Houses (30)
- Wells (10)
- Reservoirs (509)
- Kiosks (10)

#### 12.2 Recurrent Expenditure (Yearly)

- Salaries and Wages
  - Electricity Bills
  - Fuel
  - Chemicals
  - Administrative costs
  - Repairs and Maintenance
  - Depreciation
  - Interest (on loan) + Repayment
  - Profit
- Total cost for 1 year

#### 12.3 Means of Raising the necessary funds

##### 12.3.1 Capital Costs from:

- Bank loans
- Soft loans from Government
- Grants from:
  - . Central Government subsidy
  - . Donors
  - . NGOs
- Shares from:
  - . expected beneficiaries through deduction from crop sales
  - . others
  - . Quantified labour from beneficiaries

##### 12.3.2 Recurrent costs from:-

- Sales of Water
- Connection fees
- Penalties
- Subsidies from:
  - . Government (Central)
  - . local government
  - . District councils
  - . Charities

## 12.4 Tarriffication

### Type of Consumers

#### 12.4.1 Domestic through:

- kiosks
- yard connection
- house connection

#### 12.4.2 Commercial in:

- Bars
- Guest houses
- Hotels
- Shops

#### 12.4.3 Industrial

#### 12.4.4 Institutional:

- Hospitals
- Schools
- Churches/Mosques
- Offices

#### 12.4.5 Livestock Watering points

## 12.5 Recommendations

- The Tariff structure should aim at full recovery of costs (capital and recurrent) at a specified time frame (see sketches).
- Tariffs should be reviewed from time to time.
- Water Kiosks should be metered and managed by individuals or village, who or which should sell water by buckets.
- The rates at the water kiosks per bucket should be set by the village. This could then differ from village to village, allowing for competition to operate such kiosks.
- The rates should be similar for all consumers, but the more you spend the more you pay on an increasing block tariff.

### 13. REPORT FROM WORKING GROUP 3

#### SOCIO - ECONOMICAL ASPECTS

##### 13.1 COMMUNITY PARTICIPATION:

- Privatization is not recommended.
- CP especially the participation in decision making is paramount. Community management of the Water Supply is the key issue. It seems at the time being the level of CP is very low and needs sensitization.
- The committee has worked the rates of the communities in the project and find them exhaustive. However the aspect in decision making is yet to be emphasized.
- The group also noted that, Communities were not involved in the choice of the technology nor in the planning process of the technology chosen. However, since the project is to satisfy a social need, their participation in Operation and maintenance and rehabilitation is likely to succeed.
- Government has a tendency to consider communities ignorant and require to be informed of everything. Even the researchers have observed that "dissemination of information on CP has not reached the household level"
- Sensitization as a continuous process should be done through films, prints and Community Development officers should be involved. It is continuous.
- CSD UNICEF project. The people have been sensitized. Since they are the same people not much will be required in sensitizing them. It is a gradual and continuous process.
- Every village elect not nominate the water committee and the rates will be defined by the communities.

##### INVOLVEMENT OF COMMUNITIES

13.1.1 Participation of communities in the management of the scheme. This involves participation in decision making, planning, construction, rehabilitation and day to day upkeep of the project.

Rehabilitation - trench digging

- caring pipes
- Daily upkeeping of DP/hand pump
- fencing of DP sites
- Repair of DP/hand pump

Decision making- Participation in meeting

- elected by communities
- women involvement

Planning - identification location of APs

Construction - Digging trenches  
- transportation of materials  
- shallow well construction.

- 13.1.2 Cost sharing will be effected through sale of water of 2/- per bucket for piped schemes. This amount will go to the organization. The communities will sit in the body and decide on the amounts for Enumerating pump/scheme attendants. In this case the issue of water fund and banking of the money will not arise.

For the handpump money will still need to maintain a Water Fund and bank it.

13.1.3. Water Committees - institutionalization of the functions of the project at the village level should include formation of a Water Committee. In the Committee at least half of the members should be women. The members should be elected democratically.

13.1.4 Training of villagers in Water related issues should be given a priority. This training should include training in water technology and other trades, community participation skills and book keeping.

13.1.5 Integrated approach to the sector problems water related sectors such as health, education and community development, should be involved.

## 13.2 AFFORDABILITY

The people in the area are willing to pay for water if it is a reliable source. The source of income is mainly from sales of cashew nut, groundnuts and cassava. Average per capita income is 3,000/-.

There are disparities between villagers and villages, a factor which will make flat rates not appreciated. They proffered to pay for water at 2/- per bucket. For those unable, communities will make arrangements of helping them. Therefore nobody will fail to collect water due to lack of shs. 2/- or 13/-.

WILLINGNESS is assured, but Affordability is an issue that needs to be addressed very carefully. The opportunity cost of water is very high.

The village government should be given mandate to decide who should pay or not. The community should therefore find a way of realizing the amount. Special attention should be given to those who cannot afford.

Privitazation is not recommended

### 13.3 PLANNING FOR CHANGE

Sensitization of people in the beginning through meetings, workshops and seminars. Caution is given that this sensitization be given ample time and it should be a continuous process.

### 13.4 POSSIBILITY TO SUBSIDIZE WATER CHARGES

If the amount required is above 18% of peoples incomes, then the central government should subsidize. The subsidy will be for capital costs and purchase of expensive spare parts. people are ready to pay 2/- per bucket and whatever remains is to be topped up by the government.

### 13.5 COLLECTION SYSTEM

The logistics and methods of collection will be the responsibility of the body. The group however recommends that the community should be involved in working out the modality. The system should include kiosks, collection from crop/livestock sales.

### 13.6 OWNERSHIP

The communities feel they are co-owners of the project and they would want to see the levels represented in the body. They are ready to buy shares in the company or whatever body that will be formed.

- Communities should safeguard the facility
- Legality on who owns what. The water right is to be given to the body not the DED. The contribution of 2/- per bucket is an indication of the responsibility to own.

### 13.7 GOVERNMENT INVOLVEMENT

- The government should work in full consultation with the people at all level.
- The Government will continue to support the project in production of water, training, coordination aspects, expertise, procurement of equipment.
- Water source protection, to ensure that the source is adequate.
- Availability and stocking of spareparts within the project area.
- FINNIDA's continued assistance in procurement of spareparts in big pumping stations. Phasing out should be gradual. In the meantime, the project should concentrate an building in capacities for nationals to take over.
- Education the people on the importance of community participation.

PHASE II OF THE STUDY

The finds the information made available in the report is comprehensive and can be used in the planning process of the project.





14.0 REPORT FROM WORKING GROUP 4  
TECHNICAL ASPECTS

14.1 OPERATIONAL ARRANGEMENTS OF WATER SUPPLY

(i) Adequacy of sources for long term use

Recommendations:

- Capacity of existing sources to be ascertained.
- Establish a monitoring system for quantity and quality.
- Source protection measures are put in place.
- Population projections are carried out.

(ii) State of conveyance mains, distribution network and other structures:

Recommendations:

- Evaluate the scheme and assess its service potential and recommend improvements for cost-effective operation.
- Plan and implement the recommendations.

(iii) State of machinery and equipment

Recommendations:

As two above

Standardization of machinery to be aimed at.

(iv) Communication and Transport.

Recommendations:

- Sufficient means of transport and telecommunications to be secured.
- Cost benefit analysis of centralization/decentralization.
- Accessibility of installations to be secured at all times by
  - . Involve Ministry of Works to undertake prompt repair on village roads.
  - . Repair critically important roads lead to water installations.

(v) Procurement, spareparts and fuel supply

Recommendations:

Procurement procedures to be streamlined.

Exemption of taxes to be looked into.

Local availability of spares, equipment and fuel should be ensured.

(vi) Power Supply  
Recommendations:

Optimal combination of power sources and storage facilities to ensure continuous water supply.

(vii) Technical Manpower Requirement

Recommendations:

- Identify need as per organization structure and job descriptions.
- Set up and implement a comprehensive training programme.
- Attractive remuneration and incentive package.

14.2 WATER SELLING SYSTEMS

(i) Ownership of kiosks.

Recommendations:

- to be owned by users.

(ii) Tariffs

Recommendations:

- To be uniform for all per container.
- In efficiency of management should not be passed onto tariffs.

(iii) Revenue Collection Systems

Recommendations:

- One revenue collection system should be aimed for

(iv) Management of the system and water delivery system

Recommendations:

- Provision of block meters to be considered for blocks of villages.

- Structures for easy selling of water to be considered.
- Provision for drainage of waste water from collection points should be made part of the design of water delivery system.

#### 14.3 RESPONSIBILITIES OF USERS

- Source protection
- Guard against vandalism plus general responsibilities as stipulated in the water policy document and specific responsibilities depending on agreement with water users and the system of management to be put in place.

#### 14.4 RESPONSIBILITIES OF DWE

- Overseas of proper technical operation of the scheme.
- Controls/carries out surveillance of Water Quality and Quantity.
- Directs community participation.
- Member of the Board.
- Advises on any extensions to the existing system.

