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**Mid-term Review of the
Zanzibar Urban Water Supply Development Project
October 7 - 15, 1992**

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ACKNOWLEDGEMENT

The midterm review of the FINNIDA-supported Zanzibar Urban Water Supply Project was in the field from October 7 - 15, 1992.

It consisted of three members:

Dr. H.R Hikmany	of the Ministry of Finance of the Government of Zanzibar
Ms. Madeleen Wegelin	sociologist and urban development expert of IRC and
Mr. Han Heijnen	sanitary engineer and teamleader of IRC International Water and Sanitation Centre in The Hague, The Netherlands.

It would not have been possible to have all the discussions and field visits in such a short span of time without the logistical support provided by staff of the Government of Zanzibar and the management of the Zanzibar Urban Water Supply Project. We recall with pleasure the one day workshop that was organized at the end of the mid-term review in which so many participated with such enthusiasm. The midterm review team would like to express their thanks to all those involved for devoting their time and energies into making this possible. Particular thanks are due to the Project Manager and his family for their hospitality and support during the mission.

We would further like to commend the Project for its set of thorough and solid Project reports that enabled the mission to quickly absorb essential information about the project.

Throughout the evaluation, government officers, project staff and consumers were very supportive to the review process. A large number of people spent time to discuss water supply issues with the team and this is gratefully acknowledged. The team would also like to thank FINNIDA for the opportunity to review the project, and for the support provided from Helsinki and Dar es Salaam.

Executive Summary and Recommendations

In October 1989 the Government of the United Republic of Tanzania and the Government of the Republic of Finland agreed to cooperate in developing the urban water supply sector in Zanzibar. The planning phase of the Zanzibar Urban Water Supply Development Project commenced in 1990 and a project document for the first implementation phase was completed by June 1991. It focused on a development plan for urban water supply and on an assessment of human resources needs and institutional arrangements suitable for an urban water supply management body.

The first implementation phase of the Zanzibar Urban Water Supply Development Project (ZUWSP) was started in August 1991. The project is within the Department of Water Development of the Ministry of Water, Construction, Energy, Lands and Environment of Zanzibar. It covers improvement of water supply to Zanzibar town on Ugunja island and the towns of Mkoani, Chake Chake and Wete on Pemba island. It is foreseen that the urban water supply component of the Department will be transformed into an Urban Water Authority. Institutional development is geared towards that objective.

Town water supply is not new to Zanzibar. Already early in the century piped water supply was available in Stone Town and surrounding areas using water from intakes in Bububu and Mtoni. Rules and regulations were in force with respect to service levels and house connections, rate payments and standards for appliances. It is clear that the system functioned well in those days and the effects of it can still be seen in some premises. Rate payment was well established and records were kept by the then Water Supply Authority. Skilled staff was employed and supervised to ensure standards. Economic difficulties of the last decade, the growth in the urban population and the declaration by the Government of Zanzibar in 1982 that "water is free" for domestic consumers, have caused the public supply of water to gradually crumble. Erratic power supplies (especially in Pemba), low-grade piping and plumbing material, lack of supervision of the fundis making the house connections, and illegal or uncontrolled connections (e.g. for small scale irrigation and leading to the rural areas) has led to a situation whereby water supply has become highly inadequate and unreliable. Yet, the consumers can not really complain to the Department of Water Development as they are not paying for services.

The ZUWSDP was initiated to improve the technical and managerial aspects of 4 existing town water supplies in Zanzibar. From the foregoing it is clear that the project can be characterized by the concepts of **rehabilitation** and **upgrading**. Rehabilitation of the technical and administrative supply capacity combined with upgrading in quantity, quality and reliability of the water supply to meet present-day and future demand.

In this context it may be worth mentioning the economic recovery programme (ERP) initiated in 1987 by the Government of Zanzibar to broaden its revenue base by economic diversification especially through the promotion of tourism and export processing zone (free trade zone). These economic activities rely heavily on the availability of water, again underlining the importance of proper water supply.

Supplying water or setting up the institution?

The ZUWSDP has during its planning phase and during the first year of operation focused its activities on capacity building for the Urban Water Supply Section and on the rehabilitation of the water supply sources. Since 1989 therefore work has been going on in strengthening the basis for proper water supply development. Whereas this work has been done thoroughly and well, the clients: i.e. the government of Zanzibar and the actual water consumers, have seen little result so far.

It is accepted that it takes time to improve the water supply situation in Zanzibar, but an approach whereby structural improvements in water supply development and management go hand in hand with an improvement in delivery would certainly have been preferable. It would have meant that the ZUWSDP would have been able to establish consumer relations on the basis of increasing consumer confidence, would have been able to bring forward the discussion on tariffication and the institutional necessity for an Urban Water Supply Authority, and would have been able to generate larger government commitment and action with respect to a range of issues, among which important ones like the zoning of protection areas for boreholes and springs.

In Pemba the project has been able to improve the water supply situation by a clever mix of improving piped supply schemes and putting handpumps on existing hand dug wells. Consumers are enthusiastic and highly appreciative, as shown by the extent of community labour contributions. Even though the situation is much more difficult in Pemba due to continuing shortages of diesel needed for power generation and thus needed to pump and supply water, the standing of the project is good because of the visibility of the water supply development efforts and the strong communication with and involvement of the consumers.

In Zanzibar town the project has not been able to build on physical improvements that certainly have taken place in the meantime and has not yet been able to make an effective communication link with the government of Zanzibar and with the consumers in the town. The delay between the planning phase and the first implementation phase of the project has been considerable and so it would have been strategically better to show results fairly soon to the consumers. Instead a lot of time is being spent on studying the existing water supply distribution system and in making ad-hoc repairs. To build confidence towards consumers and politicians it would be better to focus on social areas of water need as was in a more natural way done in Pemba.

1. *recommendation*

To strengthen consumer relations it is recommended that social mapping is undertaken in Zanzibar town to find out in which areas there are the greatest needs for water supply improvements. If at all possible, these areas should then get priority in the design and implementation of improvements in the distribution system. Due consideration should be given to the integration in physical and financial terms in the overall ZUWSDP programme to ensure the sustainability of such improvements.

End-of-Mission Workshop

At the end of the review mission a workshop was organized to discuss the Zanzibar Urban Water Supply Development Project. The workshop was very well attended by close to 40 participants. Representation from the house of representatives and participants from senior management levels in the Ministry of Water, Energy, Construction, Land and Environment, led by the permanent secretary, from various other ministries and departments, and from the Programme debated for the first time since the inception of the Programme about the Programme and the key issues relating to the sustainability of the urban water supplies in the Zanzibar isles. The deliberations showed a high degree of concern and willingness to act on issues such as tariffication, policy framework and legislation, the set-up of the Urban Water Authority and its mandate, as well as water resources management and the need for environmental protection. The outcome of the discussions are reflected in the recommendations in the following texts.

Institution building

The establishment of an Urban Water Supply Authority is proposed. Initially the proposed authority will be part of the Department of Water Development. In time the Authority is supposed to become a parastatal with a legal basis for its operation and financially independent.

The DWD is in general fairly weak and understaffed. No head or director for the Urban Water Supply Authority has been appointed so far. This makes it hard to further pursue the autonomous development of the proposed Authority as there is a risk of inadequate advocacy for resources development within the Authority. At the same time problems remain with the legal status of the Authority. Regular discussion and promotion with relevant authorities is needed to work towards an independent Urban Water Supply Authority, and - in the context of the Ministry and the Department for Water Development - ensure adequate provision for the quantitative and qualitative aspects of water resources management in Zanzibar and Pemba.

2. recommendation

Promotion of the issues raised at the workshop through regular consultation by the Programme with various levels of Government will be instrumental in further raising the interest and commitment of the Zanzibar Government towards the establishment of a proper water authority. Support from key programme partners such as the Ministry of Water, Construction, Energy, Lands and Environment and the Embassy of Finland should be sought to keep discussions on water supply and sanitation development, in particular with respect to the status of the Urban Water Supply Authority and the financial self-sufficiency of the WS&S sector on the political agenda.

The Programme has been investigating the appropriateness of the existing Town Waterwork Rules dating from 1940. Although these are not applied anymore they carry a lot of useful rules and regulations with respect to water supply, domestic appliances and drainage.

3. recommendation

The Town Waterwork Rules dating from 1940 should be considered, updated and adapted to present circumstances as a first step in making a new beginning with a properly regulated urban waterworks system.

The activities of the training and management consultant have up till now mainly been directed to the development of an organizational structure for the urban water supply section. The organizational chart as proposed in the masterplan is currently under reconsideration. The staff inventory process has been slow due to local circumstances. In that respect it might be questioned whether a full time consultant is needed to guide this process. No doubt the management consultant also has the responsibility to re-establish a consumer registration system but this has only very recently started. Furthermore, the consultant is assisted in all of her activities by a very capable and active DWD officer who would have the potential to take over her tasks within the next few months.

4. **recommendation**

It is therefore recommended that the continuation of the post of the management consultant will be reconsidered after the contract expires by the end of 1992. It might be better to utilize the last 6 months of expatriate support indicated in the budget in a short-term consultancy fashion as and when the time is ripe with respect to guiding further developments in institution building and consumer registration. Till that time, the Zanzibari counterpart officer supported and guided by the project manager can take care of further developments.

It is planned that the registration files for house connections and commercial connections will be transferred soon to the UWS office and that customer relations are conducted from this office. A strategy for registration by area is being worked out at the moment. The shift will also imply that operational staff for the houseconnections would have to be moved to the UWS office, including the fundis (plumbers), the people who draw the area map and inspectors.

5. **recommendation**

The process of (re)registration is started first in the areas where water supply is at present at least regular even if not 24 hours. The areas can be determined on the basis of the social mapping. Also registration could start in the areas which are selected for upgrading and improvement so that implementation and registration is carried out simultaneously.

6. **recommendation**

Automatization is started of the (re)registered customers. The experience of the State Fuel and Power Corporation should be taken into account and if possible their files could be used as a basis.

Since 1982 no water charges are levied for residential customers. Commercial customers do have to pay, but the amounts are minimal. During the field trips an assesment was made of the willingness to pay of residential customers. This willingness was indicated everywhere, probably because people used to pay before. In areas where water supply was at least regular for some hours a day, customers were already prepared to pay.

There are several possibilities for tariffication which need to be explored and analysed. It is possible to introduce a flat rate for all household connections, which would form the basis for registration and would get customers accustomed to paying. A second option, which was selected at the workshop, is to base the tariffs on the zones in which people live. Thus, a distinction would be made between Stone Town, planned areas and unplanned areas. More options are discussed in the report.

7. **recommendation**
The Government should take the decision on the re-introduction of water charges. This should be a precondition for the continuation of the project.
8. **recommendation**
The project should prepare an overview of the different options for tariffication with the implications for implementation and the positive and negative issues for each option. This overview should then be discussed with planners, policy makers and related departments and a proposal made for the tariffs. In addition, the commercial tariffs should be increased and meters installed for the larger customers.
9. **recommendation**
Together with the introduction of Rules and Regulations for the urban water works, measures should be taken to supervise and improve the connection of premises to the mains. Illegal or quasi-illegal connections, sometimes made by fundis employed by the DWD, should be reduced to a minimum. In the same context, it is proposed to establish a corps of private fundis certified by the water authority to undertake house connections and domestic plumbing. The water authority is further advised to reduce the number of fundis it employs in the future and instead recruit and train neighbourhood water inspectors, who can certify that house connections and domestic appliances are made according to regulations.
10. **recommendation**
A new policy should be established for new houseconnections. It should be determined beforehand in which areas new connections are technically still possible without jeopardizing the reliability of supply.
11. **recommendation**
For Pemba, an assessment should be made of the interest of customers in house connections. The system of handpumps and water committees seems to be working well and in case interest in houseconnections is not high because people cannot afford it, it may be feasible to introduce public taps on the same kind of conditions as the pumps.

Rehabilitation

Rehabilitation of boreholes, springs and pumping stations both in Pemba and Zanzibar is progressing well. Output of sources (based on safe yield, avoiding over abstraction) is now adequate for the calculated supply needs of Zanzibar around 2000. However, insufficient water reaches the consumer due to leakage, diversion into illegal connections and poor pressure levels.

The supply situation in Pemba is gradually also reaching required capacity. However problems with power supply continue to cause serious problems in supply capability.

Saateni pumping station is being rehabilitated with great skill using the old pumps with new engines. A lot of "rubbish" and old water supply materials (valves) have been recognised as good value and is being done up. The workshop expert is guiding this process transferring skills in operation and maintenance in the process to his younger Zanzibari colleagues. The workshop that is intended to be installed eventually in Mablue will also be looking after the preventive maintenance of UWS vehicles.

12. **recommendation**
No great investment in establishing a vehicle maintenance facility should be envisaged as private workshops in town will be used for special jobs.

In most of the pump houses the electrical installations are highly inadequate and dangerous. Though the electrical material is in store, no electrical engineer has been contracted so far to make the necessary installations.

13. **recommendation**
An electrical engineer is however urgently required. As it is unlikely that this job can be finished in one contracted activity, it might be advisable to contract a electrical engineer from Tanzania, Kenya or Uganda to undertake the work. This will allow for easy follow-up work, as and when needed.

Since a few months the repair of the distribution network has been started. However at the moment the two repair teams are running after their own tail in the sense that the work is undertaken in an ad-hoc manner on the basis of the reports received from two roving water inspectors.

14. **recommendation**
It would be highly advisable if repair work would gradually be brought in line with the mapped water development concentration areas.

Technical repair skills for the distribution network are available in Zanzibar. The people that have those skills are most probably retired by now. Some elderly fundis are being used by the project as informants on the location of valves.

15. **recommendation**
In the absence of appropriate vocational training opportunities in Zanzibar, it might be good to consider to develop more pipe repair teams around such an elderly fundi. The senior fundi can show his younger colleagues what the right way is of repairing a pipe or putting a saddle properly. By using this approach for a few years, the young fundis can learn from their elders, while at the same time it may speed up the network repair activity.

16. **recommendation**
In how far this work needs to be supervised by an expatriate technician needs to be considered. It is proposed that this task can already soon be taken over by a local network manager.

17. **recommendation**
Ways should be sought to record and exchange within the Programme the expertise and experiences gained in both Zanzibar and Pemba with respect to consumer relations, redevelopment of the distribution system, consumer education and source protection, revenue collection and systems for financial management, community participation in an (semi-)urban setting, etc. Regular staff workshops and short term secondments among the two islands may prove useful mechanisms to achieve that.

Environmental Issues

The studies undertaken during the inception phase of the project give a good picture of the water quality and quantity situation. The aquifers in Unguja island are by and large unconfined which means that there is no protective sealing layer between the human activities on the surface and the ground water stored. It thus means that wastes generated by human activities will gradually percolate into the aquifer and will cause pollution of the water. The degree of that pollution depends on a range of factors such as time elapsed (in respect of bacterial degradation) and degree of dilution. In order to minimize the long-term effects of any seepage of waste into the aquifer, it is imperative that protection zones are established, that household and industrial waste is managed and controlled well and that water quality is monitored over the years.

When discussing the quality issues during the workshop it was indicated that laws have already been passed by the House of Representatives allowing fencing off of water source protection zones. Also, homesteads that have built (encroached) on the protection zone can legally be demolished.

The Programme has studied the matter and has proposed two types of protection areas for zoning.

18. ***recommendation***

The Zanzibar Government should urgently take action to establish designated protection zones for all drinking water sources on the two islands in consultation with the Zanzibar Integrated Land and Environmental Management (ZILEM) Programme and the ZUWSDP.

The ZUWSDP provides an opportunity to develop an on-going assessment of the state of the ground water reserves in Zanzibar. The documentation prepared during the inception phase of the ZUWSDP does not indicate any risk of sea water intrusion or deterioration of the water quality due to over abstraction. Nevertheless, monitoring of water quality remains necessary to track down any changes over the seasons and years.

19. ***recommendation***

The ZUWSDP should ensure a proper monitoring of the groundwater situation during its lifetime. If at all possible, it should contribute to information collection and data base development on the status of groundwater in preparation for a national institute that could take on this type of environmental monitoring.

20. ***recommendation***

While the ZUWSDP could play a capacity building role with respect to ground water and environmental issues, ground water resources management can not be its responsibility. This would be the responsibility of a restructured DWD, which would for instance execute such a responsibility in collaboration with the Commission for Lands and Environment and supported by an adequate legal framework.

1. Introduction and background

In October 1989 the Government of the United Republic of Tanzania and the Government of the Republic of Finland agreed to cooperate in developing the urban water supply sector in Zanzibar. The planning phase of the Zanzibar Urban Water Supply Development Project (ZUWSDP) commenced in 1990 and a project document for the first implementation phase was completed by June 1991. It focused on a plan for the rehabilitation and further development of the urban water supply and on an assessment of human resources needs and institutional arrangements suitable for an urban water supply management body.

The first implementation phase of the Zanzibar Urban Water Supply Development Project was started in August 1991. The project is located within the Department of Water Development of the Ministry of Water, Construction, Energy, Lands and Environment of Zanzibar. It covers improvement of water supply in Zanzibar town on Ugunja island and in the towns of Mkoani, Chake Chake and Wete on Pemba island. It is foreseen that the urban water supply section of the Department will be transformed into an Urban Water Authority. Institutional development is geared towards that objective.

The interest for the Project is good as was shown by the field visits in Pemba where the mayor of Mkoani town was very knowledgeable about and active in the project and by the visits to the various wards of Zanzibar town. The deliberations during the workshop at the end of the mission also showed a high degree of interest and concern in the Project. Now only should the Government of Zanzibar show its real commitment to these developments by meeting the legal and institutional requirements for water resources management and urban water supply development.

Town water supply is not new to Zanzibar. Already early in the century piped water supply was available in Stone Town and surrounding areas using water from intakes in Bububu and Mtoni. Rules and regulations were in force with respect to service levels and house connections, rate payments and standards for appliances. It is clear that the system functioned well in those days and the effects of it can still be seen in some premises. Rate payment was well established and records were kept by the then Water Supply Authority. Skilled staff was employed and supervised to ensure standards.

Economic difficulties of the last decade, the growth in the urban population and the declaration by the Government of Zanzibar in 1982 that "water is free" for domestic consumers, have caused the public supply of water to gradually crumble. Erratic power supplies (especially in Pemba), low-grade piping and plumbing material, lack of supervision of the fundis making the house connections, and illegal or uncontrolled connections (e.g. for small scale irrigation and leading to the rural areas) has led to a situation whereby water supply has become highly inadequate and unreliable. Yet, the consumers can not really complain to the Department of Water Development as they are not paying for services.

The ZUWSDP was initiated to improve the technical and managerial aspects of 4 existing town water supplies in Zanzibar. From the foregoing it is clear that the project can be characterized by the concepts of **rehabilitation** and **upgrading**. Rehabilitation of the technical and administrative supply capacity combined with upgrading in quantity, quality and reliability of the water supply to meet present-day and future demand.

In this context it may be worth mentioning the economic recovery programme (ERP) initiated in 1987 by the Government of Zanzibar to broaden its revenue base by economic diversification especially through the promotion of tourism and export processing zone (free trade zone). These economic activities rely heavily on the availability of water, again underlining the importance of proper water supply.

The Project Document for the First Implementation Phase envisaged a review of the implementation phase two years after its commencement. However, pressures to compare progress to the plans and manning schedule in light of the delays encountered in the programme execution and the financial constraints faced by FINNIDA, have caused this review to take place earlier.

The main purpose of the mission was to review the progress of the first Implementation Phase; to evaluate the success of the selected approach; and to appraise the need of expatriate personnel during the remaining period of the phase. Special emphasis had to be given to issues of viability of the urban water supply unit to be established, including the real commitment of the parties, local financing, as well as environmental impacts of the increased use of the ground water.

End-of-mission Workshop

At the end of the review mission a workshop was organized to discuss the Zanzibar Urban Water Supply Development Project. The workshop was very well attended by close to 40 participants. Representation came from the house of representatives and participants from senior management levels in the Ministry of Water, Energy, Construction, Land and Environment, led by the permanent secretary. Also participants from various other ministries and departments, and from the Urban Water Supply Development Project. For the first time since the inception of the project discussions were held about the objectives of the project and the problems encountered as well as the key issues relating to the sustainability of the urban water supplies in the Zanzibar isles. The deliberations showed a high degree of concern and willingness to act on issues such as tariffication, policy framework and legislation, the set-up of the Urban Water Authority and its mandate, as well as water resources management and the need for environmental protection. The outcome of the discussions are reflected in the recommendations of the mission. The programme of the workshop, list of participants and issues for group discussions are given in annex 1.

2. Institution Building

2.1 Introduction

The Ministry of Water, Construction, Energy, Lands and Environment has the responsibility for water production and delivery in rural and urban areas in Unguja and Pemba. The Department of Water Development (DWD) is the executing agency within the ministry. The DWD does not have organizational or financial autonomy which results in the department not being able to carry out its functions effectively. When the Urban Water Supply Project was initiated, the need for a separate section for urban water supply was stressed. It was indicated in the Master Plan that in due course the Urban Water Supply section would become a separate authority, preferably a parastatal with a legal basis for its operation and financially independent.

The DWD is in general fairly weak and understaffed. No head or director for the Urban Water Supply section has been appointed so far. This makes it hard to further pursue the autonomous development of the proposed UWS Authority. If the UWS section is not financially independent, it will further be difficult to ensure that sufficient funds out of the total budget for the Water Development Department will be reserved for necessary operation and maintenance activities in the urban areas. At the same time problems remain with the legal status of the Authority. It is not clear how far the idea of an independent parastatal has progressed within Zanzibari government circles, but it would certainly be useful to capitalize on the momentum created by the end-of-mission workshop and to use regular discussion and promotion with relevant authorities to continue to work towards a decision on the future status of the UWS section.

Support from key programme partners such as the Ministry of Water, Construction, Energy, Lands and Environment and the Embassy of Finland should be sought to keep discussions on water supply and sanitation development, in particular with respect to the status of the Urban Water Supply Authority and the financial self-sufficiency of the WS&S sector on the political agenda.

To provide the UWS section with a good start it is clear however that it is urgently necessary to appoint a qualified head of the section who will have the potential to grow into the position of director of the proposed Urban Water Supply Authority. The profile of the appointee should further be such that until such time he will be able to collaborate well within the Water Development Department, and accepting its directives with respect to issues of water resources management and equitable water development.

It is recommended that the Government of Zanzibar drafts appropriate legislation to establish the UWS Authority.

With respect to the future role of the Department of Water Development it is envisaged that the DWD will increasingly start to play a facilitative role within the water sector, leaving actual implementation to the UWS Authority and the Rural Water Supply Section which is presently still part of the DWD. It is proposed that the DWD will provide guidance with respect to development and utilization of water resources, and ensure quantity and quality by issuing the appropriate directives to the various agencies in Zanzibar involved in water utilization and discharge. To enable the DWD to play such a role a proper legislative framework has been drafted to ensure that the Department of Water Development can indeed ascertain compliance to directives for proper water resources management and distribution. The role of the Commission for Lands and Environment should furthermore be spelled out properly in this legal provision.

It is of some concern to the mission that the UWS section is taking staff from the DWD and setting up a proper organizational management system for UWS, but is not involved in assisting DWD to carry out a similar operation. If the UWS would have been located in the same building as DWD, equitable staff and organizational management development for both the DWD and the UWS would have been a natural process. Now that is not so as both agencies are housed in separate premises. This carries the risk that operational activities are still to a large extent carried out from the DWD office on which UWS does not seem to have much influence. Thus, the UWS section could become an organization without much operational effectiveness, while the DWD office carries out operations in a very unstructured way due to a lack of operational clarity.

It is therefore suggested that the ZUWSDP takes a slightly broader view towards the institution building of the UWSS and incorporates the needs of the DWD in its plans as well. It is accepted that in view of the change in the role of the DWD proposed above, it may not be clear as yet what the future needs of the Department are but all the same ZUWSDP could use its expertise to initiate a discussion on the broader organizational needs of the sector. This would ultimately also help to strengthen the management capacity within the sector and thus, indirectly lead to a better management of water resources which will obviously benefit the urban centres most.

2.2 Institutional organization of the Urban Water Supply Section

In September 1991, the Urban Water Supply Section (UWSS) was established within the DWD, but in a separate building. The UWSS has four sub-sections:

- Water Supply divided into an Operation & Maintenance Unit and a Planning & Design Unit;
- Workshops, divided into Garage, Mechanical Works and Civil Works units;
- Research and Development, divided into Water Resources Development and Laboratory units;
- Administration, divided into Manpower & General Services, Finance and Store Units.

A good review of the institutional arrangements for the UWSS in Unguja has been written by the management consultant in September 1992. In this review the practical experiences over the past year are compared with the propositions of the Master Plan.

Among others, the need for a separate unit on Research and Development is reconsidered. The mission feels that this reconsideration is fully justified because it is rightfully questioned if general water resources development should be part of the UWS. The task of overall coordination and controlling of water resources and protection of ground water resources should indeed resort under a national institution, covering both urban and rural water supply. As indicated above a restructured DWD could act in that role.

Similarly, the need for a separate laboratory is questioned. The mission understood that also the Environmental Department has a laboratory and that both sewerage and drainage sector have a need for laboratory services. This would indicate that one laboratory serving the needs of all these departments and sectors should be established/consolidated and that this laboratory should not necessarily fall under the UWS, but for instance under the Ministry of WCELE, or possibly attached to a separate institution as apparently previous was the case with the University.

It is recommended that a decision is taken on the laboratory, both with respect to institutional arrangements for cooperation and use and to funding arrangements.

With respect to Operation & Maintenance and the Workshop and the division of tasks between these units, the review stated that reconsideration of the arrangements is necessary. The mission would like to add, that the two crews which are now carrying out operation & maintenance activities do not seem to be working in a very coordinated manner, but ad-hoc on the basis of reports received from two roving water inspectors. There does not seem to be a structured approach for the O&M activities leading to area wise improvements. Because operation and maintenance are going to be the core activities in the project, a very

clear plan of operations should be made, indicating priority areas which have to be established in conjunction with a social review of the areas most in need of water. It seems necessary that at least two more crews would be needed for a more structural approach. It is recommended that repair work is gradually brought in line with the mapped water development concentration areas, selected on the basis of social mapping and technical feasibility.

Whereas there are general problems in Zanzibar to find trained and capable middle level cadres for planning, management and administration, it may well be that technical repair skills for the distribution network are available. The people that have those skills are most probably retired by now. Some elderly fundis are being used by the project as informants on the location of valves. However in the absence of appropriate vocational training opportunities in Zanzibar, it might be good to consider to develop more pipe repair teams around such an elderly fundi. The senior fundi may not be able to do the physical work to the same degree as during his working life, but he can show his younger colleagues what the right way is of repairing a pipe or putting a saddle properly. By using this approach for a few years, the young fundis can learn from their elders, while at the same time it may speed up the network repair activity. In how far this work needs to be supervised by an expatriate technician needs to be considered. It is assumed however that this task can already soon be taken over by a local network manager.

It is recommended that elderly (retired) fundis are hired to carry out on-the-job training of inexperienced fundis. Supervision does not necessarily have to be carried out by an expatriate technician and this post should therefore be reconsidered as these tasks could be taken over by a local network manager.

The lack of structured approach is also applicable to new houseconnections. Part of the problem may be due to the fact that most daily operational tasks in the urban areas are still mainly carried out by DWD and DWD staff. The physical separation of the DWD office and the UWS office seems to extend to the operational activities. For instance new houseconnections are seemingly given without any consideration of a strategic plan. It is urgently needed to establish a new policy for new houseconnections. First of all it should be determined in which areas new connections are possible. Secondly a new system should be developed for the execution of new connections.

It is for example questionable whether only water authority fundis should be allowed to do these houseconnections. More so because they are presently monopolizing the installation of house connections and in-house pipe fittings. Thus they can ask any price for their work. This seems a conflict of interests and so it would probably be better to establish private fundis to do the in-house connections. Afterwards the connection should be checked and approved by an UWS inspector. The connection from the main to the house has to be done by fundis from the water authority to ensure proper connections and mapping of the pipes.

To improve the work of the DWD fundis new instructions have to be issued for house connections. The fundis should be supervised by well-instructed inspectors. Lastly it is suggested to encourage private fundis to undertake the in-house fittings. To further ensure quality pipefitting work in the house, proper pipes and fittings should be available on the market. DWD inspectors could encourage the importation of better piping material by having regular visits to the few hardware stores stocking water supply materials and promoting the use of quality materials. Lastly, proper technical instructions should be

available for fundis. It might even be considered to run two or three-day training courses for established fundis on proper fitting techniques. Examples of such technical instructions can be found in some technical literature a.o from the U.K.¹

It is planned that the registration files for house connections and commercial connections will be transferred soon to the UWS office and that customer relations are conducted from this office. A strategy for registration by area is being worked out at the moment. The shift will also imply that operational staff for the houseconnections would have to be moved to the UWS office, including the fundis (plumbers), the people who draw the area map and inspectors. How this will effectively be done is not yet clear.

The activities of the training and management consultant have so far mainly been directed to the development of an organizational structure for the urban water supply section, which is according to the workplan. As mentioned above, the organizational chart as proposed in the masterplan is currently under reconsideration, based on the specifications of the duties of each department and the job descriptions which have been provided for most of the current jobs in the urban water supply section. Furthermore performance evaluation systems have been prepared and systems for personnel management.

At the time of the mission, two new staff members had just been recruited for the administrative unit: a consumer officer/administrative assistant and a public relation officer. Because these two persons are fresh graduates without any experience, it may take some time before they can be effectively operational, and they will have to be trained on the job by the administrative officer and the consultant.

It is a concern to the mission that there is no person sufficiently qualified to guide the social process of the water development activities (community participation/consumer relations and user education). The management consultant is a sociologist by training but in her working environment seems to have been more associated with management (systems) development rather than with sociological aspects of community involvement and representation. Her job in the ZUWSDP has been to set up the institutional organization, which has been adequately done.

This work does not seem to need a full time expatriate support any more. Moreover, the consultant is assisted in all of her activities by a very capable and active DWD officer who has been very well trained on the job and has the capacity to carry out the requirements for further institutional organization. On the other hand, to develop a social approach of the water supply development or to give shape to the contents of a meaningful user education programme, it may be necessary to have support of a sociologist with recent experience in these areas.

The continuation of the post of the management consultant should thus be reconsidered after the contract expires by the end of 1992. It might be better to utilize the last 6 months of expatriate support indicated in the budget in a short-term consultancy fashion as and when the time is ripe with respect to guiding further developments in institution building, consumer relations and user education. Till that time, the Zanzibari counterpart officer supported and guided by the project manager can take care of further developments.

A useful publication from a developing country is for instance the book on " Residential and non-residential drinking water installations and drainage requirements in Nepal" published by the Balaju Mechanical Training Centre, Kathmandu and available from SKAT, St.Gallen. Switzerland

What to do?

Supplying water or setting up the institution?

The ZUWSDP has during its planning phase and during the first year of operation focused its activities on capacity building for the Urban Water Supply Section and on the rehabilitation of the water supply sources. Since 1989 therefore, work has been going on in strengthening the basis for proper water supply development. Whereas this work has been done thoroughly and well, the clients: i.e. the government of Zanzibar and the actual water consumers, have noticed little result so far.

It is accepted that it takes time to improve the water supply situation in Zanzibar, but an approach whereby structural improvements in water supply development and management go hand in hand with an improvement in drinking water delivery would certainly have been preferable. It would have meant that the ZUWSDP would have been able to establish consumer relations on the basis of increasing consumer confidence. The discussion on tariffication and the institutional necessity for an Urban Water Supply Authority could have been brought forward, and a larger government commitment and action could have been generated with respect to a range of issues, among which important ones like the zoning of protection areas for boreholes and springs.

It can be argued that the time was not yet ripe for a stronger profile for the UWS as the changes that could be brought about in the supply to the consumers were so small. However, the discussions the mission has had with consumers at all levels, including those that participated in the workshop show that there is a high level of interest in water supply affairs. The ZUWSDP could have used that interest by mobilizing support and thus commitment for the goals of the project. This could have been achieved by a more active public information effort. Some work in this area has been done by producing a video for screening on the Zanzibar television, but that certainly was an inadequate effort. The mission feels that the ZUWSDP should use its growing capacity to deliver water to promote its activities by informing the public and making the improvement of drinking water supply a common effort between the Government, the public and the Project. If that is achieved, the population will accept to bear regular inconvenience due to the on-going work and will also want to consider paying for the supply of water in the expectation that matters will improve considerably.

2.3 Consumer relations

For the preparation of the master plan a household survey was carried out in 1990. The masterplan indicates that this survey is not yet a sufficient basis for a plan for community participation and education activities. Collection of relevant data and the initiation of experiments and studies would have to take place in the first two years of the implementation phase. So far, no activities have been undertaken in this respect because of concentration on organizational management. No use has yet been made of the results of the survey and because the economic and political situation has changed considerably during the past two years, the results may not all be valid any more.

The masterplan further indicates that community participation should be taken into account in planning and implementation of each operational phase and that small scale pilot programmes are needed to work out proper procedures. It is not clear what is meant by community participation. Because most people have houseconnections, community

participation for water delivery is not really necessary. What is necessary is to establish a communication system between consumers and the UWS section. It has to be clear to the consumers where they can go if they have a problem and the UWS section has to be able to effectively react on the problem. Even if it is not possible for the UWS to improve the water situation immediately, it can at least be explained why this is not possible (for instance if water pressure is low due to the number of illegal connections). In areas where public taps are the main source of water supply, community participation is essential to ensure sustainability of the system. The present activities on Pemba show that community participation is feasible and successful.

The mission undertook a number of field trips in different areas of Zanzibar town, and the three towns in Pemba to talk to residents and assess the water situation. Discussions were also held with staff working in the water department, the urban water supply section, the electricity department and the environmental department.

Water availability

Water availability in different parts of Zanzibar towns differs considerably and a number of areas have almost no water at all during periods of several weeks. However, within these areas, some houses do have water and others not, indicating a connection to different mains or an extent of (illegal) connections which effectively reduce the pressure to such an extent that almost no house gets water. Other areas have a more regular supply, but rarely is there a 24 hour availability of water. People have learned to cope and most houses have storage containers which they fill up during the night when supply returns. When water does not come for longer periods, people usually get water through neighbours, through a public tap (if this had water), through the CCM branch office or through water vendors. These water vendors sell water for Sh 50 per container, some households spent Sh 300 per day on water.

When the project will start on the upgrading and rehabilitation of the existing system, it is advisable that the selection of areas for implementation is based on the current water situation and in as far as possible priority should be given to those areas which have severe shortage of water. For this purpose, all districts and subdistricts should be visited to assess the current water supply situation and interviews should be held with the residents, with the CCM offices and other district/ subdistrict level organizations to establish the number of hours per day/or night/or week/or month that water comes from the private tap. Also roughly the number of households without connection per area should be established as well as the reasons for non-connection and the place where these people get water. An inventory should be made of the number of public taps in each area, the condition of these taps and the hours of supply from these taps. On the basis of the social mapping, priority areas for water improvement, including new connections, can be indicated. In collaboration with the technical sections, priority areas can be determined on the basis of social need and technical feasibility.

The administrative officer assisted the mission in the field trips and would be able to carry out these visits together with the newly appointed public relation officer and/or the customer relations officer. This would also enhance the visibility of the project with the Zanzibar residents and could provide a basis for the development of consumer relations.

Social mapping should be undertaken in Zanzibar town to find out in which areas there are the greatest needs for water supply improvements. If at all possible technically, these areas should then get priority in the design and implementation of improvements in the distribution system. Due consideration should be given to the integration in physical and financial terms in the overall ZUWSDP programme to ensure the sustainability of such improvements.

Houseconnections

In Zanzibar most people seem to have a houseconnection. It is estimated that there are between 20.000 and 30.000 official houseconnections. The extent of illegal houseconnections is not known but may be as much as double the number of legal connections. To get a houseconnection, the customer has to get an application form at the Water Department and pays a fee of Sh 500 which covers form, plan of the location of the house and labour cost for the connection from the main up to the house. The connection has to be done by a fundi from the department. Material cost of the connection from the main and inside the house is borne by the customer. The fee for the connection inside the house is determined by the fundi and is his private income. The inside connection also has to be done by a fundi from the water department. There is no supervision or checking done by an inspector. The total cost to the customer will depend on the distance from the main to the house and on the labour cost charged by the fundi and is at least Sh 5000. Up till 1982 water charges were levied, but at present water supply is not charged except for commercial buildings. If people do not have a connection, this is mainly due to the low reliability of the water supply, which makes people reluctant to spend funds on a connection and not being sure that they will have water.

Per month between 40-50 new connections are made. There does not seem to be a policy which determines where connections can be laid or where they cannot be laid because pressure is already too low. There is also no clear policy on the provision of public taps and it could not be assessed by the mission to what extent there are areas where many people do not (yet) have a connection and where consequently more public taps (or pumps) are needed.

There is no communication between the water department (or the urban water supply section) and the customers. Because customers do not pay for water they have no claims and no channel exists for such claims anyway. The people seem to be resigned to the fact that sometimes they have water and sometimes not and that some people in the neighbourhood do have water and others not.

Because no public relation activities are taking place and consumer relations are non-existent, the project is not very visible in Zanzibar as yet. This may change when more systematic improvements in the network can be carried out.

3. Water Supply Improvements

3.1 Situation Analysis

The water supply systems of Zanzibar town and the towns on Pemba island were developed during colonial times. When planned and constructed, the systems were performing their tasks well, being technically sound and financially managed well. Legislation existed and was enforced effectively (ref. The Towns Water-Works Rules 1940, annex 3). Various changes in organizational responsibilities for water supply and the policy to provide water free have made it very difficult for the Zanzibar authorities to keep up with demand for extension and improvement of the existing water supply systems. Lack of foreign exchange made it furthermore impossible to purchase necessary quality water supply materials.

As a consequence of all this, the water supply systems have gradually deteriorated and have increasingly failed to deliver the required services. The Government of Zanzibar assisted by the Government of Finland decided to address the issue of rehabilitation in 1989 and have since been working on plans to improve the water supply delivery in Zanzibar and Pemba. Whereas the reasons for the poor functioning of the water supply systems are manifold, as indicated in this report, this section will only deal with the technical water supply issues. The technical issues can be summarized as follows:

- * insufficient water quantity: sources not delivering sufficient water or an inadequate number of sources;
- * poor pressure levels in the distribution network: leakage, insufficient booster stations, poor quality of the pipes and fittings;
- * illegal connections, and pipelines "leaking" water into the rural areas;
- * poor household water supply fittings, while taps are also often left open in the house to collect any water that might drip in.

3.2 Physical progress

Production

Since the project started to look after the improvement of the intakes and the distribution system progress with respect to the spring intakes and boreholes has been according to plan.

In the Zanzibar town supply the civil works at the springs are being done up. The pumping station at Saateni is being rehabilitated with great skill using the old pumps with new engines. A lot of "rubbish" and old water supply materials (valves) have been recognised as good value and is being restored to its original purpose.

The existing boreholes have been checked and the majority is now operational. Additional boreholes are being drilled to augment production and spread abstraction of ground water over a larger area to reduce the risk of ingress of saline water.

As indicated in annex 2 the combined daily production of boreholes and springs in September 1992 was 25000 m³. Over the first nine months of 1992 production varied from 17000 to 29000 m³. An important influence on the total quantity delivered is the output of the Bububu and Mtoni springs. In May-June the output of the two springs equalled 16000 m³ while in the dry period February-March the output reduces to 3500 m³.

It is assumed that the continuing rehabilitation of the boreholes and the drilling of some additional ones will lead to a reduced fluctuation in the production of water during the year and that this can be stabilized at around 25000 m³. If that is achieved the production target calculated in the Water Master Plan for the year 2000 is reached.

With respect to the water demand estimates it is noted that the Water Master Plan indicates a five fold increase in water consumption between 1990 and 2015 for Zanzibar town. Similar increase are found on Pemba island, but there it does not have such an influence on the design of schemes as these are very much smaller. However for Zanzibar town a five fold increase also means a serious financial outlay to make such an increase of production and supply possible. The mission has some doubts whether an increase of the production from 22000 m³/d to 50000 as indicated for the year 2000 and 2015 respectively is indeed realistic. It may well be that through increased efficiency of the UWS Authority and through the promotion of water saving measures, the actual water requirements could be reduced. It is clear that a reduction of water production has important implications for the distribution network and for the drainage of sullage. The Project is advised to consider these issues once more and if so felt necessary adapt the Water Master Plan.

The proposed input of the expatriate drilling engineer through the first 8 months of 1993 is considered to be sufficient to achieve the required physical targets as well as to ensure that his Zanzibari colleagues can continue their work with minimal outside technical support. Rehabilitation of existing boreholes and the judicious drilling of new ones can be continued by the crew using the rig they have now. It is not considered economical to buy additional rigs. Rather, it would be good to ensure proper maintenance of the present rig and if so necessary hire additional drilling capacity from Tanzania or Kenya. As indicated in the workplan for Phase I, it is suggested that a drilling engineer will again come to the project by the end of this phase for follow-up and further capacity building.

In Pemba the situation on the production side is quite encouraging, with near adequate water production being reached shortly for the towns of Chake Chake, Wete and Mkoani. Delivery of water remains a serious problem here due to frequent stoppage of electricity supply. In addition, rehabilitation of pumping and distribution stations requires a lot of work. However, this work is progressing well.

Delivery

While water may be available in sufficient quantity, it can not be said that it is also delivered to the consumers in the right quantity! In Zanzibar town the pressures are generally low and a lot of areas are getting water erratically. Poor delivery is caused by a variety of factors, some of which have already been mentioned above. Leakage caused by damage and poor quality of the pipes and fittings will reduce pressure and quantity. The lay-out of the original distribution system is gradually getting known but the changes made afterwards are not recorded. Location of gate valves to control sections of the distribution system are not known. It is noticed however that intricate looped connections have been made over time to ensure that water would indeed flow to a particular point. All this makes it nearly impossible to plan and predict improvements in pressure levels.

A serious problem also seems to be the flow of water into rural areas that are not

supposed to be part of the Zanzibar town water supply scheme. It is not quite clear what actually happens, but it seems that some peripheral "illegal" connections at the Eastern side of the distribution system supply a fairly large quantity of water to the rural areas. This would partially explain why the 25000 m³ now produced (equal to the target quantity calculated to be necessary in 2000) is still not sufficient to satisfy demand.

As discussed earlier it is recommended that the rehabilitation of the distribution network is structured in such a way that priority is given to those areas in the town where the benefit would be greatest in terms of social need. This means that the replacement of mainlines, the rehabilitation of sections of the distribution network and the installation of booster stations, etc. are prioritized not necessarily on the basis of technical considerations only, but that social needs and maximum service impact also play a role. In view of the slightly reduced funds for 1993 ZUWSDP has to consider very well how it is using the funds for the purchasing of necessary pipes and fittings. Priorities are needed here, and the P&D engineer will have to calculate the effects of the various options. By bringing in the social need and the consumer relation aspect the complexity of the rehabilitation problem is most certainly further increased. However, software programmes do allow fairly rapid calculation of various scenarios and so it must be possible to design structural improvements in a particular section of the network that satisfy the consumer demand, fit into the overall improvement plan and allow phased implementation of the rehabilitation plan on the basis of available funds. The 1991 annual plan indicates that the project already has some experience with such considerations when it calculated the pressure zones in the network.

As a matter of fact the issue of pressure zoning is important in the case of Zanzibar as it is clear from past experience that many in-house connections and fittings are inadequate. Raising the pressure might give rise to such pressures that leakage and bursting occur, leading to damage to housing. In the Stone Town, the Water Supply Development Plan had initially assumed a maximum pressure of 50 meter, or 25 meter above the highest houses. In view of the poor condition of many pipes it has been decided to reduce the scheduled pressure to 30 meters only. To get a better picture of the pressure distribution in the system a number of manual pressure gauges will be installed in the network to augment the 4 automatic one now in place. Better insight in pressures and flows will make network calculations also more reliable.

Since a few months the repair of the distribution network has been started. However at the moment the two repair teams are running after their own tail in the sense that the work is undertaken in an ad-hoc manner on the basis of the reports received from two roving water inspectors.

As indicated earlier in the report it is necessary to adopt a more structured approach towards the rehabilitation of the network. That will most probably mean that more work gangs would need to be available to work on the network. Some will then as before continue to do the immediate repair work whereas the two to three other teams will work on the network according to a proper network rehabilitation plan.

Technical (repair) skills for the distribution network are available in Zanzibar. The people that have those skills are most probably retired by now. Some elderly fundis are being used by the Project as informants on the location of valves.

In the absence of appropriate vocational training opportunities in Zanzibar, it might be good

to consider to develop more pipe repair teams around such an elderly fundi. The senior fundi can show his younger colleagues what the right way is of repairing a pipe or putting a saddle properly. By using this approach for a few years, the young fundis can learn from their elders, while at the same time it may speed up the network repair activity.

In how far this work needs to be supervised by an expatriate technician needs to be considered. It is proposed that this task can already soon be taken over by a local network manager, who would then preferably be supervised by the P&D department.

Support Activities

Saateni pumping station is being rehabilitated with great skill using the old pumps with new engines. A lot of "rubbish" and old water supply materials (valves) have been recognised as good value and is being done up. The workshop expert is guiding this process transferring skills in operation and maintenance in the process to his younger Zanzibari colleagues. The workshop that is intended to be installed eventually in Mablui will also be looking after the preventive maintenance of UWS vehicles.

No great investment in establishing a vehicle maintenance facility is envisaged as private workshops in town will be used for special jobs.

The condition of electrical installations and equipments of the water works and intakes is in many cases very bad and extremely dangerous. Often, protective devices are lacking and wires are just joined in a make-shift manner. Though the electrical material is in store, no electrical engineer has been contracted so far to make the necessary installations.

An electrical engineer is urgently required. As it is unlikely that this job can be finished in one contracted activity, it might be advisable to contract a electrical engineer from Tanzania, Kenya or Uganda to undertake the work. This will allow for easy follow-up work, as and when needed.

3.3 Water supply in Pemba

In Pemba the project has so far had quite some impact through its ability to improve the water supply situation by a clever mix of improving piped supply schemes and putting hand pumps on existing hand dug wells. Consumers are enthusiastic and highly appreciative, as shown by the extent of community labour contributions.

The Urban Water Supply Section in Pemba is led by an enthusiastic and capable engineer. The resident expatriate consultant is quite an experienced person, straightforward and practical in his rehabilitation and water supply development approach. Together they make an excellent team capable of undertaking the work necessary to restructure the water supply organization on the island and develop technical and managerially sound urban water supply schemes. The issue of unreliable electricity supplies continues to cause problems but that is to a large extent beyond their grasp.

The ZUWSDP should investigate the possibility to provide further training to the Pemba civil engineer in development and management of urban water supply schemes. WEDC in the U.K may well offer the right courses. It is also recommended that the expatriate engineer should be retained on Pemba at least up to mid 1994 to assist in the completion of the rehabilitation.

In Pemba, water availability depends to a large extent on the power supply. Since this is very irregular, people have requested the UWS project to assist them in the provision of pumps, which are usually provided on existing traditional wells. A community can request a pump but has to fulfil certain criteria: more than 200 people; no alternative water supply, and the willingness of the community to improve the well with rings, an apron and a stand for the pump. The UWS makes an assessment of the technical capacity of the community to carry out the improvements themselves and provide them technical assistance if necessary. The community has to form a water committee and has to maintain the pump and pay for repairs. Training of these committees has not yet taken place because there are so far only nine pumps placed.

The cost of a houseconnection in Pemba is higher than in Zanzibar, at least Sh 9000. Quite a number of people do not have a connection because they cannot afford it, which increases the interest in pumps. The presence of the pumps make the project in Pemba more visible than in Zanzibar.

It is recommended that in Pemba, an assessment is made of the interest of customers in house connections. The system of hand pumps and water committees seems to be working well and in case interest in houseconnections is not high because people cannot afford it, it may be feasible to introduce public taps on the same kind of conditions as the pumps.

Ways should be sought to record and exchange within the Programme the expertise and experiences gained in both Zanzibar and Pemba with respect to consumer relations, redevelopment of the distribution system, consumer education and source protection, revenue collection and systems for financial management, community participation in an (semi-)urban setting, etc. Regular staff workshops and short term secondments among the two islands may prove useful mechanisms to achieve that.

4. Environmental Considerations

The studies undertaken during the inception phase of the project give a good picture of the water quality and quantity situation. The mission has no reason to make serious comments on the statements made in the extensive reports that have been prepared during the inception phase of the ZUWSDP.

There is only one concern and that relates to the implementation of the recommendations given in the various documents with respect to environmental protection (a.o. Zanzibar Water Supply Development Plan 1991-2015 p31,32; ZUWSDP, report on hydrogeology, annex 1) and the monitoring of the ground water levels and quality. The mission has the impression that the implementation of these important proposals and the environmental monitoring has been delayed. It is however imperative that the appropriate environmental measures are taken to safeguard the water resources. Therefore the ZUWSDP should bring these recommendations again to the attention of the Zanzibar government for her follow-up. Implementation of these recommendations by the Zanzibar government would be a yardstick for her commitment to the Project and to the water supply sector at large.

When discussing the quality issues during the workshop it was indicated that laws have already been passed by the House of Representatives allowing fencing off of water source protection zones. Also, homesteads that have built (encroached) on the protection zone can legally be demolished. The Programme has studied the matter during the inception phase and has proposed two types of protection areas for zoning.

The Zanzibar Government should urgently take action to establish designated protection zones for all drinking water sources on the two islands in consultation with the Zanzibar Integrated Land and Environmental Management (ZILEM) Programme and the ZUWSDP.

Ground water is the only feasible source to meet the water demand for the towns in Unguja and Pemba. In addition this ground water is needed to satisfy the demands in the rural areas and for agriculture. The potential of ground water withdrawal has been studied during the inception period and on the basis of that study areas for potential development have been indicated for both islands. Calculations indicate that water resources are adequate to serve demand for urban and rural water supply, and irrigation using less than 10% of the expected annual recharge (2015).

Whereas in absolute quantities there are no problems with the resource fresh water, there may be problems in certain areas of the aquifer due to disturbance of salt-fresh water interface and due to salt-intrusion into boreholes caused by over discharging. Under the present pumping conditions these risks are minimal, but water quality should be monitored to be able to interpret any changes in water quality (in relation to season, water quantity abstracted and time elapsed).

The aquifers in Unguja island are by and large unconfined which means that there is no protective sealing layer between the human activities on the surface and the ground water stored. It thus means that wastes generated by human activities will gradually percolate into the aquifer and will cause pollution of the water. The degree of that pollution depends on a range of factors such as time elapsed (in respect of bacterial degradation) and degree of dilution. In order to minimize the long-term effects of any seepage of waste into the aquifer, it is imperative that protection zones are established, that household and industrial waste is managed and controlled well and that water quality is monitored over the years. ZUWSDP provides the opportunity to assess the state of the ground water reserves in

Zanzibar, but should not be left with the care for them. Ground water resources management should be the responsibility of a restructured DWD in collaboration with the Commission for Lands and Environment.

Rehabilitation of boreholes and intakes as well as the drilling of additional boreholes will spread the ground water withdrawal more evenly throughout the ground water aquifers. The calculations made in the documentation prepared during the inception phase of the ZUWSDP does not indicate any risk of sea water intrusion or deterioration of the water quality due to over abstraction. Nevertheless, monitoring of water quality remains necessary to track down any changes over the seasons and years.

The masterplan states that for environmental education (water user education) the UWS should create cooperative relationships with health and education authorities in environmental education and should invite town councils and local governments to cooperate in improving local knowledge about water among the residents. So far communication has been established with the department of environment and especially with the environmental education section. This section has been in existence for less than a year, but has been able to have a weekly programme on environmental issues on the radio and television, while three newspapers have reserved a weekly section on environmental issues. Other activities include the start of youth groups in a number of villages and working on curriculum development for inclusion of environmental education in the school curricula. Because water is a major environmental issue, the section is very interested in cooperating with the UWS and including education in water in their programmes. A task for the project would thus be to collect water education materials, to write stories on water for the newspapers and to establish consumer relations through radio programmes which can be transmitted through the environmental education programme. Focus could be on the finite character of water supply sources on the islands; on the need to protect the intake areas from pollution; on the respective roles and responsibilities of the water authority on the one hand and the customers on the other; explanations of low pressure in some areas as a result of illegal connections etc. Also part of the education should be directed to water use at home, i.e. methods of storage, the need to clean storage vessels regularly, the need to cover the vessels and to draw water from them with a long handled cup. It should be investigated to what extent the need to boil drinking water is realistic in terms of household finances and water quality. There may be indigenous methods to purify water which may be effective. It may be necessary to attract an outside consultant for a short period to assist the project team in this work.

Project staff should start to collect water education materials, to write stories on water for the newspapers and to establish consumer relations through radio programmes which can be transmitted through the environmental education programme.

The UWS has already produced a video on health and water in cooperation with Zanzibar television. The issues raised are water source protection, illness as a result of drinking of non-boiled water and the inability of witch doctors to heal diarrhoea. Because the film is largely taken in (semi)rural areas, the effect on urban residents may not be very high. The film does not focus on issues which are valid for urban residents such as water storage, water conservation, reporting of leakages and the effects of illegal connections. Moreover, no specific attention is given to women, although they are both in rural and urban areas the managers of household water.

5. Economic Issues

5.1 Financial and Economic Analysis

The approved Government's 1992/93 budget totals 32,851.6m/= of which 11,583.9m/= is Recurrent and 21,267.7m/= capital expenditure. Out of the total capital budget 3,280.7/= is expected to come from local sources assistance from abroad are estimated to amount to 17,987.2m/=. Revenue collection is envisaged to reach 31,901.6m/= during the year under review. These figures clearly show a budget deficit of 950m/= which will be covered by grants and credits from local and external sources. Further to this arrangement, the Government is proposing adjustments in the tariff of some sources of revenue and introduce new others.

Comparatively, 1992/93 budget deficit is less the 1991/92 by 32 per cent. This indicates both an expansion in the widening of revenue base with a simultaneous improvement in revenue collection. However, these developments still leave a lot of room for improvement. For instance, GOZ's public debts are estimated to increase from 973.7m/= in 1991/92 to 1,412.4/= during 1992/93. This is an average increase of 48.8 per cent. In order that the Government is able to reduce the budget deficits and at the same time service debt dues, other sources of revenue must be introduced.

5.2 Economic Projections

Zanzibar is currently experiencing a fast growing population (3% per year) and increasing socio-economic demands in both quantity and quality. The infrastructure roads, water, electricity, ports and sea navigational facilities has deteriorated, and continues to deteriorate, denying the Government a base for economic reconstruction. On the other hand export revenue is on the decline while imports of food commodities continue to consume 80% of the meagre foreign reserves. The resultant effect is a reduction of Government's capacity to buy spares for the sustenance of the existing production sectors. Obviously this situation reflects the poor status of existing pumps and service lines in the water supply sector. Undoubtedly, for a desirable functioning state of the Water Supply System deliberate efforts with implementable plan should be introduced so as to collect more money to service this badly needed commodity water.

With the financial sector portraying a blurred image marred by excessive credits to public enterprises, most of which, far from bringing corresponding returns, have either closed down or are maintaining mere skeleton appearance, a diversified approach of the economy becomes a prerequisite. Hence, the introduction of the Economic Recovery Programme.

Among the strategies outlined by the Economic Recovery Programme (ERP) us the expansion and improvement of the methods of revenue collection. However, this activity must be preceded by an action plan aimed at widening the revenue base. Considering that Zanzibar is a small island with weak economic base and rudimentary industrialization, positive measures to diversity the economy from the present monoculture nature are of profound importance.

In implementing the economic diversification strategy, several income generating activities are being put into affect. For instance, the Trade Liberalization Policy (1984), has tremendously increased sales tax and related duties. The Investments Protection Act, 1986

has enabled tourism to grow thereby enabling the Government to improve foreign exchange earnings. Currently, the Government has designated sites for Economic Processing Activities. In the meantime studies are being conducted on the viability of various other strategies that can contribute to the speeding up of the required developments. Among such possible options open to the Government include the establishment of a Free Port, off-shore banking, off-shore companies and ship registration.

The implementation of all these economic activities will need, among other ingredients, a reliable water supply system. Water is and should be considered an important input in whatever direction the economic U-turn will take. It is evident that improved water supply would very much benefit economic development in Zanzibar. From the above economic and financial analysis it is obvious that the Government will be unable to improve water supply services and continue to deliver water free of charge.

5.3 Water supply in Pemba

A consequence of the difficult economic situation is seen in the low reliability of the water supply in Pemba island. As indicated a few times earlier Pemba faces serious shortages in power supply. This is caused by the fact that the State Fuel and Power Cooperation (SFPC) is unable to meet the diesel costs to run its power generators in Pemba. The estimated monthly costs runs up to 20.0 M/= while revenue collections are hardly 3.0M/=.

Roughly, SFPC is able to collect an average of 15% of its running costs. Revenue collections is made difficult due to unavailability of power to consumers. Thus enforcement of payment becomes unrealistic. However, generators must run and fuel has to be supplied. Among the non-paying customers comes the public services.

In order to ensure constant supply of diesel in Pemba the Ministry of Finance came to an agreement with SFPC whereby outstanding bills will be paid. Under this arrangement MOF reimburses fuel companies supplying diesel to Pemba Power Plants. Thus the responsibility of ensuring constant fuel for running the power generator now is shifted from SFPC to MOF.

The advantages of this agreement between SFPC and MOF is now realized in the sense that power generators are functioning and power supply in Pemba is becoming more reliable. The resultant effect is an increased functioning of water pumps which then leads to a more reliable water supply.

The arrangements are simply acknowledging the fact that water supply is an expensive venture. The availability of clean water to the population is strongly related to the proper functioning of pumps (which need constant maintenance) and constant power supply (which need oil in the case of Pemba). If the Department of Water is able to pay its electricity bills, so much financial burden could be relieved from the Treasury.

6. Criteria for sustainability

6.1 Introduction

To further support the discussion on the town water supply projects and the water supply development in general, a seminar was organized at the end of the review mission. The seminar tried to raise a few issues of sustainability as these relate to the ZUWSDP and to the future safe guarding of ground water in the Zanzibar isles.

Following an expose by review mission members on issues of quantity and quality of water, the reliability of the water supply and a presentation of the ways by which people manage to cope with the unsatisfactory water delivery situation, the criteria for sustainability to be discussed were introduced. The four issues that were considered most opportune in the context of the workshop were:

1. cost of production of water and the need for tariffication
2. legislation for water and the necessary policy framework to safeguard the water supply
3. institutional strengthening
4. water resources management and environmental protection

The workshop did not try to attempt to address the issues to very great detail, but wanted to contribute to the "water and environment" debate on the islands by offering a structured opportunity to discuss important issues. Close to 40 representatives from relevant sectors of the Zanzibar administration participated in the workshop. A full listing of the workshop participants and the outcome (unedited) of their deliberations is given in annex 1.

6.2 Tariffication and revenue collection

The cost of producing water, that is to withdraw water from the boreholes and intakes, to treat it and to pump it to the town, is quite considerable. In terms of energy for pumping, staff and materials for operation and maintenance, etc. quite a bit of financing is required to ensure that all tasks of the water supply authority can be executed properly and with the right level of responsibility. It is obvious that adequate funds thus have to be furnished to the water supply authority for water delivery, O&M, environmental protection measures, exploration and expansion and for staff development. In the past these funds have been granted by the Government of Zanzibar but in view of the economic projections given in section 5, it seems ever more difficult to allocate the necessary funds. If the funds can not be allocated in adequate measure by the Government, then the consumer has to be addressed. Such a situation existed once but not any more.

Since 1982 no water charges are levied for residential customers. Commercial customers do have to pay, but the amounts are minimal, at Sh 75-150 per month for cafeterias/teahouses; Sh 200-450 for restaurants and Sh 3000- 18000 for hotels depending on the number of rooms, the service level and the facilities. The bill is sent every month by the revenue collector and has to be paid within 15 days. If payment is overdue for a week, a second bill is sent. The connection is said to be cut after another week. Fine for disconnection is Sh 100, which is less than it cost to disconnect. Customers can pay in advance for a year, in which case they get a discount for two months. With inflation as it is, this is however not at all attractive.

New connections for commercial buildings are immediately registered for billing, but for the older connections there is no system for control on registration although the revenue inspector does go around and checks registration of commercial customers.

The harbour is a large customer and although ships do pay for water to the harbour master, these funds are never carried over to the revenue department of the water authority.

During the field trips an assessment was made of the willingness to pay of residential customers. This willingness was indicated everywhere, probably because people used to pay before. In areas where water supply was at least regular for some hours a day, customers were already prepared to pay. In areas where supply was irregular and often not existent at all, it was clear that the situation had to change before people would be willing to pay. The bidding game was done with quite a number of people and it turned out that many were willing to pay Sh 500 per month. It should be mentioned that this is per house, not per family. Since most houses are occupied by more than one family, the charges would be shared among more than one household.

A visit to the Electricity department revealed that they have almost completed the automization of revenue collection. There are 19.000 houses legally connected and the connection costs vary from Sh. 30.000 to Sh. 50.000, depending on the distance from the main wire and the need to erect additional poles. It was intimated that generally when houses are not connected to electricity, this is not a matter of inability to pay for the connection but inability of the electricity department to supply the connection. All connections are metered and the cost of the meter is about Sh. 17.000 (this is included in the total connection cost). Zanzibar town is divided into 15 districts and each district has a meter reader. The meter readers are supervised by a senior reader. The meter reader visits each house every month to read the meter and to deliver the bill of last month. The customers have three months to pay their bills, after which they get a warning by letter included in the bill and later by radio announcement that all customers in such and such district who have not paid their bills will be disconnected within the following week. If the electricity is disconnected, a fine has to be paid of Sh. 500 before reconnection takes place.

The system seems to work well and it might be possible for the water department to make use of the automation experience of the electricity department for their registration. The possibility of including a flat rate for water in the electricity bill was discussed, but does not seem feasible as connections do not always overlap. However, in the phase of re-registration of water customers, it would be possible for the staff of the water department to follow the meter reader and on his introduction check the house for number of taps and kind of toilet (if necessary for the billing) or just on having a house connection or not. The advantage is, that the electricity meter reader already knows his customers and full details of the customers are entered in the files. For those households who have a water and an electricity connection, the automation system of the electricity department could be used as a basis to set up the system for the water department. It would therefore be advantageous to follow the same division into districts as the electricity department.

Automation should be started of the (re)registered customers. The experience of the State Fuel and Power Corporation should be taken into account and if possible their files could be used as a basis.

The existing files on houseconnections date back to the 1940s and especially these old connections will have to be rechecked for name of house owner and house number. It should be possible however, to make use of the old files when doing the re-registration. The old files contain the situation sketch of the house and indicate where the connection pipes are laid outside the house, this information should be kept and updated if necessary. It is necessary to start the process of re-registration as soon as possible and it may be advisable to start the registration in those areas where water supply at the moment is regular to the extent that customers get water daily. As soon as the decision on water tariffs is taken, these people can start paying. At the time of re-registration, it would be possible to start the process of consumer relations by explaining coming tariffication and responsibilities of customers and authority as well as information on the location of the customer relation office.

It should then be stressed that the water charges are not for the water per se but for the operation and maintenance of the network that brings the water from the source to the customer. In this way, tariffication will not contradict religious principles in which water is considered a free good for all.

The process of (re)registration is started first in the areas where water supply is at present at least regular even if not 24 hours. The areas can be determined on the basis of the social mapping. Also registration could start in the areas which are selected for upgrading and improvement so that implementation and registration is carried out simultaneously.

During the workshop systems for tariffication were discussed. There was consensus on the need to reintroduce water charges, because the network cannot be operated and maintained without customer charges being levied. The situation at present is such that the finances available for the water department are almost totally devoted to the salaries of the department staff. At the moment funds are even lacking for stationary, forms and files, let alone for rehabilitation and maintenance or extension of the water supply system.

It is recommended that the Government takes a decision on the reintroduction of water charges. This should be a precondition for the continuation of the project.

There are several possibilities for tariffication which need to be explored and analyzed. It is possible to introduce a flat rate for all household connections, which would form the basis for registration and would get customers accustomed to paying. At a later stage diversification of fees could be introduced.

A second option, which was selected at the workshop, is to base the tariffs on the zones in which people live. Thus, a distinction would be made between Stone Town, planned areas and unplanned areas. This system has the disadvantage that not all unplanned areas (which would have to pay least) are low-income areas and planned areas have parts which are inhabited by low-income categories.

Before tariffication stopped in 1982, the tariffs were based on the Annual Rental Value of the houses. During the discussions it became clear that the requirements to keep this system functioning well, i.e. a yearly update of all rental values cannot be fulfilled and that therefore this system should not be reintroduced.

A fourth option would be to base the tariffs on type of house (building materials used) or facilities present in the house. This system would need assessment of each individual house and very clear regulations on typology of houses and facilities inside the houses. Moreover, it would need reassessment every couple of years.

The project should prepare an overview of these different options with the implications for implementation and the positive and negative issues for each option. This overview should then be discussed with planners, policy makers and related departments and a proposal made for the tariffs.

In addition, the commercial tariffs should be increased and meters installed for larger consumers.

In order to support the Project in its economic projections, to make a first assessment of the tariffs and to investigate the various options for rate collections, a economist is indicated in the Project document. The mission agrees with the fact that this economist performs a number of short term missions rather than that the economist would be engaged for a longer consultancy period. By coming in intervals the economist can start the process of economic projections and tariffication, leave instructions for follow-up during the interval and on the basis of improved data and further experience refine the economic projections and potential for tariffication during a next consultancy. In view of the slow pace of data collection it would seem a waste of time to have an economist for longer periods in the Project than is now proposed.

6.3 Legislation and policy environment

As a basis for a sustainable water supply service, clear rules and regulations indicating the responsibilities of both the supplier and the customer have to be established. Such legislation forms the basis for the relationship between supplier and user and should address all the issues directly and indirectly related to ensuring an interrupted water supply of good quality.

The project has been investigating the appropriateness of the existing Town Waterworks Rules dating from 1940. Although these are not applied any more, they carry a lot of useful rules and regulations with respect to water supply, domestic infrastructural requirements and drainage.

It is recommended that the Town Waterworks Rules dating from 1940 should be considered, updated and adapted to present circumstances as a first step in making a new beginning with a properly regulated urban waterworks system.

6.4 Institutional Strengthening

For a water supply to function properly, a strong organization is necessary with a clear mandate and the powers to enact its responsibilities. The Project has as part of its task to strengthen the institutional build-up of the UWSS and has already made some good progress. However, the Project can now only do its institution building part in the context of prevailing institutional set-up within the Water Development Department. A real break-through can only come when a separate agency is created with a mandate to

independently execute its duties and responsibilities. The working group in the workshop concluded that the independent agency should then be monitored by a National Water Authority that would then need to be created. This idea had also been raised by the mission as is reflected in section 2.1.

The Project should give further thought to the institutional capacity building tasks within such an independent body and would preferably at that time also consider the institutional development needs of such a National Water Authority. The Government of Zanzibar should consider how it would like to incorporate such a National Water Authority in its administration and what mandate it should have. The latter also refers to a potential role for such authority with respect to the environmental aspects of water management.

6.5 Environmental Considerations and Source Protection

During the inception phase and also in this report ample attention has been given to environmental considerations with respect to their influence on the ground water aquifers from which water is abstracted. It is clear that in the fragile environmental conditions of Unguja and Pemba utmost care has to be taken to ensure good quality water now and in the future. To preserve the fame of Zanzibar as an island with good wells, control measures have to be taken with respect to protection zones, management of wastes, etc. Some of these control measures have been proposed or are even embedded in legal provisions. However they have so far not been enacted. It is imperative that the Government of Zanzibar takes the issues associated with protection zones serious and enforces existing provisions with respect to encroachment onto borehole sites and intakes. If that is not done, some of the boreholes and springs within the town area will prove to be polluted beyond use in a few years time. This will cause severe problems as water will then have to be drawn from sources further away from the town thus causing increased costs for transportation of water.

During the workshop the working group was aware of these considerations and came up with useful suggestions on how to remedy the situation. It is clear that here again (as in other groups) strengthening of the institutions involved and a greater importance attached to monitoring the environmental compliance are indicated as prime activities.

7. Expatriate staffing

The mission has been asked to give its judgement about the level of expatriate staffing within the Project. In the document various mentions have been made already about expatriate staff inputs. These will only be summarized here for completeness sake.

With respect to the project coordinator no observations are felt necessary. The mission feels that the present project coordinator is most certainly up to his task. However, somewhat closer supervision and scrutiny of the activities may be in order as this will allow him to play a more active role in continuing specific tasks in the absence of his colleagues or during the intervals between consultancy visits.

The contract of the training and management consultant should not be extended after expiry of her contract, as there is presently no further work for her to do. Maybe later when there is more clarity about the direction of the UWSS would it be useful to bring an institutional development expert back into the project for a short term consultancy.

This has also been indicated in the staffing plan.

By this approach some man months are saved which could be used for a consumer relations expert, or for training of the newly employed officers that are supposed to develop aspects of consumer relations.

The P&D water supply engineer should be retained during the full course of the Project. His inputs are essential to maintaining the technical quality of the rehabilitation efforts in Ugunja and Pemba.

As indicated it is felt that task of the network engineer can soon be taken over by qualified Zanzibari staff. This is in accordance with the Project plan. This staff should operate under the instructions of the P&D engineer.

The drilling engineer will leave around August 1993. In view of the remaining work and the time he still needs for capacity building of his staff this investment is certainly warranted.

The mission can not at this judge whether the contract of the O&M engineer should be terminated by mid 1993 as is indicate in the staffing schedule. This will wholly depend on the progress made in the physical rehabilitation of the various pumping and booster stations, and the moment at which the physical and staffing arrangements have been put in place for the continuation of his activities. The latter is important as there should be adequate time for him to transfer his skills to his Zanzibari colleagues. It might thus be needed to extend the contract of the O&M engineer and only end it by the end of 1993.

The resident engineer Pemba is a very capable person who together with his counterpart has really established a positive presence of the Project in Pemba. His contract is to expire by mid 1993. Depending on the institutional and technical development requirements and whether his colleague - as proposed by the mission - would follow a specialized course at for instance WEDC, the Project management should review the contractual arrangements. The suggestion of the mission would be to ensure adequate overlap because it would be a pity when the positive developments that have now put in place would be lost due to too soon a withdrawal of staff.

Of the short term personnel the electrical engineer has been mentioned. His arrival in the Project is imperative as any delays will cause delays in the completion of the rehabilitation of pumping stations which in turn will lead to a reduced production of water!

The hydrogeologist will shortly execute a consultancy to the Project. In view of the need to establish proper monitoring systems for hydrogeological survey and environmental monitoring his regular consultancy is needed.

All in all the mission feels that though there could be some few adaptations, the manning schedule is acceptable for a project of this complexity.

**CAPACITY BUILDING FOR SUSTAINABILITY
in the
ZANZIBAR URBAN WATER SUPPLY DEVELOPMENT PROJECT**

**WORKSHOP PROGRAMME
Thursday October 15, 1992**

- 08.30 Registration
- 09.00 - 09.15 Opening Session
- 09.15 - 10.30 Presentation of key points by the Review Team
- 10.30 - 11.00 Coffee break
- 11.00 - 12.00 Plenary discussion of key points and findings of
the Review Team
- 12.00 - 12.30 Composition of discussion groups and selection of
key issues for consideration
- 12.30 - 14.00 Lunch break
- 14.00 - 15.45 Working group sessions
- 15.45 - 16.00 Coffee break
- 16.00 - 16.45 Presentation and discussion of the results of the
working groups
- 16.45 - 17.00 Closing session

ISSUES FOR THE WORKSHOP

urban water supply situation in the Zanzibar Isles

issues of quantity & quality

reliability of the supply

"coping with the situation"

(ground level reservoirs/bowers/vendors)

criteria for sustainability

cost of production/tariffication

legislation/policy framework

institutional strength

set-up of the organization and its mandate

water resource management and environmental protection

Introduction to the Workshop presented by the
Hon. Salum Hashim Rajab, Minister of
Water, Construction, Energy, Lands & Environment

OPENING SPEECH BY

**AT THE WORKSHOP ON
CAPACITY BUILDING FOR THE SUSTAINABILITY IN THE
ZANZIBAR URBAN WATER SUPPLY DEVELOPMENT PROJECT
AT MBWENI, ZANZIBAR**

**Mr. Chairman,
Distinguished Guests,
Workshop Participants,
Ladies and Gentlemen,**

I am indeed pleased for the honour and privilege you have extended to me by your invitation to come and open this workshop on the "Capacity Building for the Sustainability in the Zanzibar Urban Water Supply Development Project".

Mr. Chairman,

On behalf of the Zanzibar Government, my Ministry and on my own behalf, I take this opportunity to welcome you all to Zanzibar (for those who have come from outside Zanzibar). It is our hope that you will enjoy your stay in Zanzibar and feel at home.

I wish also to convey my sincere Congratulations to the Finnish International Development Agency (FINNIDA) for initiating and facilitating this workshop which was planned to be conducted sometime in June 1992.

Mr. Chairman,

I am aware that this workshop has drawn many technical and experienced delegates from various Ministries and Institutions from both Unguja and Pemba. This is therefore, an opportune moment for the intellectuals and experts from different disciplines to get together with the objective of exchanging experiences on technical and socio-economic problems of common interest to humanity.

I am delighted by the response which demonstrates the desire for cooperation among Ministries and Institutions so that we might reach a better understanding of how we can help each other.

Mr. Chairman,

The development of water supply to the urban areas is of most important issue because most of industries, institutions and other socio and commercial activities are located in the towns.

In Zanzibar, the government is making concerted efforts to rehabilitate and expand these schemes with a view to meet the present and projected demands.

An assistance from the Finnish Government was requested during the 1989.

The approval of the request was followed by feasibility study to the project areas which are the towns of Chake Chake, Wete, Mkoani and Zanzibar Town.

Mr. Chairman,

This project of the Development of Water Supply in the urban areas was the result of that study. Both the Finnish and Zanzibar Government have the obligations for the smooth running and success of this project on both technical and financial matters.

Mr. Chairman,

It is well aware that there is an increasing problem of water bodies pollution from industrial, agricultural and domestic effluent in Zanzibar like other parts of Tanzania. Poor environmental conditions as well as proper method of handling the waste water and solid waste.

These problems need to be considered and prevented as their consequences may lead up to a high cost in treating the raw water.

Mr. Chairman,

This workshop has, therefore, a lot of crucial issues to discuss in order to assist the Government to overcome some of the major problems some engineers to solve the problems of environment, water supply, waste water disposal and so forth. We require your contribution.

Mr. Chairman,

With these few words, I declare to open this workshop and wish you every success.

Thank you !

PARTICIPANTS

- | | | |
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| 1. Mr. Han Heijen | - Senior Programme Officer | - FINNIDA Review Team |
| 2. Ms. Madeleen Wegelin | - Research Officer | - FINNIDA Review Team |
| 3. Hon. Manafi Said Mwinyi | - Representative | - House of Representative |
| 4. Hon. Burhan Saadati Haji | - Representative | - House of Representative |
| 5. Mr. Muhammad S. Sulaiman | - Principal Secretary | - Ministry of WCELE |
| 6. Mr. Hemed S. Hemed | - Director | - Department of Water |
| 7. Mr. Eero Meskus | - Project Coordinator | - UWSS |
| 8. Ms. Aysha S. Suleiman | - Chief Planning Officer | - Chief Minister's Office |
| 9. Mr. Ali Rajab Mohamed | - Senior Industrial Officer | - Ministry of Trade, Industry & Marketing |
| 10. Mr. Mzee Keis Mzee | - Regional Water Officer | - Regional Commissioner Urban/West |
| 11. Mr. Ali Abeid Rajab | - Planning Officer | - Ministry of Planning |
| 12. Mr. Ali Kh. Seif | - Director | - Mkoani Town Council |
| 13. Mr. Mzee Kh. Juma | - Sanitary Engineer | - Municipality of Z'bar |
| 14. Mr. Mchenga A. Mchenga | - Zonal Irrigation Engineer | - Irrigation Division |
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| 17. Mr. Ali S. Amour | - Water Engineer | - UWSS |
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| 26. Mr. Ahmed M. Miskiry | - State Attorney General | - Attorney General's Chamber |
| 27. Mr. Mrisho A. Haji | - Ass. Planning Officer | - Ministry of WCELE |
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| 29. Ms. Haula K. Issa | - Administrative Officer | - UWSS |
| 30. Ms. Tuire Nikulainen | - Management Consultant | - UWSS |
| 31. Mr. Teuvo Kuusela | - Network Technician | - UWSS Pemba |
| 32. Mr. Abdulla J. Khatib | - Director of Planning | - Ministry of WCELE |
| 33. Mr. Moh'd Ilyas Moh'd | - Executive Engineer | - Water Department |
| 34. Mr. Heimo Ojanen | - Water Supply Engineer | - UWSS |
| 35. Mr. Ghalib Omar | - Town Planner | - Commission for Lands & Environment |
| 36. Mr. Mbarouk Omar | - Director | - Ministry of Planning |
| 37. Dr. H. R. Hikmany | - Review Team | - Ministry of Finance |
| 38. Mr. Kari Karanko | - Finnish Ambassador | - Embassy of Finland |
| 39. Mr. Jussi Tikkanen | - Programme Officer | - Embassy of Finland |
| 40. Mr. Juma Khamis Juma | - Project & Planning Officer | - Ministry of WCELE |

PARTICIPANTS

GROUP 1

TOPIC: COST OF PRODUCTION / TARIFFICATION

- | | | |
|----------------------------|--------------------------------------|---------------------------|
| 1. Mr. Abdulla J. Khatib | - Director of Planning (Chairman) | - Ministry of WCELE |
| 2. Ms. Haula K. Issa | - Administrative Officer (Secretary) | - UWSS |
| 3. Ms. Madeleen Wegelin | - Research Officer | - FINNIDA Review Team |
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| 9. Mr. Juma Khamis Juma | - Project & Planning Officer | - Ministry of WCELE |

GROUP 2

TOPIC: LEGISLATION / POLICY FRAME-WORK

- | | | |
|-----------------------------|----------------------------------|--------------------------------------|
| 1. Hon. Burhan Saadati Haji | - Representative (Chairman) | - House of Representative |
| 2. Mr. Said S. Suleiman | - Executive Engineer (Secretary) | - Water Department |
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| 8. Mr. Heimo Ojanen | - Water Supply Engineer | - UWSS |

GROUP 3

TOPIC: INSTITUTIONAL STRENGTH SET-UP OF ORGANIZATION AND ITS MANDATE

- | | | |
|-----------------------------|-----------------------------|---|
| 1. Mr. Ali S. Amour | - Water Engineer (Chairman) | - UWSS |
| 2. Mr. Ghalib Omar | - Town Planner (Secretary) | - Commission for Lands & Environment |
| 3. Mr. Muhammad S. Sulaiman | - Principal Secretary | - Ministry of WCELE |
| 4. Mr. Hemed S. Hemed | - Director | - Department of Water |
| 5. Mr. Ali Rajab Mohamed | - Senior Industrial Officer | - Ministry of Trade, Industry & Marketing |
| 6. Mr. Ali Kh. Seif | - Director | - Mkoani Town Council |
| 7. Mr. Mzee Kh. Juma | - Sanitary Engineer | - Municipality of Z'bar |
| 8. Mr. Hamad J. Bakar | - Hydrogeologist | - UWSS |
| 9. Mr. Fadhil A. Said | - Planning Officer | - MON |
| 10. Mr. Mrisho A. Haji | - Ass. Planning Officer | - Ministry of WCELE Environment |
| 11. Dr. H. R. Hikmany | - Review Team | - Ministry of Finance |

GROUP 4

TOPIC: WATER RESOURCE MANAGEMENT AND ENVIRONMENTAL PROTECTION

- | | | |
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| 1. Mbarouk Omar | - Director (Chairman) | - Ministry of Planning |
| 2. Mr. Moh'd Ilyas Moh'd | - Executive Engineer (Secretary) | - Water Department |
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Urban/West |
| 5. Mr. Ali Abeid Rajab | - Planning Officer | - Ministry of Planning |
| 6. Mr. Mchenga A. Mchenga | - Zonal Irrigation Engineer | - Irrigation Division |
| 7. Mr. Mohammed A. Moh'd | - Civil Engineer | - UWSS - Pemba |
| 8. Ms. Saida S. Awadh | - Ass. Accountant | - Ministry of WCELE |
| 9. Mr. Seif A. Mussa | - Operations Manager | - State Fuel & Power
Corporation |
| 10. Mr. Teuvo Kuusela | - Network Technician | - UWSS Pemba |

**COST OF PRODUCTION / TARIFFICATION
(IT DEPENDS THE AREA, TECHNOLOGY AND MATERIAL)**

- What ways are there to ensure adequate financing for water.

We are looking for:

- Government - Ministry
- Consumer - Private Consumer
- Commercial Consumer

Private Consumer i.e. House Connection

We categorise into 3 areas:

- Planned areas = 500/= per house
- Stone Town area = 500/= per ~~house~~ family
- Unplanned area = 250/= per house

Commercial Consumer

Big hotels, industries and government office, they will pay according to the amount of water consumer. Meters will be connected.

- * Public institution like hospital, church, mosque and school. They will pay 300/= per month.
- * Public stand pipe; The local government is responsible for maintenance.

Are these politically acceptable?

It depends upon the politician, they will reach the message to the people.

INSTITUTIONAL STRENGTH

- Group proposed a parastatal organization responsible for Urban Water Supply (allowance can be made to integrate waste water in the later stage). This authority should be monitored by the National Water Authority (to be created).
- The organization should have a full mandate administratively, managerially and financially.
- The Authority should also be protected by the Act (to be enacted).
- UWSS should continue assuming the responsibilities of the Parastatal Organization to acquaint local staffs during the transition period. This period should also be used to train staff that will take-over the Authority.

WATER RESOURCES MANAGEMENT

INSTITUTION: Establish a Water Board under the Ministry responsible for water

FUNCTION:

- responsible to grant/stop licenses for borehole drilling.
- existing rules and regulations revised and legal enforcement taken seriously.
- ensure establishment and functioning of sustainable groundwater surveillance system.

ENVIRONMENTAL PROTECTION

INSTITUTION: Environmental Commission

FUNCTION:

- control the use of chemicals (pesticides, herbicides, industrial chemicals etc).
- integrate proper land use planning.
- control human activities which can lead to destroy water quality.
- monitor industrial waste disposal.

Prepare a water policy.

Planning & Design Section

Zanzcap.wk3
09.10.1992

ZANZIBAR URBAN WATER SUPPLY
INTAKE CAPACITY IN SEPTEMBER 1992

SPRING INTAKES	m3/h	m3/d (24 hours)
Mtoni spring	199	4780
Bububu gravity	181	4340
Bububu booster	94	1070 (13 hours average)
Springs/total	474	10200
DIMANI CAVE	80	1900
BOREHOLES		
Chunga 9	68	1632
Kianga	151	3624
Mwembe Mchomeke	108	2592
Kijito Upele I	40	960 (from September test use)
Mbweni	47	1128
Kaburi Kicombe	134	3216
Total/boreholes	548	13200
GRAND TOTAL	1102	25300

SUMMARY OF THE AVERAGE DAILY FLOWS IN 1992

Month	m3/d			
	Mtoni	Bububu	Others	Total
January	2360	3810	12290	18460
February	2020	2920	12050	16990
March	1730	2750	13260	17740
April	3900	3980	14710	22590
May	7820	5100	9640	22560
June	8860	5950	14000	28810
July	7840	6110	14040	27990
August	6410	5760	14130	26300
September	4780	5580	13450	23810

The capacity of the spring intakes varies according to the seasons.
 Minimum Bububu 1900 m3/d and Mtoni 1600 m3/d (Febr-March)
 Maximum Bububu 6200 m3/d and Mtoni 10200 m3/d (May-June)

GOVERNMENT NOTICE No. 15

Buryay
28/2/40.

THE TOWNS DECREE.

The Towns Water-Works Rules, 1940.

In exercise of the powers conferred upon His Highness the Sultan in Executive Council by section 132 of the Towns Decree, the following rules are hereby made:— Cap. 100.

1. These rules may be cited as the Towns Water-Works Rules, 1940, and shall come into force on the 1st day of March, 1940. Title and commencement.

2. For the purpose of these Rules, the following words and expressions shall have the several meanings hereby assigned to them, unless the context requires otherwise:— Definitions.

The "Authority" shall mean the Water Supply Authority appointed under the provisions of the Towns Decree.

"Water-works" shall mean all reservoirs, dams, weirs, tanks, tunnels, adits, boreholes, filters, settling tanks, purifying plant, sterilizing plant, conduits, aqueducts, mains, pipes, foundations, standpipes, hydrants, taps, pumps, engines, and all other structures, appliances or things used or constructed for obtaining, storing, purifying, sterilizing, conveying, distributing, measuring or regulating water which are used or have been constructed by or on behalf of the Government and are the property thereof and/or which are under the exclusive control of the Authority;

"Owner", "Occupier", and "Premises" shall have the meanings assigned to them in section 3 of the Towns Decree;

"Consumer" shall mean the owner or occupier of any premises to which a supply of water is maintained by the Authority or any person entering into a contract with the Authority for the supply of water or who is lawfully obtaining water from the Authority;

"Domestic purpose" shall include every kind of ordinary household purpose, but shall not include the use of any boiler, engine or machine, any mining operations, the flushing of any sewer or drain connected with any trade, manufacture or business, the cleansing of any road, path or pavement, or any garden purpose;

"Main" shall mean any pipe, aqueduct or other work under the exclusive control of the Authority and used by it for the purpose of conveying water to consumers, but shall not include any communication pipe;

"Communication pipe" shall mean any pipe leading from the Authority's mains to the premises of any consumer as far as the boundary of such premises;

"Service" shall mean all pipes and apparatus intended to be used or used for or in connexion with the supply of water by the Authority and situated on the premises of the consumer;

"Service pipe" shall mean any pipe included in such service;

"Connexion" shall mean the communication pipe and service;

"Inspector" shall mean any officer or person authorized by the Authority to inspect mains, connexions or meters.

Meters,
power of
Authority
to affix

3. The Authority may, at its own discretion and at its own expense, at any time affix a meter to any connexion with the water supply. Any such meter together with the fittings connected therewith shall be and shall remain the absolute property of the Authority, and any person removing, injuring or tampering with any such meter or any consumer who allows the meter attached to his service to be removed, injured or tampered with shall be guilty of an offence.

Charges.

4. Charges in respect of water supplied, meter rents, turn-on fees, testing of meters, etc., shall be in accordance with the tariff shown in the schedule hereto, or in accordance with any amendment thereto which may be in force from time to time:

Provided that the British Resident may, by notice published in the *Gazette*, exempt any person or body of persons from the payment of all or any of the charges specified in the schedule.

Fire
hydrants.

5. Where a fire hydrant has been installed on any premises, and the consumer has been supplied with the means of opening the same, the quantity of water taken therefrom will, if no meter is provided on the hydrant, be assessed by the Authority at its sole discretion, and a charge made at current rates for the water used as if it had been supplied through a meter.

Failure
to pay.

6. When any amount is due to the Authority under any of these rules, and has remained unpaid for a period of fifteen days after notice demanding payment has been given, the Authority may disconnect the supply of water to the premises in respect of which such debt has been incurred, and restore such supply only on payment of such moneys due and any other amounts that may also have become due to the Authority under these rules or any charges owing to such failure to pay.

Deposit.

7. The Authority may demand a deposit in advance equal to the estimated charges for the supply of water for one month and may retain such deposit during the continuance of the water service to the consumer.

Meters, safe
keeping and
repair of.

8. The consumer shall be responsible for the safe keeping and condition of any meter or stop-cock fixed on his service and shall be answerable to the Authority for any damage or injury which may be done to or sustained by them.

Meters,
repair and
substitution
of.

9. No consumer shall disconnect, interfere with, or cause or permit any other person to disconnect or interfere with, for any purpose whatsoever, any meter the property of the Authority or fittings connected therewith, and in the event of any repair being found necessary the consumer shall immediately give notice thereof to the Authority and the Authority will effect such repairs as may be found necessary

to such meter at its earliest convenience. The Authority may, at its own expense, disconnect and remove any meter and affix and substitute any other meter at its discretion.

10. The quantity of water which shall be registered by the meter as having been supplied to any consumer shall be deemed to be the quantity so supplied. The quantity of water so registered shall be paid for by such consumer at the rate or charge fixed by these rules for water supplied through a meter and such payment shall be made at such times and in such manner as prescribed in these rules. Quantity registered.

11. Every consumer shall be bound by the entry in the books of the Authority showing such meter reading in the absence of evidence showing either that such entry has been incorrectly made or that the meter was, at the time of such reading, in default, and it shall not be necessary to produce the person who read the meter or the person who made any particular entry to prove such reading or entry. Entry in books of Authority binding.

12. If any consumer shall at any time be dissatisfied with any particular reading of a meter supplied by the Authority, and shall be desirous of having the same tested, he shall give written notice to the Authority within seven days of such reading, and thereupon the meter shall be tested by the Authority. Dissatisfaction with reading.

If the meter shall be found to be correct within five per centum, the consumer shall pay to the Authority Shs. 7-50, and further, if the meter is of greater size than two inches, the cost of conveying the meter to and from the place of testing. If the meter shall be proved to be incorrect, the Authority will affix a correct meter free of charge.

The meter shall be considered correct if no error shall be shown of more than five per centum either way. Any dissatisfied consumer shall be given an opportunity of being present at the testing of his meter.

13. Should the meter supplied by the Authority at any time be out of order and registering incorrectly, the Authority will repair or replace the same as soon as possible and the quantity of water to be paid for by the consumer from the date of the meter ceasing to register correctly up to the time of its repair or replacement shall be estimated by the Authority upon the basis of the previous consumption of water upon such premises, by taking the average daily consumption for the month last preceding the date upon which such meter was last examined and found in order, or by taking an average of the quantity used during the previous three months, or during the corresponding period of the previous year, or upon the basis of the subsequent consumption registered after such repair or replacement has been effected, as the Authority thinks fit. The consumer shall pay the amount of such estimate within fifteen days of receiving the same, unless such estimate is received by him more than fifteen days before the date by which such account would have been payable in the ordinary course under these rules, in which case the said amount shall be payable on or before such last-mentioned date. Incorrect registration.
Average may be charged.

Dribble through meter.

14. When the supply to any connexion is taken through a meter, the closing down of any stop-cock or shut-off cock to such an extent, or the insertion of any obstruction or orifice in a communication or service pipe, as will only allow the running of water into any tank or other receptacle at a dribble, shall be an offence under these rules.

Position of meter and shut-off cock.

15. The consumer shall, if required by the Authority, provide a suitable and safe place within his premises or plot in which to fix a meter and/or shut-off cock. The position of all meters and/or shut-off cocks must remain clearly defined and the box enclosing them must always be exposed to view. The shut-off cock will be installed by the Authority at its own expense and for its own exclusive use and shall be placed in such position as the Authority shall determine.

Supplies for building purposes.

16. In cases where supplies for building purposes are laid on upon the application of any owner or contractor, the cost of providing and fixing the communication pipe shall be borne by such owner or contractor, and a meter may, at the sole discretion of the Authority, be fixed to the connexion. In such a case the owner or contractor shall pay for water so supplied the charges prescribed in the schedule hereto or any amendment thereof.

The same communication pipe, if, in the opinion of the Authority, it is suitable for the purpose, may be used for the permanent supply of the premises, but no connexion shall be made with the service until all the provisions of these rules have been complied with.

Unauthorized taking of water.

17. A consumer who has not made application to the Authority, and who has not received the assent of the Authority in writing for a supply of water and who has not otherwise complied with the requirements of these rules shall not take any water from or make any connexion with any main, reservoir, conduit pipe, cistern, or other place containing water belonging to the Authority. Any consumer infringing the provisions of this rule shall be guilty of an offence.

Selling or removal from premises of water.

18. No person shall, without the written permission of the Authority, and subject to such conditions as the Authority may require, sell any water supplied to him by the Authority, nor, without such permission, shall any person take away or suffer to be taken away from his premises any such water whether or not he is to receive any payment or other consideration for the same. Any person infringing the provisions of this rule shall be guilty of an offence: Provided that this rule shall not apply to any person for hire taking water from a public standpipe for delivery elsewhere or taking such water for sale elsewhere or removing water from his own premises for his own use.

Special agreement.

19. Nothing in these rules shall be held to prevent the Authority making any special agreement with any consumer with regard to the method of supply, the price to be paid, or the quantity of water to be supplied.

Special restrictions.

20. The Authority may at any time after public notification limit the supply of water to such hours as it may decide. Such limitation may apply to the whole or to any part of a town. Public notification for the purpose of this rule shall mean publication in the *Gazette*, and/or in any newspaper circulating in such town.

21. Every notice, order, or other document under these rules requiring authentication by the Authority shall be sufficiently authenticated if signed by the Director of Public Works and Electricity or his authorized assistant or deputy.

Notices and other documents

22. Where any notice, order or other document is required by these rules to be served on or given to any person, it shall either be served personally on such person or left at, or sent by registered post to, his last usual place of abode or business, and if served by registered post shall be deemed to have been served at the time when the letter containing the same would have been delivered in the ordinary course of post, and in proving such service it shall be sufficient to prove that the notice, order, or other document was properly addressed and put into the post, and in case any such person shall be absent from the Protectorate any such notice may be served upon any agent of such person known to the Authority.

Service of notice.

23. The Authority shall not be liable for any failure to supply water or for any defect in the quality of water supplied, however caused.

Failure to supply.

24. All premises supplied with water by the Authority shall, except with the written consent of the Authority, have their own separate connexions.

Separate connexions.

25. (1) Every consumer shall, at his own cost, lay down and maintain his own service:

Provision of service.

Provided that the Authority may, at its discretion, on receipt of an application in writing in that behalf, instal a service upon any consumer's premises.

(2) Where the Authority undertakes to instal a service, the consumer shall pay in advance the estimated cost of such work and shall in addition be liable for any expense incurred by the Authority in excess of the amount estimated; and where the actual cost of the work is less than the amount estimated the consumer shall be entitled to a refund of the balance:

Provided that, where, having regard to the financial circumstances of the applicant, the Director of Public Works and Electricity or his authorized assistant or deputy so directs, the consumer shall pay the cost of such work in accordance with the terms of a written agreement in that behalf to be entered into by the consumer and the Authority, and in every such case an additional charge of fifteen per centum of the actual cost of the work shall be payable.

26. The consumer shall provide at his standpipe (if any) a concrete or other basin, and, for the disposal of all waste water from the connexion, he shall provide such soakaway pit or drain as may be required by the Authority. The Authority shall not turn on the water until these works and those specified in Rule 25 have been passed and approved by the Authority.

Standpipes and soakaway pits.

27. (1) Upon receipt of an application in writing the Authority will, if the application is accepted, provide and lay down a communication pipe from the nearest source of supply to a stop-cock situated on or near the boundary of the premises of any consumer at the expense of such consumer, and will thereafter maintain such communication pipe at the expense of the Authority.

Communication pipes.

(2) Where the Authority undertakes to provide and lay down a communication pipe, the consumer shall pay in advance the estimated cost of such work and shall in addition be liable for any expense incurred by the Authority in excess of the amount estimated; and where the actual cost of the work is less than the amount estimated the consumer shall be entitled to a refund of the balance:

Provided that, where, having regard to the financial circumstances of the applicant, the Director of Public Works and Electricity or his authorized assistant or deputy so directs, the consumer shall pay the cost of such work in accordance with the terms of a written agreement in that behalf to be entered into by the consumer and the Authority, and in every such case an additional charge of fifteen per centum of the actual cost of the work shall be payable.

- Unauthorized connexions.** 28. No person shall effect any connexion with or injure or in any way interfere with any main, communication pipe, stop-cock, meter, instrument or valve of any kind whatsoever incorporated in the water-works without the written permission of the Authority. Any person tampering with any part of the water-works shall be guilty of an offence.
- Covering of service.** 29. No person shall cause or suffer any newly laid service pipe to be covered in the course of the installation or alteration of a service until such pipe has been examined and approved by the Authority or an Inspector.
- Inspection.** 30. No service shall be connected with the main and no additional fittings, except taps replacing old taps, shall be connected with the main until such service and additional fittings have been inspected by the Authority or an Inspector and a certificate of approval obtained.
- Alteration.** 31. No alteration shall be made in any existing service until such proposed alteration has been submitted in writing to the Authority and a certificate of approval obtained.
- Service materials to be used.** 32. No consumer shall install or have installed a service with materials which, in the opinion of the Authority, are unfit for the purpose or which, in the opinion of the Authority, would give trouble or cause leaks in the supply or in any way endanger, detract from the usefulness of, contaminate or in any other way affect the water supply. All materials, fittings, etc., shall be of such strength and quality as may be approved by the Authority. Every pipe or fitting, except ball cocks, shall be capable of withstanding a hydrostatic pressure of not less than one hundred pounds per square inch. All new water service pipes shall be seamless and shall be of steel, wrought iron, lead or copper, but, subject to written approval by the Authority, other material may be used.
- Sizes of pipes to be installed.** 33. The diameter of all pipes installed on a consumer's premises will be determined by the Authority, and no pipe other than of the size approved by the Authority may be installed.
- Leakage in service connexions.** 34. Every consumer shall report immediately to the Authority any leaking tap valve or connexion in his particular service supply. Failure to do so will constitute an offence, and the Authority may in such cases repair the leak and/or instal a meter without notice,

and the consumer shall pay for the repairs to such service and/or the installation of such meter, or any other charges for work and labour done as the Authority may require at its discretion.

35. No person may have a connexion made from the water supply to any fountain, swimming bath, laundry, hot water installation, water closet, filter, scouring or cleaning plant, or machinery of any description, without the written permission of the Authority, and such permission will only be granted on such terms as the Authority may at its sole discretion decide when full particulars of the capacity of the fountain, swimming bath, laundry, hot water supply, filter, or cleaning plant, etc., and the estimated amount of water required to operate the same for twenty-four hours, are submitted with the application.

Cisterns, hot water supplies, water closets, filters, scouring and washing plants.

36. No service shall communicate with any pipe, cistern, butt, or other receptacle used, or capable of being used, for the conveyance or reception, of any water other than water supplied by the Authority.

Cross connexions to other supplies.

37. When it is proposed to instal more than two taps on the premises, a service cistern shall be installed, which shall be mosquito-proofed and maintained mosquito-proof to the satisfaction of the Authority and of the Medical Officer of Health, of such type and size and with such fittings as may be approved by the Authority. House taps shall be supplied from this cistern.

Services of more than two taps.

38. Flushing cisterns for water closets shall be of a capacity not greater than three gallons and for trough closets five gallons.

Flushing cisterns.

No automatic flushing cisterns shall be installed or used except with the written permission of the Authority and subject to its requirements.

39. The provision for ablutions in any Mosque supplied from any Government main shall not exceed one tap for every twenty persons normally using such Mosque.

Supply to Mosques.

40. The Authority, without paying compensation and without prejudicing its right to recover all payments due for water supplied to the consumer, may summarily discontinue the supply to the consumer—

Connexions may be cut off.

- (a) if he shall have failed to pay, within fifteen days after notice demanding payment has been given, any sum which, in the opinion of the Authority, is due under these rules;
- (b) if, in the opinion of the Authority, he shall have injured or tampered with or suffered injury to be inflicted upon or interference with any portion of the water-works;
- (c) if, in the opinion of the Authority, he shall have committed a breach of any of these rules.

41. Any consumer who is vacating his premises for a period of at least one calendar month may terminate his liability to charges specified in the schedule to these rules by giving the Authority seventy-two hours' notice in writing. The consumer shall be responsible for all such charges up to midnight on the day on which the aforesaid notice expires.

Consumer may have water cut off.

Provided that if a consumer, who vacates his premises for not less than the period above specified and gives the notice above required has paid water rate in advance for the whole year, he may obtain a refund of half the amount paid in respect of the period during which the premises are vacated:

And provided further that where a consumer who has paid water rate in advance for the whole year moves during the currency of such year into other premises the annual rateable value whereof is different from that of the premises which he has vacated, and does not claim a refund under the first proviso hereto--

(a) where the annual rateable value of the new premises is less than that of the premises which he has vacated, the consumer may obtain a refund of an amount equivalent to the same proportion of the difference between the yearly rates payable in respect of the two premises which the unexpired period of such year (reckoned in days) bears to a full year; and

(b) where the annual rateable value of the new premises is greater than that of the premises which he has vacated, the consumer shall pay to the Authority an amount to be ascertained in the same manner as in paragraph (a).

Authority not bound to supply water in certain cases.

42. Notwithstanding anything contained in these rules the Authority shall not be bound to supply water to any person or consumer.

Obstruction of officials.

43. Any person hindering, molesting or refusing admission or information to the Authority or an Inspector in the course of any inspection or of the performance of any act which he is authorized to perform under these rules, shall be deemed to have committed a breach of these rules.

Infringement of rules.

44. Any owner or occupier having or using upon his premises, and any person providing, fixing, causing or suffering to be fixed upon any premises, any service or part thereof or any meter or apparatus which fails to comply with the requirements of these rules, shall be deemed to have committed a breach thereof.

Liability of consumers.

45. Any breach of these rules committed on any premises shall be deemed to be a breach by the consumer.

Penalties.

46. Any person convicted of an offence against these rules shall be liable to a fine of seven hundred and fifty shillings or to imprisonment for a period of six months or to both such fine and imprisonment.

Revocation. 1935-1938 Supplement, pages 499 to 517.

47. The Zanzibar Town Water-Works Rules, 1935-1938, and the Towns (Wete and Chake-Chake Water-Works) Rules, 1937, are hereby revoked.

U. cc.

Gov. ser.

Inst.

Alter.

Service materi to be

Sizes of pipes to be installed.

Leakage in service connexions.

TARIFF OF CHARGES.

Rule 4.

(A) CONNEXIONS TO THE HIGH PRESSURE SUPPLY.

1. There shall be payable to the Authority by the occupier of any premises on which a connexion (other than one the charges concerning which have been duly terminated under Rule 41) is situate, in respect of the supply of water:—

(a) Where no meter is installed, either

(i) a monthly charge payable in advance of one-half per centum of the annual rateable value of the premises as at the day of such charge becoming due and payable, subject to a minimum charge of Shs. 3 per month;

or, at the option of the consumer,

(ii) a yearly charge payable in advance of five per centum of the annual rateable value of the premises as at the day of such charge becoming due and payable, subject to a minimum charge of Shs. 30 per annum. This annual charge will be payable on the 1st day of May in each year, and broken periods of a year will be charged for at the monthly rate specified in sub-paragraph (i) above.

(b) Where a meter is installed, a monthly charge payable on demand, according to the reading of the meter for the water supplied, of Shs. 2-25 per thousand gallons for all water supplied for any purpose: Provided that the minimum monthly charge, exclusive of meter rent, shall not be less than one-half per centum of the annual rateable value of the premises, nor less than Shs. 3 in cases where one-half per centum of such value does not amount to Shs. 3.

2. There shall be payable on demand the following further charges:—

(a) Where a meter is installed, a monthly meter rent of Sh. 1 for meters of half an inch or under, Shs. 2 for meters over half an inch but not over one inch, one per centum of the actual cost of the meter in position for all meters over one inch.

(b) Shs. 10 for turning on a supply which has been turned off for any breach of these rules.

(c) Shs. 2 for turning off or turning on any supply at the request of the consumer.

(d) Shs. 2 for any special reading of the meter.

(e) For testing of meters: As provided in Rule 12.

3. In lieu of the charges specified in the two preceding paragraphs, there shall be payable by every Government official in occupation of three quarters a sum amounting to three-quarters per centum of the amount of the salary, including personal and acting allowance (if the amount of the salary, including personal and acting allowance is paid to such official and it shall be lawful for the Chief Accountant and his agents at the time of payment to deduct from the salary of each such Government official the amount of the rate payable by such official in respect of the period for which such rate has become due and payable

(B) CHARGES IN RESPECT OF CONNEXIONS TO THE LOW PRESSURE SYSTEM IN THE TOWN OF ZANZIBAR

1. There shall be payable to the Authority by the occupier of any premises on which a connexion (other than one the charges concerning which have been duly terminated under Rule 41) is situate, in respect of the supply of water for non-domestic purposes, the following monthly charges payable in advance:—

(i) At the Dhobi Station.

	Shs. Cts.
For each Tank	9 00
For each Shed	3 00

(ii) For other non-domestic purposes.

When the service pipe is one inch in diameter

15 00

When the service pipe is one inch and one-fourth in diameter

22 50

When the service pipe is one inch and a half in diameter

30 00

When the service pipe is two inches in diameter

45 00

When the service pipe is less than one inch or more than two inches in diameter

By agreement with the Authority.

For each pump driven by power other than manpower, an additional charge of

7 50

NOTE.—Temporary connexions for building or other non-domestic purposes are chargeable as above.

2. There shall be payable on demand in respect of all premises connected to the low pressure system the following charges:—

(a) Shs. 15 for turning on a supply which has been turned off for any breach of these rules.

(b) Shs. 3 for turning off any supply at the request of a consumer.

By Command of His Highness the Sultan in Executive Council, Zanzibar, this 2nd day of February, 1940.

WILLIAM ADDIS,

Member to the Executive Council.

Countersigned under the provisions of Article 42 of the Zanzibar Order in Council.

J. HATHORN HALL,
British Resident.

6TH FEBRUARY, 1940.