

A Strategic Approach

towards Sustainable Water Resources Management

Case Studies

15th – 24th July 2002
Nairobi, Kenya

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Constraints of Designing Tariff Structure Targeting the Urban Poor of the City of Addis Ababa

By Almaz Mekonnen, Addis Ababa Water & Sewerage Authority, Ethiopia

Executive Summary

Water Resources of AAWSA

The Addis Ababa Water & sewerage Authority, AAWSA an organ of the government, carries the sole responsibility of providing potable water & disposal of sludge to the city dwellers.

The authority is getting its water from surface & ground water sources. Presently, out of the 185000m³/day production only 5% is attributed from ground water sources. The proper managing of these sources is of paramount importance to the existence of the city and its residents. A comprehensive leakage studies and water demand management projects are part of the strategic plan to monitor the loss which is estimated to be between 30-35% of the water supply.

Purpose of the report

The purpose of the report is to design a strategy plan in the way that to address to the problem of urban poor in such a way that to make them users of the social tariff as stipulated in the federal water resource management policy. The settlement of the city residents is the bottleneck of the authority to categorize its customers by income group or consumption pattern. Because of the congestion of the city, many clients are living in a cluster condition using water from one connection or standing tap, which leads to progressive tariff rate. Lack of access to each household connection for many reasons and together with lack of properly defined customers data profile, the aggregate amount of water consumed in a particular compound/area would be high to be charged on the basis of sliding scale tariff.

Solutions to mitigate the problem

As AAWSA has a dual responsibility to give sustainable water supply to all and to established tariff rate, which could subsidize the urban poor, there is a need to have a vision to avoid impartial treatment of the urban poor by giving priority and incorporating into strategic plan. To this effect, the following options could be seen & further studied.

- To allow credit system for connection for this particular group of customers (residents in congested areas)
- To cover initial cost of connection and to let the customer repay on instalment basis
- To include the connection costs in the development plan and protect the future new connection requests coming in this kind of format.
- To make an arrangement with bankers or other credit institution by allocating a seed capital that facilitates credit to customers.

Timely revision of the tariff to meet the revenue requirement of the authority is one of the prerequisite to build the financial capacity that enables to realize its plan.

Country Background

Ethiopia is one of the multi tribal countries located in the horn of Africa. It has area coverage of 1,106,000 sq. kms with a population of about 65 million. The nation usually faces chronic problems of draught caused by enormous fluctuations in the amount of rainfall from year to year.

The country, on the other hand is one of the richest countries of Africa, in terms of surface & ground water resources, which contributes about 85% of the water volume to the Nile River. But, due to technological backwardness & political instability, as well as continues civil war, the people are not able to use what nature has given them in the form of abundant water

supply for social & economic benefits. The water resources could contribute towards the development of socio-economy development in terms of using irrigation systems to increase the farming yield for 90% of agro dependant population to be self-sufficient.

The trend of the economy & the standard of living are earmarked to be below poverty line. Because of this, the present government has committed it self to set a well defined & organized programmes to alleviate poverty throughout the country. Strategies & goals were clearly stated to guarantee the following radical changes. To this effect, overall economy & financial policies have been addressed & implementation programmes are under processed.

1. Privatisation of government owned public enterprise
2. introduction of land lease polices
3. Tax reduction & waiving on exported industrial goods inside; and on imported items to promote investors to sell their goods outside the country.
4. To equate the development of the rural regions with the urban cities, sufficient amount of budget is allocated and priority is given to develop the back ward regions
5. To have effective & efficient management & labour, civil service reformation and financial policy have been studied and preparatory activities are in processes
6. To strengthen the financial position of the country, a new tax policy like VAT has been introduced
7. To make water supply sustainable, the water policy is changed to allow a tariff structure based on cost recovery.

The Federal Government of Ethiopia has issued water resources management policy since 1998. Among other things the policy incorporates the following pro-urban poor pricing & tariff policy statements:

- Provide subsidies to communities who can't afford to pay for basic services on capital costs and phase out subsidy gradually based on established criteria
- Establish a "social tariff" that enables poor communities to cover operation & maintenance costs.
- Establish progressive tariff rates, in urban water supplies, rates to consumption rates
- Develop flat rates for communal services like hand pumps and public stand posts.

Historical Background of AAWSA

Addis Ababa is the capital city of Ethiopia established during the era of emperor Menlek II in 1986. It's the centre of the country situated at about 90° N latitude & 38° longitudes on at an elevation between about 2100mts and 3000mts above sea level. The current size of the city is about 600km² with 3.0 million inhabitants.

The people of Addis were making use of water coming from springs & wells. Piped supply of clean water was a new advent introduced in 1901. The water from high altitude of Entoto down hill to the low field near to the Ground palace by means of constructed ditches. The water was stored in a big pond dug, and constructed with stonewalls stuffed with charcoal and limestone for filtration purpose.

Gradually, construction of small dams on rivers was expanded and tap water was being supplied to quite a number of residents of the different areas of the capital. A major turn took place when the Addis Ababa Water and Sewerage Authority (AAWSA) was established as an autonomous body by order No. 68/1971 issued on the 26th February 1971 and proclamation No.10/1995 to reassert its establishment as an autonomous public authority under region 14, following the formation of regional states.

The main objectives of the Authority's are stipulated as follows:

1. Supply of safe and adequate water; and
2. The provision of wastewater and sludge disposal service for Addis City dwellers.

The authority is structured under water & sewerage Board presided by the President of Addis Ababa City administration and the relevant ministries and organization of the federal government as members. The internal structure comprises of one General Manager, two deputy G/Ms, seven departments, five services & six branch offices.

The authority is self- financing and the source of it revenue is being the sale of water, sewerage service, connection fee, other miscellaneous income, foreign grant & loan, and capital subsidy from the government (A.A. City administration). The authority is used to charge its clients at the rate of 0.50 per cubic meter before & after its establishment as an authority. The tariff rate was not changed for more than half a century. And as a result, consequential inadequacy to respond promptly to customer's requirements to new connections, upgrading, transfers & maintenance services became a day-to-day episode. Despite the fact that several tariff structure studies were presented to the government since 1974, none of them have received positive response to change the tariff until the year 1995 G.C. It was a departure of the existing tariff structure from past is that it's a mixed system i.e. flat & progressive with respect of volumetric charge. The current tariff was proposed to serve for two years; however, it has been more than six years since it has become operational. Due to increases in the number of the city populace and improvement in standard of living, demand for water supply began to increase from time to time.

The total yield of clean water at present has reached 198,000m³ daily demand of 243,000m³. There's a water deficit of at least 25.53%. Presently the number of water-connected customers is about 190,000, which has shown enormous changes.

Purpose of the Report

In designing the authority's tariff structure, willingness to pay and affordability was given important consideration in order to match with the federal state policy. The survey was a success except that questionnaires on affordability were notoriously unreliable. And also, data on multi users of one connection wasn't available to place clients into their respective blocks.

Due to this fact, the current & the proposed tariff have a loophole to charge urban poor on sliding tariff rate contrary to the water management policy. For a number of reasons, the stated problems didn't get solutions. AAWSA'S infrastructure development programme should incorporate this issue to give a reliable solution to the urban poor. The main purpose of the report is to find a pertinent solution that would help to treat the urban poor to pay only operation & maintenance cost of water supply.

Water as Economic and Social Good

Water has several distinguishing characteristics. It is essential for life and as a result like other commodities or market goods it is hardly possible to rely on the automatic reaction of market forces to determine water prices. Because of the social nature of water, the involvement of the Government in the ownership and management of water supply facilities are indispensable in most of developing countries.

Although Government ownership & management of water supply facilities are unavoidable this does not mean that there should be an excessive reliance on the government to develop, operate and maintain water systems.

Water has an economic value that varies over time and among uses. It can be considered as a production factor since it is used as an input in the production process. In addition, today there are many indications that water scarcity will become a global problem affecting an ever-growing number of countries. Therefore, there is a need to deal with economics of water and to consider water as an economic good.

Defining Urban Poor

The urban poor can be defined from the perspective of water supply services as follows.

- Depends in most of the cases on communal water supply systems like public fountains.
- In some cases there is service connection where one connection serves many households (on the average up to seven households).
- The per capital consumption rate is low and even this rate is lower than the 20 liters which is considered as the minimum threshold from the point of view of sustaining health & sanitation.
- The household size is big and this compensates for low per capital consumption, which results in high aggregate consumption on household basis.
- Household income is low and this has an impact on willingness and ability to pay for water supply services.
- Uses traditional sources (if available) for purposes like cloth washing.

Pro-Urban Poor Tariff Structure

Based on the Federal Water Resources Management Policy, water & sewerage tariff structure has been developed for the city of Addis Ababa. The tariff structure consists of the following elements:

- Service connection fee
- Deposits
- Water meter rent
- Volumetric charge
- Reconnection fee

Service connection charge is based on the demand of customers. New customers that need to have their own connection apply to their respective branch offices. Branch offices estimate the cost of connection. The cost of connection includes full material and labour and it depends on the distance of the customer's house from the secondary distribution system. Deposit is a guarantee for non-payment of bills and the amount is tied to the size of the water meter. Customers with high size of water meter deposit higher amount than owner of low size of water meter. Water meter rents are related to the size of the water meter. The rents paid in monthly basis and the rents for high size of water meters are higher than low size water meters. Volumetric charge has two features. Flat rate is applied to public fountain customers and sliding rate with block system is applied to customers with service connection.

The public fountain users and the first block customers are supposed to be the poor section of the urban dwellers. Accordingly, the tariff level proposed for this ground of customers is based on recovery of operation & maintenance costs which is defined in the policy to be the "Social Tariff".

The tariff blocks and the cost recovery levels for each block are shown in the following table.

| Blocks | Consumption Range (m ³ /month) | Cost recovery level |
|------------------------|---|----------------------|
| <i>Public fountain</i> | <i>All Consumption</i> | <i>O & M</i> |
| Block 1 | 0-7 | O & M |
| “ 2 | 8-20 | Full cost |
| “ 3 | Above 20 | Full cost + Mark up% |

As it's stipulated on the above chart, it seems that the urban poor are beneficiary of the lower tariff under block one rate. Nevertheless, the current & the proposed tariff structure of the authority partially lack to address the urban poor who use water from one connection in a compound.

Constraints to Address the Urban Poor

As stated above there's a pro-urban poor policy and pro-urban poor tariff structure developed for the city of Addis Ababa. However, the settlement of the urban poor is not suitable to practice either the policy or the tariff structure. Particularly this is exemplified in the one service connection for many households. Under this situation, the aggregate monthly consumption of these house holds is jumping to the next higher blocks and hence could not enable the poor people to enjoy the social tariff set for the lower block, i.e. block one.

SWOT Analysis

| | Positive (Strengths) | Negative (Weakness) |
|----------|--|--|
| Internal | <ul style="list-style-type: none"> - Water resource management policy gives provision for the urban poor - design of tariff structure is based on affordability and cross subsidy - The undergoing capacity building programme of AAWSA | <ul style="list-style-type: none"> - The prevailing tariff couldn't fully address the problems of urban poor - socio-economy conditions aren't thoroughly examination - No appropriate data base for customers profile - Inaccurate Meter reading enforce poor customers to pay more - Limitation of management to fire & hire employees. |
| External | <p>Opportunities</p> <ul style="list-style-type: none"> - Increasing number of customers from time to time - More demand for water supply - Enormous water resource around the city | <p>Threats</p> <ul style="list-style-type: none"> - Lack of unorganised private sectors to take over some types activities - Fast expansion of the metropolitan area - Political interference or eroding the Authority's autonomy - Lack of co-ordinated efforts of utilities |

Suggested Solutions

The solution to mitigate the problem is to introduce one connection to one household system. This can be practical if the organization is able to adopt a service connection policy that helps the urban poor. The existing practice of up front payment system for connection is beyond the ability of the urban poor. Therefore, establishing credit facility or spreading the payment over time or subsidizing the connection fee for the urban poor are feasible solutions to mitigate the under lined problem.

Moreover, to enhance each household connection, the authority or the government should allocate special funds to gradually clear the existing problem caused by irregular settlement; and disallow new connection for this type of customers in the future.

Conclusions

As water is one of the basic necessities of life, it will be well to remember this fact and make an economic use of it. Using uneconomically the water that's brought to the house with so much effort and expense doesn't only harm the client, but also becomes the cause for so much wasting of water that would otherwise be of use somewhere else."

Therefore, each client in order to avoid damages to pipe & wastages of water must take utmost care. On the other hand, the authority has to invest in ways to protect water resources to ensure access to adequate water supply to the city inhabitants. Sustainable & efficient with equitable charges must be worked out during rendering service to clients, especially for the urban poor.

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Ground Water supply Addis Abeba

By Michael Teferra, Addis Abeba Water & Sanitation Authority, Ethiopia

Executive Summary

Addis Ababa city, the capital of Ethiopia and the continent has a total area of 600km² and a current population of 2.7 million with average annual growth rate of 3%. Addis Ababa Water and Sewerage Authority is an autonomous governmental organization responsible for water and sewerage service for the city of Addis Ababa. Around 76% of the 208,000m³ daily water production is obtained from surface water and the remaining comes from springs and wells. There are three dams used to impound the surface water namely Legedai, Gefersa, and Dire built in 1974, 1945 and 2000 respectively. The water from Legedadi and Dire is treated in one treatment plant and the Gefersa is treated in a separate plant. Over 160,000 connections exist to serve the population of the city. The present unaccounted for water is 35% and the shortfall is 25%.

Rehabilitation of the existing facilities (treatment plants, dams, reservoirs, transmission lines etc.), expansion of distribution lines in the new developing areas, water demand management activities and capacity building are the main tools that are being used to achieve the objectives of the water sector policy.

Ground water project consisting of developing 25 water production wells which are located on the southern end of the city well field has been given priority among the other new source development projects to reduce the shortage of water supply. This project was divided in two phases and the first one is already completed by developing 11 boreholes. The capacity of the first phase is 52,000 m³ /day. The second phase with an objective of producing additional 75,000 m³ /day from the 14 boreholes was commenced two years ago. A mathematical modeling was carried in order to determine the aquifer yield of well field before implementing the second phase. The model, however, proved that no additional water could be obtained from the well filed.

The future plan of AAWSA on finding additional water has ultimately changed due to the unexpected absence of additional 75,000 m³/day that was estimated in the previous preliminary studies. The rapid growth of the city, the high rate of loss of water and the absence of any new source-developing project have an overall effect on the quality of water supply service of the city. Moreover, the financial, economical, social, environmental and institutional constraints are the main challenges for AAWSA on the process of planning, developing and managing the water supply facilities. It is therefore, the time for the organization and the government as well to seek for an optimum solution that would help to improve the situation on the water supply sector.

Country Background

Ethiopia is endowed with abundant source of water with an amount of 122 Billion meter cube surface runoff per year excluding the subsurface resource. Around 80 to 90 percent of this resource is found in the western part of the country in which only 30 to 40 percent of the country's populations live. The unbalanced distribution of the resources and their inconsistent seasonal availability are the major characteristics of the water resources of the country. As a result of this and the economic constraints, only 24% of the populations have access to improved drinking water sources. The corresponding figures for urban and rural are respectively, 77% and 13%.

Addis Ababa city, the capital of Ethiopia and center for many international organizations, has also many challenges in the water supply facilities like the rest part of the country. It is one of

the fastest growing cities in Africa with an estimate population of 2.7 million inhabitants and a total area of 600 km². The Addis Ababa Water and Sewerage Authority (AAWSA) is an autonomous government institute in charge of providing water and sewerage services to the inhabitants. The main source of water supply is surface water obtained from three dams and two treatment plants from which a total of 168,000 M³/day is obtained. The remaining 40,000 M³/day water comes from wells and springs scattered within the city and the main well field, which is located on the southern side. The UFW is 35% and the city has a present shortfall of 25%. AAWSA has already identified future development works on additional water sources. The attached figure shows the existing and future water sources for the city of Addis Ababa.

In order to utilize the water resources properly, the government of Ethiopia has devised a Federal water Resource Management Policy with a main goal of enabling the country's water resources to make sustainable contribution to the ongoing socio-economic development through equitable, efficient and sustainable development and management of the water resources. The objective of the water supply sector is to enhance the well being and productivity of the Ethiopian people through provision of adequate, reliable and clean water supply services and to foster its tangible contribution to the economy by providing water supply services that meet the live stock, industrial and other water user's demands.

To achieve the objectives of the water supply sector policy for the city of Addis Ababa, the following strategies are used as implementation tools by AAWSA:

- Completion of existing projects
 - o Ground water projects
 - o Leakage control
 - o Rehabilitation of treatment plants, dams, service reservoirs, etc
 - o Network and distribution installation

- Developing New sources
 - o Construction of dams and treatment plants including transmission lines
 - o Drilling of water wells inside the city and on selected well fields

- Capacity building
 - o Restructuring of the organization
 - o Purchase and installation of necessary equipments and machinery
 - o Construction of a well equipped laboratory and conducting research activities
 - o Installation of billing software and accounting system
 - o Training and development of manpower

After the first phase was completed, the second phase was commenced in 1999 with the following objectives:

- Develop mathematical modelling for the well field and its catchments area to determine the safe yield of the well field and that of the individual well.
- Carryout socio economic and environmental impact assessments
- Carryout detailed design works and prepare tender documents, and supervise during implementation.

From the second phase 73, 000m³/day was expected to be abstracted from the well filed. This could have improved the water supply by 20%.

The pipe supply and all electromechanical works are covered by Agence Francaise de Development (AFD) accounting 50% of the project cost and the remaining part which includes civil works are covered by the government of Ethiopia.

Project Achievements and SWOT Analysis

The first task of the project was to carry out the modelling work before going into the detail design and implementation. The result of the modelling showed that the actual yield capacity of the well filed is not more than 50,000 m³/day, which is far below the expected amount. The study also recommended different alternatives of water abstractions that would help AAWSA to decide the way in which the ground water is utilized in the future.

The alternatives are the maximum possible abstraction rate for short periods (5years), medium abstraction for 10 years and minimum abstraction rate for 20 years. In addition environmental impact assessment has been carried out. Unfortunately, the project area is within the main industrial zone of the city and there are also many factories under construction very close to the well field area. There is, therefore, a fear in the future that the ground water may be contaminated. For such purpose, the EIA study has identified close and distant protection areas that would help to preserve the quality of the ground water.

In general even if no additional water could be obtained as estimated in the previous studies, the following are the major advantages of the second phase of the project;

- The exact amount of water that can be abstracted from the well field is known
- The impact of industrial activities close to this area and measures to be taken are known
- The modeling result has saved the organization not to invest money for implementing the second phase
- Finally, the result of the project has made AAWSA to revise its future plan in developing of new sources and take immediate actions to minimize the increasing gap between the supply and demand.

On the other hand, there are some weak points that people should learn from the projects. Before implementation was started, one of the previous studies proposed that 125,000m³ of water could be obtained from the well filed. Following this proposal, 25 production wells were drilled and some group test was conducted to determine the yield of the wells. The result of the test showed that the yield of the wells is even more than anticipated. It was at this time that AAWSA decided to realize the first phase with a larger capacity. The weakness here is regardless of the preliminary studies and the group tests, the modeling work had to come first to exactly know the yield capacity. Currently the first phase project is working under its design capacity. Moreover, AAWSA could have started few years earlier preparation of implementation of the other new sources, as the expected amount of water could not be obtained.

The unexpected reduction in additional ground water supply, the rapid growth of the city, a high rate of unaccounted for water, scarcity in source of fund for implementing huge projects

which would, otherwise, eliminate water shortage for longer periods and other social and environmental constraints forced the responsible bodies to seek an immediate and optimum solution. This requires not only the effort of AAWSA or the government but also the involvement of different stakeholders, local and international partners and donors as well. Therefore, there is a need for changes in policies and strategies of all parties.

As stated at the beginning of this study, different strategies are identified in order to achieve the water sector policy objectives. One of the strategies is development of new sources in particular construction of dams and treatment plants. This projects need hundreds of million US dollars. To realize this project, AAWSA is considering different alternatives taking the experiences of the other world in to consideration.

It is obvious that a number of years are required to create a good environment and let different actors interlink to work for quality service in this sector. The nature of the projects by themselves need more than 5 to 7 years to be in effect. There is therefore, a fear that the water supply service for the city of Addis Ababa may be worse at least for the following few years.

Conclusion

Like in the rest part of the country, there is a lot to work for AAWSA in order to improve the water supply service for the city of Addis Ababa. Many of the activities undergoing are rehabilitation works, expansion of distribution lines for the new developed areas, water demand managements activities and developing of new small scale and medium size projects. Many international donors and lenders such as EU, Government of Netherlands, AFD, ADF, the World bank, etc and also international consultants and contractors were involved in executing the projects. The overall effect of this has made AAWSA to acquire sufficient experiences in planning, developing and managing water projects.

As the population growth of the city and its radial expansion is very fast, there is an equivalent water demand from domestic, industrial and other uses. Therefore, there is a need of setting up of efficient management system and careful planning and implementation of developing of new sources. Even if the impact of donors, lenders, international firms on the financial and economical, management, technical and other aspects is highly considerable, there needs a basic change in government policy in particular to the involvement of private sector in order to improve the quality of service and at least reduce some of the constraints. Taking all this into consideration, AAWSA is planning to facilitate things such that private sectors could be encouraged to be involved in some parts of the activities.

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Water Resources Assessment Baringo District

By Francis Edalia, Department of Water Development, Kenya

Executive Summary

Kenya is a medium sized Country and lies across the Equator but experiences wide variations in Climate due to great differences in altitude. The topography ranges from low lying coastal plains to the highlands east and west of the Rift valley.

More than two-thirds of the Country is arid to semi arid with very low mean annual rainfall of less than 250mm. Water resources availability varies in time and pace due to the physiographic and climatic variations. The Country experiences floods and droughts. Proper management of the Water resources in the Country is therefore very crucial and requires high profile treatment.

Much of the socio-economic activities in the Country rely on the use of Surface water mainly but in the dry areas, groundwater offers the only reliable source of water.

There is a Country Water sector policy paper prepared in 1999 which gives the guideline as to the direction in which the sector is expected to move over the coming years. To implement the policy, two Country strategy papers have been prepared, one dealing with Integrated Water Resources management and the other dealing with Water Services and Sanitation. To create the Legal framework for implementation of the Water sector reforms, the Water Act has been reviewed and is at final stages in Parliament for enactment into new Water Act.

Water Resources Assessment is one of the main components of Water Resources management. Information provided through Water Resources Assessment is useful in the management and development of the Water Resources.

The case study presented here is the Water Resources Assessment study for Baringo District in Kenya. The study was done in 1994 and has provided the basic water resources data for use as one of the reference documents in the management and development of the Water resources in the District. However, since it is now eight years from the time the study was done, there is need to update the report to reflect changes that may have taken place since then.

Water Resources Assessment has to be done continuously since water availability is a dynamic phenomenon. There is therefore the need for maintaining reliable and adequate data collection networks, trained human resources, adequate financing for equipment and transport, and maintenance of monitoring networks.

Country Background

General introduction

The Republic of Kenya lies in the East African region. It extends from Lake Victoria to the West to the Indian Ocean to the east. The Country covers an area of 583,000 square Kilometres. Although it crosses the equator, it experiences wide variations in climate due to great differences in altitude. The Indian Ocean coastline stretches from the Somalia border in the North to Tanzania in the South.

Kenya's neighbours are Tanzania to the south, Somalia to the east, Ethiopia to the north, Sudan to the Northwest, and Uganda to the west.

Topography

Ranges from a narrow tropical belt along the coastline behind which lies large areas of semi arid to arid lands. The land then rises steeply to the temperate highland plateau through which runs the spectacular Rift valley. There are highlands to the west and east of the Rift valley.

Climate

Altitude largely governs the climate. Land over 1500m above sea level experiences a temperate climate with fairly good rainfall. For most parts of the Country, there are two rain seasons. Mean annual rainfall in Kenya varies from 250mm in desert areas to over 2000mm in the highland areas. Over 2/3 of Kenya is arid to semi arid, receiving less than 250 mm mean annual rainfall. Only 3% of the Country gets more than 1200mm mean annual rainfall and these are the areas from where the major rivers originate. Droughts and floods are a common feature of Kenya's climate.

Water Resources distribution

Due to the climatic and physiographic variations, water resources are unevenly distributed both in time and space. About half of the Country's surface water resources are found in only 8% of the total area. Groundwater resources are spread all over the Country but with variable potentials for development. The constraints to development of groundwater relate to great depths, quality, or low yield. Groundwater constitutes a small component of the national water resources but it is the major source of water in the drier parts of the Country. (Estimated water resources potential in Kenya: Surface water- 20.2billion m³/yr, Exploitable Groundwater -0.62 billion m³/yr).

However, it should be noted that the precise Water resources potential of the Country is not well known due to inadequate data and the above figures present approximate estimates only. There is therefore the need for the Country to allocate more resources in the area of Water resources Assessment to get a better understanding of the Country's water resources potential.

Country Water Policy and Strategies

Kenya's Water policy and strategies are contained in the National Water policy on Water Resources management and development document published in-1999 and is the current official water Policy document.

Policy

The Country Water Policy statements are summarized below:

- (i). Water availability: Water to be conserved and water use to be regulated to benefit all sectors.
- (ii). Roles and functions at different levels: Roles of different players to be clearly defined and decision making process to be decentralized in water management.
- (iii). Integrated Water Resources management: An integrated approach to water management and development to be adopted involving all key players under the guidance (coordination) of the Ministry in charge of Water Affairs.
- (iv). Legal framework: The Water Act to be reviewed (done already) to harmonise with other acts and strengthen enforcement.
- (v). Impact of Water resources development on environment: Water development to be geared towards improvement of the environment and safeguard the quality of water resources in particular and environment in general.
- (vi). Water Quality issues: Safeguard against discharge of undesirable elements into the water system and charge levies on effluent discharges.
- (vii). Water Resources assessment, monitoring and information system: Water resources data bases to be maintained through regular updating of water resources data.
- (viii). Water Research and Technology: Promotion of research in water matters to be undertaken.

(ix).Development to meet water demands: The Government will collaborate with other actors to ensure adequate water supplies are developed for all sectors. The Government will mainly create an enabling environment in water supply but the role of direct service provision will diminish.

(ix).Development for Poverty alleviation: Priority to be given to water programmes that have a direct impact on the vulnerable sections of the society.

(x). Technology: Vet technologies being introduced in the sector to ensure they are appropriate.

(xi). Monitoring System: A comprehensive water sector monitoring system to be developed to create data base that will support policy formulation and regulatory process.

(xii). Operation and maintenance (O&M): Self sustaining water supply systems to be encouraged and beneficiaries to meet O & M costs.

(xiii). Waste Water disposal systems: Adequate waste water systems to be developed and effluents from Industries to be appropriately treated before discharge into water systems.

(xiv). Institutional set up and Coordination: The role of the Ministry (Water Department) to be redefined with emphasis on regulatory, enabling, and coordination functions. Roles of other actors to be clearly defined.

(xv). Legislation: Review of the Water Act to be undertaken.(Bill now in final stages at Parliament).

(xvi). Others:

- Community participation: To be encouraged via CBO Water committees
- Gender concerns: Role of women to be recognized and supported via training and reflection in ownership and management of water Schemes.
- Handing over Water supplies: Local Authorities, communities, NGOs etc to be encouraged to take over ownership of Water supplies.
- Financial resources: Mobilize local resources, solicit for external sourcing to complement local resources.
- Revenue base: Water user pays principle to be adopted

Country Strategies on Water

Two Country strategy papers have been prepared for the water sector (March 2002). The two are Country strategy on water and sanitation services and the other one on Country strategy on Integrated Water Resources management.

The strategy paper on Integrated Water resources management has addressed problems facing water resources management which revolve around:

- (i). Inadequate and unsustainable water resources management practices.
- (ii). Weak water allocation procedures
- (iii). Lack of clear roles of different actors
- (iv). Weak enforcement capacity and inadequate financing.

The strategy was developed through a comprehensive consultative process with the object of ensuring sustainable water resources management practices, demand management, and well defined roles for various actors. The Strategy emphasizes decentralization of water resources management and puts in place suggestions for sustainable financing mechanisms.

The revised Water Act proposes the establishment of a Water Resources management Authority to undertake all water resources management activities. This is expected to elevate the profile of water management to the level it deserves. The Government will continue to work with all the concerned development partners and all other stakeholders in the Country in the execution of Integrated Water Resources management activities.

The other strategy on Water supply and sanitation services aims to further develop the Water policy aspirations and define an implementation framework. Problems in water services

delivery have tended to revolve on lack of clarity on Institutional framework, unsustainability of services and inadequate financing.

The strategy has focussed on specific roles of various actors clearly defined in an Institutional framework that underscores separation of service delivery from regulation. Two institutions are proposed for water supply matters to underpin the separation of roles and ensure fair play among players.. These are the Water Supply and Sanitation Boards and the Water Supply and Sanitation Regulatory Board.

Water and Sanitation services will be under single utilities unlike the current practice. This is due to close linkages in operations, maintenance and commercial aspects. The new Water Bill will create the legal framework for establishment of the proposed institutions.

In the new strategy, there is increased role for PSP, Communities, NGOs, and other interested players in WSS service delivery. The strategy has proposed a transition process to ensure systematic establishment and operationalisation of the new institutions. This will ensure smooth transfer of responsibility and systems to new service providers. The ministry has proposed the undertaking of a detailed study on status of assets to determine value and future ownership.

Project Background- Water Resources Assessment Study in Baringo District

Introduction

Water resources Assessment is important since Assessment is one of the main elements in Water Resources management and development. The Assessment of the Water resources in Baringo District enabled the status of the resource to be known with regard to the geographical location of the resource, types of water resources available, quantities available and quality and how they vary with time, the extent to which the resource is used, the potential and limitations for water supply development.

Objectives

The Water Resources Assessment study was done for Baringo District to provide basic water resources data and information for the rational development and effective management of the Water Resources in the District.

Donors

The project was implemented under the joint technical Cooperation programme between the Kenya Government and the Netherlands Government. The Kenya Government provided professional, technical and support staff and office facilities while the Dutch Government provided for the cost of consultants from Holland, training Kenyan counterparts, equipment and vehicles for the project.

Partners

DHV Consultants from Holland in partnership with staff of the Water Department at Headquarters and at Baringo District were involved in the execution of the study. Communities were involved by assisting in the inventory surveys of the water sources in the District.

Activities

The activities of the project included the following:

- Training of Kenyan professionals through transfer of skills in developing a methodology for systematic water resources assessment study.
- Inventory and review of all existing Water resources data and reports for Baringo District
- Field surveys for collection of additional data needed for the preparation of the report
- Compilation, evaluation, and interpretation of all the available water resources data.

- Preparation of a Water Resources Assessment study report whose outputs were: Text, maps, graphs and tables with data summaries.

Target groups

The main groups that were targeted for acquiring skills in Water resources Assessment studies were Professional and technical staff of the Water Department at the Headquarters and at the District. With regard to the use of the report, the target groups were all those actors who may be involved in Water management and development in the District. (Government Departments, Donors, NGOs, Community groups, Researchers ...etc).

Project Achievements and SWOT Analysis

| | POSITIVE | NEGATIVE |
|-----------------|--|--|
| INTERNAL | (Strengths) <ul style="list-style-type: none"> - Methodology for preparation of WRA study developed - WRA study report prepared - Institutional structure for execution of WRA studies exists | (Weaknesses) <ul style="list-style-type: none"> - Staff not well motivated to undertake WRA studies - High Reliance on donor support for financing WRA studies. - Poor documentation of WR data (data scattered & not fully computerized) - Limited or no budgetary allocation for WRA studies |
| EXTERNAL | (Opportunities) <ul style="list-style-type: none"> - Training of personnel to undertake WRA studies - Development of sustainable local financing mechanisms - Community involvement e.g. in monitoring/control of water use - New Water Act (provides for decentralization & financing WR management activities) - Computerization of all available WR data | (Threats) <ul style="list-style-type: none"> - Exodus of trained manpower - Non functional WR data collection networks - Civil Service reform programme |

Conclusions and Identification of Key Issues

Water resources Assessment is crucial in Water resources management and development. The study undertaken in Baringo District resulted in the preparation of a comprehensive Water Resources Assessment report which has been useful as one of the reference documents in the management and development of the Water resources of the District. Donor programmes on water supply improvement (JICA, BTC) among other users have used the report as one of their reference documents on Water resources availability in the District.

Availability of water resources and the quality of water changes over time due to a number of factors. There is therefore the need for regular Assessment of the status of the water resources in the District. Continuous monitoring is needed to provide data for updating the Water resources Assessment report.

Key issues:

- WRA report requires periodical updating
- Capacity building and retention of qualified personnel
- Financing WRA activities: Data collection networks, equipment, data banks, Publication of reports.

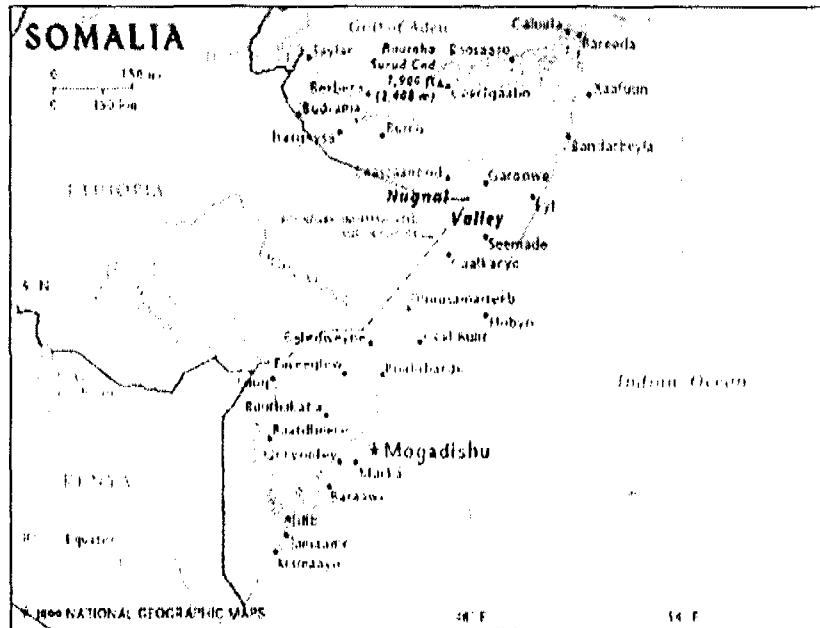
- Community involvement in Water management (allocation/water use, Land use effects on quality & Quantity, monitoring water levels....)
- Catchment management in the District

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Challenges of Irrigation Infrastructure Rehabilitation with Low Value Irrigated Crop Production

By Peter Muthigani for CEFA Somalia



Executive summary

Originally the irrigation infrastructure along river Shabelle was designed for cultivation of sugar cane, cotton, partially banana and citrus in Middle Shabelle and mainly banana production in Lower Shabelle. This production was dependent on export of banana and citrus and local processing of sugar cane and cotton. The export of bananas and citrus stopped in 1998 causing the collapse of the entire sector. The sugar factory in Jowhar was completely destroyed in 1991 and so were all other productive and processing infrastructure. Without a market for such products farmers went back to traditional crops, mainly maize and sorghum and the irrigation network quickly became silted and unusable. As a result most of the irrigated land gradually moved into a rain-fed crop production system.

The costs involved in the regular cleaning/de-silting of the irrigation system including maintenance of the machinery, labour, fuel and oils for the equipment are prohibitive when farmers grow such low value crops as maize, sorghum and sesame. At the same time cost of hiring the same from local contractors is equally out of reach for these farmers.

The Strengthening Agricultural Activities in the Shabelle Valley project aims to support the farmers in rehabilitating the irrigation infrastructure in Middle and Lower Shabelle. A case by case justification before rehabilitation of the infrastructure is required. This case study is a presentation of the findings during the attempt to justify the rehabilitation of the canal Shekhaal irrigation infrastructure. It should be noted that to attempt a relationship of the workshop and the fieldwork the only situation presented is that of the irrigation canal rehabilitation design requirement while cases for structures such as road crossings, division structures, intake/off-take structures and associated regulating structures have not been included although they form part of the overall rehabilitation requirement.

Country background

Since the fall of the Siyad Barre regime in January 1991, Somalia has been through a decade without a central government. In 1991-1992, the country virtually collapsed, inter-clan warfare, banditry, and widespread famine, claimed the lives of many Somalis. The fighting destroyed much of the capital, Mogadishu, laid to waste the agricultural communities in southern Somalia, and generated enormous refugee flows and internal displacement.

This situation eventually prompted a UN peace enforcement operation in Somalia (UNOSOM) in 1993-1995. The UNOSOM intervention succeeded in ending the famine and in some regions facilitated the return of refugees and displaced persons. But the peace operation was drawn into inconclusive, bloody armed conflict with the Somali National Alliance (SNA), failed to bring about a comprehensive national reconciliation in the country, and generated only modest support for the massive task of reconstruction. When UNOSOM forces departed from Somalia in March 1995, it left the country still divided, without a central government, and with an economic infrastructure mostly in ruins.

Somalia has remained vulnerable to chronic armed clashes, poor food security, and lawlessness. The once relatively cohesive factions have splintered into quarrelling sub-clan militias, so that most armed conflict since 1995 has been within, rather than between, major clans. This means that the country is less vulnerable to major armed clashes, but more prone to smaller, localized, and less predictable armed hostilities in neighbourhoods and towns.

The northwest and northeast regions of the country (Somaliland and Puntland, respectively) have remained stable with relatively legitimate and functional administrations.

IGAD (Inter-Governmental Authority on Development) and the government of Djibouti proposed the Somali National Peace Conference (SNPC). The "Djibouti initiative" was endorsed by the UN Security Council in December 1999. The conference, opened on 2 May 2000 was organized on the basis of clan, with a formula for numerical representation by clan (Daarood, 175; Hawiye 175; Dige-Milifle 175; Dir 205 [of which 100 were Isaaq]; and minorities, 90. In addition, a cross-clan delegation of 100 women was invited. Participants were mainly a combination of clan elders, civil society leaders, intellectuals, ex-civil servants, and in some cases faction leaders. Key players that did not attend the conference included most of Mogadishu-based warlords, Puntland and Somaliland administrations.

In October 2000, the President Abdiqasim Salad Hassan and a selected 245 member parliament, apportioned on clan basis returned to Mogadishu and started the process of establishing a national government. To date the Transitional National Government (TNG) has not taken root in Somalia and though based in Mogadishu can not claim to control the whole of Mogadishu.

Sporadic fighting characterizes most of the project area within the Shabelle Valley represented by Jowhar and Merka. On 24th May 2002 Mohamed Dheere the administrator for Jowhar attacked the Minister for Interior of the TNG who like him hails from the Abgal clan. This attack was followed up by another attack at El-Baraf on 17th June 2002 on the Minister's sub clan who were grouping in preparation to attack and revenge the attack on the Minister. Merka has remained relatively calm with the TNG presence assuring general security; however incidences of robbery and the shooting of an aid worker in February 2002 indicate that there is still a long way to go.

Project background

Originally the irrigation infrastructure along river Shabelle was designed for cultivation of sugar cane, cotton, partially banana and citrus in Middle Shabelle and mainly banana production in Lower Shabelle. This production was dependent on export of banana and citrus

and local processing of sugar cane and cotton. The export of bananas and citrus stopped in 1998 causing the collapse of the entire sector. The sugar factory in Jowhar was completely destroyed in 1991 and so were all other productive and processing infrastructure. Without a market for such products farmers went back to traditional crops, mainly maize and sorghum and the irrigation network quickly became silted and unusable. As a result most of the irrigated land gradually moved into rain-fed crop production system.

The project under which the canal Shekhaal is proposed to be rehabilitated is known as "Strengthening Agricultural Activities in the Shabelle Valley" funded by the EC for a period of 2 years starting March 2002. The objective of the project is stated as "**The agricultural production in the target area will be strengthened and diversified, contributing to increased livelihood security of the beneficiaries**". The project is a component of the EC funded food security programme implemented by four NGO's in the Shabelle Valley namely ADRA, CARE, CEFA and CONCERN Worldwide.

The project is implemented in the regions of Middle and Lower Shabelle. Middle Shabelle has an estimated population of 347,000 of whom 190,000 are involved in farming while the rest are either pastoral or urban inhabitants. Lower Shabelle on the other hand has 620,000 inhabitants, of whom 458,000 are farmers and 162,000 are pastoral and urban inhabitants. The farming community will be the direct beneficiaries while the pastoral and urban inhabitants form part of the indirect beneficiaries with a further estimated 135,000 people from other regions.

The project has two strategies namely the rehabilitation of irrigation infrastructure and the diversification of crop production. The rehabilitation of irrigation infrastructure aims at revamping irrigation farming, which will increase agricultural production/productivity and contribute to food security. Diversification of crop production, processing and marketing will increase the income of farmers and provide means for servicing and maintaining the irrigation infrastructure. Training packages for rehabilitation and maintenance of irrigation and flood protection infrastructure as well as agricultural production and capacity building are to be developed and utilized. A participatory process in decision making on infrastructure to be rehabilitated, crops to be advocated for and community contribution has been adopted by the project. Following discussions with the target beneficiaries and site visits, basic information on the irrigation infrastructure to determine extent of irrigation infrastructure rehabilitation was carried out. One of the target irrigation infrastructure identified through this initial process is Canal Shekhaal.

Canal Shekhaal was first opened in 1926. In 1985 the irrigation system dependent on the Janaale barrage was redesigned. Canal Shekhaal with an off-take from Primo Secundario was designed for a flow of 1187 l/s. At the same time the Primo Primario (Cesare Mario) was provided with a drainage outlet to canal Shekhaal. The canal has a regulating sluice gate that was opened when irrigation water was required within the irrigated fields. Of the two gates only one is currently operational.

A total of 350 ha of irrigable land under the canal Shekhaal command was cultivated with bananas before the civil war. Another 400 ha was grown with irrigated seasonal crops. A large area on both sides of the canal near the intake was irrigated directly from the Primo Secundario through pump-fed underground pipe system these farms would always be under banana production. Most banana farmers had individual water reservoirs or wells (of the 20 original wells only 2 are in use now) from where they would supplement the irrigation water from river Shabelle flow.

Currently approximately 419 ha of the area previously under banana cultivation and that used to be pump-fed from the Primo Secundario is irrigated from canal Shekhaal. Most of this area is currently under banana production. Of the original irrigated land (750 ha) under canal

Shekhaal command, 375 ha was cultivated in the dyer season 2001/2002. 636 farm families from Dieni, Jebey, Basilio, Janjow and Shalambood villages cultivated this area. Crops grown during the dyer season 2001/2002 in the Canal Shekhaal area included maize (285 ha), onion (23 ha), sesame (30 ha), cowpea (6 ha), tomato (17 ha), sweet-pepper (12 ha), water melon (2 ha). Maize, the main subsistence crop (about 45% of yield was sold in the local market) covered 76% of the cropped area with other crops used both as cash crop and for home consumption covering a total of 24% of the cropped area. Based on reported yields, sales and the market prices during the months of January, February and March 2002 the value of maize crop sold was US\$ 16,240 which is approximately US\$ 25 per farm family.

The canal has a committee of 10 that decides on an irrigation schedule that is then followed by the farmers from the 5 villages. A gate keeper is informed when to open and close the sluice gate and farmers arrange which farm feeder canals are to be opened according to the irrigation schedule.

Project achievements & SWOT analysis

The Strengthening Agricultural Activities in the Shabelle Valley project has been ongoing since March 2002. To date the project has been able to achieve some of the short term objectives including, hiring of both national and international staff, setting operational basis in both Merka and Jowhar and setting up participatory mechanisms for project implementation. The project has held various discussions with target communities and conducted initial surveys in selected areas. Immediate plans include holding focused participatory rural appraisals in the target areas to generate community action plans and participatory monitoring plans.

Following is a SWOT analysis for canal Shekhaal irrigable area.

| | POSITIVE | NEGATIVE |
|-----------------|---|---|
| <i>Internal</i> | Strengths <ul style="list-style-type: none"> • Potential for high quality (market) banana production • Potential for production of significant volumes of cereals, vegetable oils, fruits among others • Up to date telephone infrastructure • Potential to create self reliance for food items • Potential to reduce destitution • Previous experience in growing banana and fruits for EU market | Weaknesses <ul style="list-style-type: none"> • Lack of market for traditional crops (banana & grape fruit) • Utilisation of river Shabelle flow upstream by other irrigation projects (Beret-weyne, Jowhar etc) • Poor irrigation infrastructure maintenance capacity of the farmers • Growing of low value crops e.g. maize • Land ownership problems, most farms in Janaale area were owned by Italian farmers • Poor communication infrastructure (road, port) • Inability to cultivate all the irrigable area – limited irrigation water |
| <i>External</i> | Opportunities <ul style="list-style-type: none"> • Good soils • Irrigation water availability • Good weather and climate for crop growing • Export outlet to external markets through the port of Merka • Ease of access of inputs through Merka port and from Kenya on road | Threats <ul style="list-style-type: none"> • Clan/sub-clan differences and implied competition for resources • Large volumes of relief food especially cereals competing with locally produced cereals • High flood risks - infrastructure = flood relief/off stream storage in Jowhar and river embankment destroyed • Likelihood of Ethiopia using river Shabelle for irrigation purpose and therefore limiting flow downstream |

To determine the extent for irrigation infrastructure rehabilitation the manning equation has been used. The following are the results and conclusions arrived at.

i). Water Demand for Maximum Irrigable Area

During the preliminary semi-detailed survey the irrigable area for canal Shekhaal was estimated at 3,175.65 hectares. Using an irrigation requirement of 1.5 l/s/ha, (calculated based on information collected on the Shabelle Valley, Sir Macdonald & Partners 1978, 1980 and 1984) the maximum flow rate is 4,763 l/s equivalent to 4.76 m³/s.

$$A = 3,175.65 \text{ ha}$$

$$Q = 3,175.65 \times 1.5 = 4,763.48 \text{ l/s}$$

$$Q = 4.76 \text{ m}^3/\text{s}$$

During normal flow this water demand is not available at the canal Shekhaal off-take from Primo Secundario canal.

ii). Water Demand for Optimal Irrigable Area

Discussions with farmers from the five villages (Jeebay, Basiliyo, Jaanjow, Diena and Shalambood) using canal Shekhaal established that the maximum irrigated area for the canal is approximately 2,403 ha. Based on an irrigation requirement of 1.5 l/s/ha, the optimal flow rate to irrigate this area is 3,604 l/s, equivalent to 3.6 m³/s.

$$A = 2403 \text{ ha}$$

$$Q = 2403 \times 1.5 = 3,604 \text{ l/s}$$

$$Q = 3.6 \text{ m}^3/\text{s}$$

During normal flow this water demand is not available at the canal Shekhaal off-take from Primo Secundario canal.

iii). Optimal Available flow

Based on available design data for canal Primo Secundario only 1,187 l/s flows into the canal Shekhaal during normal flow. However it would be possible to allow more flow into the Shekhaal by closing (adjusting) the sluice gate on the canal Primo Secundario, this option can not be used when the irrigated crop requires water as irrigation in the Shabelle Valley is seasonal and crops growing season is the same. At normal design flow then only 1,187 l/s equivalent to 1.2 m³/s is available for irrigated crop production. Using irrigation requirement of 1.5 l/s/ha the optimal area that can be irrigated is 791 ha.

$$Q = 1.2 \text{ m}^3/\text{s}$$

$$Q = 1,187 \text{ l/s}$$

$$A = 1,187 \div 1.5 = 791.3 \text{ ha}$$

$$A = 791 \text{ ha}$$

Discussions with the farmers and local technicians established that most of the farmers had wells and off-stream reservoirs from where they could pump supplemental irrigation water for their fields.

From the calculations the optimal irrigable area using the river Shabelle water is approximately 30% of potential irrigable land. Assuming that the whole irrigation system on which canal Shekhaal depends is rehabilitated or working optimally, the rehabilitation of canal Shekhaal would allow an increase of perennial cropped area by 372 ha (791 ha – 419 ha). It will also be possible to provide at least 1 or 2 irrigation gifts to seasonal crops (mainly maize and sesame) during the growing season without affecting the irrigation requirements for the perennial crops.

Calculations for canal design are based on optimal irrigable area of 791 ha and a flow rate of 1,187 l/s.

iv). Canal design

The canal design is based on the assumption that the irrigation canals will act as drainage canals during high river flows and flood period. In most cases flood water due to incident rain is pumped into the irrigation canals from the fields and drains that do not have outlets.

The canal design is based on a continuous flow basis. On farm irrigation is rotational with sluice gates (where available or make-shift cross/check structure) being crossed or opened to allow flow into the farm header canals.

The flow through canals depends on the hydraulic gradient, S (the driving force) and the friction losses which depend on the wall roughness and the dimensions of the canal. The Manning equation is widely accepted to describe the flow conditions.

The equation can be presented in the following forms,

- | | | |
|----|----------------------------|-------------------------------|
| 1) | $Q = VA$ | $Q = \text{Discharge}$ |
| 2) | $V = KmR^{2/3}S^{1/2}$ | $A = \text{Water area}$ |
| 3) | $Q = KmAR^{2/3}S^{1/2}$ | $V = \text{Average velocity}$ |
| 4) | $AR^{2/3} = Q/(KmS^{1/2})$ | $R = \text{Hydraulic radius}$ |
- $Km = \text{Coefficient of Manning}$
 $S = \text{Longitudinal slope}$

For trapezoidal canals section the following equations are used in conjunction with the Manning equation.

- 5) $A = (b + zd)d$
- 6) $P = b + 2(1 + z^2)^{1/2}d$
- 7) $R = A/P$

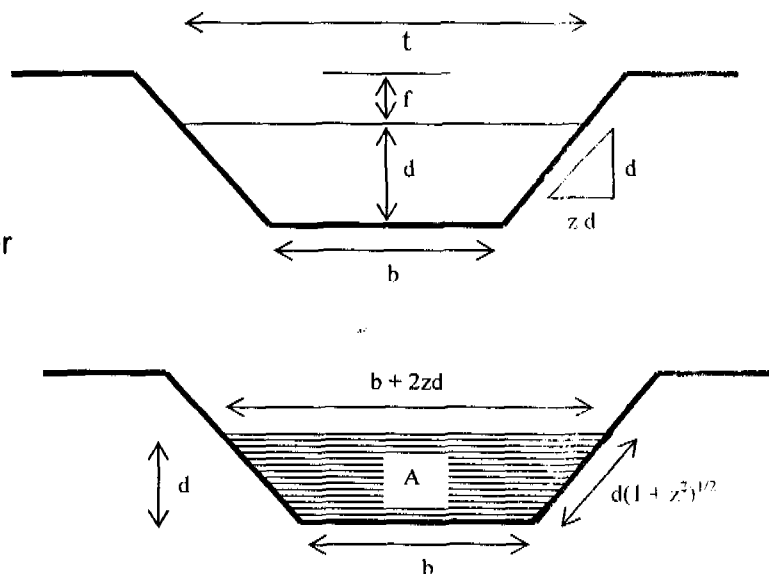
$P = \text{Wetted perimeter}$

$b = \text{bed width}$

$d = \text{water depth}$

$z = \text{side slope}$

$t = \text{top width}$



Combining the Manning equation and the trapezoidal canal section equation results to the following expressions used to derive channel dimensions.

- i) $R = ((b + zd)d)/(b + 2(1 + z^2)^{1/2}d)$
- ii) $AR^{2/3} = ((b + zd)d^{5/3})/[b + 2(1 + z^2)^{1/2}d]^{2/3}$

To use the Manning equation to determine the canal cross-section dimensions there is need to:

- a) Establish canal discharge (overall irrigation requirement/available $Q = 1.2 \text{ m}^3/\text{s}$)
- b) Estimate the roughness coefficient $Km = 37$
- c) Determine canal bed slope (preferably original bed slope) = 0.003
- d) Compute canal section factor $AR^{2/3}$ with equation 4 above

Using equation 4, $AR^{2/3}$ is computed to 0.59 , substituting this value in expression (ii), the two sided expression can be computed with assumed values of b and d until both sides are

approximately equal. The assumed value of b is based on minimum canal bed width based on current channel size with an indication given by existing fixed concrete structures.

$$[(b + zd)]^{5/3} \approx 0.59 \times (b + 2(1 + z^2)^{1/2} \times d)^{2/3}$$

| z | b | d | RHT | LHT | d/b | f | MCD |
|----------|------------|-------------|---------------|---------------|------------|--------------|------------|
| 1 | 1.5 | 0.5 | 1 | 1.3207 | 0.3 | 0.35 | 0.9 |
| 1 | 1.5 | 0.54 | 1.2737 | 1.372 | 0.4 | 0.378 | 0.9 |
| 1 | 1.5 | 0.55 | 1.3499 | 1.3848 | 0.4 | 0.385 | 0.9 |
| 1 | 1.5 | 0.56 | 1.4293 | 1.3976 | 0.4 | 0.392 | 1 |

MCD = Minimum Canal Depth.

RHT = Right Hand Term

As a rule of thumb d/b should be between 0.4 and 1, while freeboard for flows more than 1 m³/s should be calculated at 0.7d.

Canal dimensions for Shekhaal are therefore:

Bed width b = 1.5 m

Design water depth d = 0.55 m (say 0.6 m)

Bed slope 0.3%

The rehabilitated canal with a minimum depth of 0.9 (say 1 m) will allow a maximum design flow rate calculated from equations 2, 5, 6 and 7 of 2.87 m³/s. This maximum capacity will allow the canal to be used to carry excess flow from river Shabelle during flood periods and water pumped into the canal when flooding is caused by incident precipitation on the farms.

$$\begin{aligned} A &= (b + zd)d \\ &= (1.5 + 1 \times 0.9) \times 0.9 \\ &= 2.1 \end{aligned}$$

$$\begin{aligned} R &= A/P \\ &= 2.1/3.89 \\ &= 0.53 \end{aligned}$$

$$\begin{aligned} P &= b + 2(1 + z^2)^{1/2} d \\ &= 1.5 + 2(1 + 1^2)^{1/2} \times .9 \\ &= 4.05 \end{aligned}$$

$$\begin{aligned} Q &= KmAR^{2/3}S^{1/2} \\ &= 37 \times 2.1 \times 0.486^{2/3} \times .003^{1/2} \\ &= 2.87 \text{ m}^3/\text{s} \end{aligned}$$

Over the years and due to regular cleaning/de-silting, before the civil war, of the canal bed and depositing of the material on the immediate sides of the canal embankments the canal depth appears to have increased and so has the canal top width. Taking into consideration this depth at the lowest point, the maximum non overtopping flood discharge would be 7.73 m³/s.

Conclusion & key issues to be addressed during the workshop

Initial calculations on resources needed to rehabilitate the canal Shekhaal indicate a requirement of approximately US\$ 34,000. Note that the canal will be silted once every three seasons (1.5 years) and at least 50% of this cost must be met at least once every 1.5 years. **In a situation where development cannot be sustained, should relief and rehabilitation (and not development) be planned for longer periods to ensure strategic use of natural resources in light of Strategic Water Resource Management?**

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Burao Water System

By A.A Odowaa, Ministry of Water and Mineral Resources, Somaliland

Executive Summary

Water is a limited factor in Somaliland because all water infrastructures in the country were devastated by the civil war of 1988. 90% of the water sources were destroyed by the enemy (former regime) because enemy was using water as weapon to fight against the innocent population although they did not succeed in it. By the time the population returned to their original Homes they observed that their water sources were entirely ruined so that it was agreed rehabilitation of water facilities to be country priority. Then, many water resources like Boreholes, Balays and Barkedes, were rehabilitated. As case of study, I took the expansion of Burao Water System.

The existing piped Water system of Burao town was constructed in the late 1980's by the GTZ. It was served by five production wells with a combined capacity of more than 100m³/hr (or 1,500m³/day) in the original design; water would be pumped into two elevated tanks, and distributed through a network of 300-100mm pvc pipes.

However, the construction works were interrupted by the outbreak of hostilities in 1988. Four of the five Boreholes were blocked and destroyed while the tanks and pipes were also damaged.

Now UNCHS (Habitat) started with the implementation of two Boreholes which the time schedule for the completion of two production boreholes within 17 weeks using with rotary equipment deployed for drilling works. Burao Water Authority is assisted by the United Nations Centre for human settlement (UNCHS-Habitat) in the expansion and management of Burao town water supply.

The depth of the borehole is 190 meter developed, pump tested, equipped and connected to the existing water supply system. The expected sustainable discharge of the boreholes is at least 30m³/hr. Installation will be with high quality imported 8" special deep-well pvc casings and screens. The minimum drilling diameter was 12"

Country back ground

The Republic of Somaliland is located in the Horn of Africa, its boundaries are defined by the Gulf of Aden Yemen Republic in the north, Somalia in south east, Federal Republic of Ethiopia in the south and west and Republic of Djibouti in North West. It lies between latitude 8^o to 11^o30' north and Longitude 42^o 45' to 49^o East.

Total Area

Total of the Republic of Somaliland is 86000 square miles or 137600 square kilometres

Climate

Climate of Somaliland is semiarid with average air temperature of 25C^o to 35^o in the coastal area, Sun passes vertical overhead twice in a year 21 March and 23 September, we call in our language "Gu" and "Dayr". Gu is the main rainy season and Dayr is the secondary rainy season.

Average Rainfall

The average Rainfall is 500mm per year; the maximum rainfall is characterized by the high plateau and minimum rainfall in the low lands

Relative humidity

The relative humidity varies from 40% to 85% in the dry and wet season respectively.

State

Structure of the state consists of Legislative House of elders and House of Representatives and Executive council of Ministers.

There are administrative six Regions and the Capital of the Republic is called Hargeisa whereby its inhabitants are about 400,000, the total population of Republic of Somaliland is estimated 2.8 Million and which 65% are nomadic 35% are urban and rural. The population growth rate is 3.1%. Population density is estimated 22 persons per square Kilometre.

Official language

Official language of the country is Somali Language; English and Arabic are also common spoken.

Economic of the country

The backbone of the economy of the county is the livestock population. Majority of the people depend directly or indirectly on the livestock.

While, agriculture provides subsistence for 1/5 of the country's population. Also the small mining enterprises was newly established

The country has Geographical zones in relation with water sources and its characteristic is as following

1. Coastal belt usually shallow wells is the major water sources, it has low rainfall 350mm per year with high temperature especially during the summer.
2. Mountainous zone (Golis Ranges) which shallow well and springs are the major water sources; it has high rainfall 600mm-800mm per year with temperate climate.
3. Oogo (Hland Plateau) which is the livestock grazing zone and drought prone belt with an average rainfall 500mm. The major water sources are surface water catchments like Barkads, Ballays and some boreholes.

It is the policy strategy of the country to alleviate the water shortage problem by increasing the access for safe and adequate water to the inhabitants of the country particularly in the drought prone areas.

Objectives

The objectives of the project are:-

1. To increase the access for safe and adequate drinking water to the inhabitants of Burao town
2. To mitigate the water shortage in the area during the dry season
3. To facilitate the re-integration (displaced persons and returnees) in Burao town.

Activities

In order to achieve these objectives the following activities have been set up

1. Replace the permanently abandoned boreholes by the drilling two new production boreholes.
2. Purchase and install news pumping equipment
3. Construction of Generator and operation rooms.
4. Connect the production to the existing water system

Donor

Donor of this project is Royal Netherlands Government through Habitat as partner and the target group is the community of Burao town as beneficiaries of this project. The project was implemented by selected contractor with memorandum of understanding

SWOT Analysis

| SWOT | Positive | Negative |
|----------|---|---|
| Internal | Strengths <ul style="list-style-type: none">• State commitment exists• national awareness improved• investment allocated• security exists• community contribution exists although not at the required level | Weaknesses <ul style="list-style-type: none">• Lack of professionalisation• Delay of funds from the donors• Lack of efficient equipment• Lack of proper communication between the stakeholders. |
| External | Opportunities <ul style="list-style-type: none">• expansion of water facilities• the need capacity building of the water sector• the need community awareness improvement• training• water policy in place• improvement water quality | Threats <ul style="list-style-type: none">• lack of reliable Hydrological data• instability of the community |

Conclusion

In my general view the objective of these 2 production boreholes which is carried out by Habitat in Burao town is viable project which will contribute to the water supply of Burao town. Burao water supply is still in adequate so that the expectation from these boreholes to me is positive to increase the water supply of Burao town and to tackle the problem of water shortage of the town which its population increases rapidly day after day. This does not mean that if the production of these 2 boreholes will be connected to the Burao water system the supply will cover the demand of the community, still there will be a gap of water shortage because the majority of the production boreholes of Togdher region are un-rehabilitated. Burao is located in the middle of Somaliland Republic especially drought prone area where majority of the livestock is concentrated, therefore the demand of water is very high and always water emergency exists.

However, Burao is very potential market which needs external assistance. The following opportunities are included in the countries priority.

1. Hydrological investigation of Haud plateau.
2. intervention of surface water(water harvest, flood control, subsurface Dam, etc)
3. capacity building of Burao water agency
4. construction/rehabilitation of more boreholes

If these projects are addressed positively, the mitigation of the recurrent drought is possible.

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2. Hand out of small town water supply systems.
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Hargeisa Water Supply System under Adverse Frame Conditions

By Ali Mohamed Hassen, Hargeisa Water Agency, Somaliland

Executive Summary

The Burao conference had declared Somaliland as separate independent country in May 1991 and the same has been reaffirmed overwhelmingly by the constitutional referendum held on 31 May 2001. In spite of physically destroyed and recapitalised socio-economic frame conditions, Somaliland has made significant achievement in building firm foundations, for democracy, in reviving the war torn infrastructure, and more important in consolidating peace and stability.

With the restoration of peace, political stability and the creation of enabling socio-economic environment, Somaliland attracted its citizens who have taken refuge in the neighbouring countries; this has put more burden on the infant state of Somaliland. Ensuring the provision of adequate and clean supply of water, among a myriad of equally urgent and essential tasks, was a head of the government of Somaliland. HWA was thus recreated to ensure regular clean and hygienic water supply.

Since HWA (Hargeisa Water Agency) started its post war operations in 1992, it has grown tremendously and supply water nearly to 600,000 persons living in and around Hargeisa. The old Chinese built water supply system that was destroyed by the war has been rehabilitated. Out of the 15 original boreholes, nine are currently operational. The water production and boosting equipments were installed. A new distribution water system networks have been installed and extended to new settlements. At present, more than 8000 houses are directly connected to water distribution system and installed 500 kiosks.

In spite of the significant achievements made, HWA is not in a position to achieve its mission and vision realised. The population living in and around Hargeisa do not have the chance to obtain sufficient water production is 65% below the level of demand. The main problem causing factors include:

1. Absence of sufficient number of borehole
2. Frequent machinery breakdown
3. Old transmission line with frequent leakage and breakdown
4. Decentralized power supply system which costs a very high operational and maintenance costs.
5. Very limited part of the city is covered with piped distribution network
6. Expansion of the city above the elevation of water storage tanks;
7. Non availability of funds to cope with the existing problems.

In order to cope with these problems, HWA envisages to:

1. Increase the number water production points (Boreholes)
2. Centralise the power supply system
3. Establish an effective information management system.
4. Introduce a computerized accounting and billing system
5. Improve its revenue collection capacity
6. Conduct research on key issues and establish meteorological and hydrological networks.

Country Background

With a population of about three million and total area 137,000km square, Somaliland, the former British Somaliland Protectorate, restored its independence after the total collapse of the Somali Republic on 18 May 1991. A multi-party state, Somaliland has legislative body

composed of the House of Elders and House of Representatives, and Executive body. It has 6 administrative region and 33 districts.

Several characteristics features may be noted as follows:

Average rainfall of 430mm/year

Precipitation is generally in the form of downpours at the end of the day.

The wind regime is very regular and is subject to the monsoons. (NE from October, to May and SE from June to September)

The year is divided into two seasons, the dry (October to March) and rainy (April to September) seasons.

The mean annual evaporation is 3207mm.

Hydrologically, Somaliland is divided into coastal, mountainous, and plateau zones.

- The plateau; it is a gently undulating plateau extending into Somalia and Ethiopia. Elevation varies between approximately 1400 and 1600m asl. Hargeisa lies on the Northwest limite of the plateau.
- The Mountains; it consists sharp ridges and steep precipitous valleys, with a flat riverbeds and gently sloping pediments thinly and discontinuously veneered with sand and stones cut from adjacent mountains. Elevations vary from 1000-14000mas.
- The coasted plain. From the base of the mountains which end abruptly at north about 1000m high, there is the coastal plain sloping gently to the Gulf of Aden.

Water Resources

a) Boreholes: Boreholes are distributed in the regions in the following manner.

| Region | Total | Operating | Non-operational | Abandoned |
|----------------|-------|-----------|-----------------|-----------|
| Awdal Region | 37 | 10 | 06 | 21 |
| Sool Region | 18 | 07 | 10 | 01 |
| Sahil Region | 12 | 03 | 03 | 06 |
| Galbed Region | 62 | 19 | 09 | 34 |
| Togdher Region | 43 | 10 | 19 | 19 |
| Sanag Region | 36 | 09 | 07 | 21 |

- b) Hand dug shallow wells
- c) Springs
- d) Berkads and Balleys

Background of the Program Location

Hargeisa Water Points

The water source area is situated in sediment of antique river courses of Udan, Anayo and Horohadleh rivers, which cover 12km². on the average, there is one well per Km². according to the data from 12 prospecting wells, estimated water reserve is 190,000,000m³. seasonal rainfall, floods, and base rock water around recharge the water source area. This shows that dry-up extracting will not happen.

HWA Background

a) Mission:

HWA strives to satisfy the water needs of Hargeisa residents with the provision of affordable clean, hygienic and sufficient water in a modern supply system.

b) Target Population:

The target populations of HWA include.

- Urban residents

- Sub-urban residents
- Private and public organization
- Industries
- Commerce and others.

c) Objectives

In striving, to carry out its mission HWA has set itself the following objectives

- To provide affordable clean and hygienic water to Hargeisa residents
- To consistently maintain water production and delivery services.
- To manage and administer the agency in financially and technically sound, dynamic, and successful manner for the benefit of all interested parties.
- To collect, process and present water information
- To advice, the interested parties all technical issues
- To involve, interested parties in the private and public sectors in the promotional development of water production and supply systems.

d) Operations

i. *Water Production:*

Water is supplied to the town from a series of boreholes located 25km to the north of the town. The entire system consists of 15 boreholes of which only nine are currently operational. The combined output of these nine boreholes is 6000m³/day and are connected to two reinforced concrete sump tanks with a combined capacity of 475m³ located at a central pumping station at the well site of Geed Deeble.

Water from the tanks is boosted through 10km of 300mm diameter steel pipe to similar size concrete sump tanks at a secondary booster station then delivers the water to reservoirs in Hargeisa town through 13km of similar pipe size and dimension. Each borehole in the system is connected to its own generator. The pumping stations have two generator each.

Currently HWA operates on a 18 Hour basis to produce 6000m³ per day. This is the amount the agency can produce with operating boreholes and equipment at hand.

ii. *Water Delivery:*

HWA distributes water in the following three:

1. Public Kiosks:

Today there are more than 500 public kiosks in operation all over the city. The bulky of the kiosks are found in sub urban and location occupied with low income families in order to give the opportunity to collect water at a reasonable price. The total amount distributed by Kiosks amounts about 82,000m³. this is to say that the kiosks distribute more then half of total metered consumptions.

2. House Connection

Household connections are the second major source of water consumption. There are more than 8,000 houses with connected is through household connection. Out of the total water consumption house connection amounts above 11%.

3. Stand Pipes:

HWA has only one standpipe that delivers about one percentage of the consumption. Tanks collect daily water from the standpipes and delivery to the residents living in and around Hargeisa.

- Sub-urban residents
- Private and public organization
- Industries
- Commerce and others.

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SWOT analysis

| Strength | Weakness |
|---|--|
| <ul style="list-style-type: none"> ❖ Clearly defined mission and objectives ❖ Relatively regular supply of water ❖ Regular upward annual growth on water production in order to meet the increasing demand. ❖ Water kiosks and house connections extended to all the corners ❖ Relatively affordable low sales price ❖ Capacity to repair machinery defects (Mechanical, electrical and related expertise) ❖ Good relation with the community and the government | <ul style="list-style-type: none"> ❖ Volume of production far below demand. ❖ Frequent machinery breakdown, transmission line, and distribution network. ❖ Decentralised power supply system with high operational costs. ❖ Fuel distribution to boreholes that are widely scattered very difficult during rainy seasons. ❖ Non-availability of some of the spare parts ❖ Price of fuel and spare parts very high, and unpredictable. ❖ Area covered with piped network is very small ❖ Water rationing system in place due to water scarcity. ❖ A substantial part of the new settlements are located above the elevation of the water storage tanks (1530 masl) and do not get water through gravity. ❖ Poor storage capacity ❖ Large outstanding bills ❖ Theft of water by some consumers ❖ Sales offices confined at HQ. Only ❖ Sales operations involves very voluminous paper work with risks of errors ❖ Less motivated and under paid staff ❖ Overstaffed due to the prevailing high rate of unemployed ❖ Internally generated revenue not sufficient for investing in expansions ❖ Very poor information management and absence of data for planning. |
| Opportunity | Threats |
| <ul style="list-style-type: none"> ❖ The attention of the government and international donor communities is attracted to the adverse situation of water ❖ Favourable local political trends. ❖ Establish links and cooperation with potential funding agencies and water development oriented parties. ❖ Existence of potential water resources ❖ Availability of water tankers to help water distributions. | <ul style="list-style-type: none"> ❖ Disruption of the regular supply due to break down in machinery and feeder pipes; ❖ Loss of confidence of the community due water scarcity ❖ Loss of purchasing power of the Somaliland Shilling which threatens the acquisition of spare parts. |

Proposed Intervention Measures

- In order to meet the demands of increasing population there is an urgent need to increase the number water production points (Boreholes)
- Regular supply of water is constrained by frequent machinery breaking due HWA has been using. Often the water production and boosting machinery are used beyond their useful life without being sufficient overhauled. As a result, there is frequent machinery break down that disrupts water supply operation. Thus, there is a need to centralize the power supply system the replacement of the tired machines is also recommended for emergency.
- The capacity of the HWA to manage information of the individual management areas is not effective, and thus there is a need to establish an effective information management system,.

- In order to enhance the operational capacity of the agency, introducing a computerized system of accounting is essential. This will add much to productivity and management efficiency.
- In order to streamline and improve its revenue base HWA needs to expand and improve its revenue collection capacity.
- Planning and water resource management is constrained by inadequate existence of database. Thus conducting research on key issues is recommended, it is also recommended that meteorological and hydrological networks are established.
- The need to raise external funds for HWA's priority intervention sectors is of prime importance, thus there is a need to establish various funding sources.
- There is also a need to forge links and cooperation with water supply and development oriented agencies for sharing information and experience.

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- No inst'l framework - no laws
- Security - people cutting pipe.
- New water policy drafted.

Expansion of Borama Water supply system

By Abdirahmaan A. Sheikh Ali, Ministry of Water and Mineral Resources, Somaliland

1,000 house connections .

Executive Summary

| | | |
|------------------|---|--|
| Project Title | : | Expansion of Borama Water supply system |
| Project Location | : | Borama town |
| Beneficiaries | : | 120,000 people. - At time of Brits - 5000 |
| Duration | : | 12-18 months for System Expansion & 6 months Management Sport |
| Partners | : | Borama Municipality |
| Major inputs | : | Water equipment like pipes, pumps, generators and construction materials and financial support |
| Borama Community | : | Pipe digging, pipe laying, water meters, participate in Planning, supervision and setting up of an effective Management system |

Key persons have joined hands and are part of the Water Supply Committee. Therefore, one can have confidence that the committee, with a clear mandate and authority to give orders, formulate policies and bylaws for the Water Agency, can be effective.

Borama has been a town in active use since the 1930's since the British made a water supply system. At first they made a shallow well at Dhamug. Later more wells were made and interconnected. A number of assessments were done after the Second World War. The latest was in the 1980's by the Chinese eight bore-wells were developed of which four are presently in use.

Borama water supply system was rehabilitated after the civil war. The system was not expanded but simply made operational without taking into account the extensiveness of town and the lopsided distribution of the town.

Borama Water supply is being managed under the Borama Municipality. The structure at present is not very encouraging, as the system does not cater for equitable payment to the workers, therefore, a low moral within the workforce and careless attitude toward the water system exists.

The citizens of Borama are suffering under this particular type of management recently (June 2000) and a cross section of the citizens of Borama came together for a three day workshop to discuss the short comings of the system and the way forward. The method followed and the outcome is very encouraging.

The new mayor at present has supported the findings and the formation of a water committee and has expressed himself to be supportive. The legal bases for the committee to become effective are not there. It depends on good will of all persons involved to make the recommendations to work.

The private sector involvement needs to be studied and to be encouraged to ensure continuous functioning of the system. Undoubtedly there is enough expertise in Borama town to operate and maintain such a system. Financial management will require for a while. A good working system that will benefit the citizens of Borama, support the municipality of Borama and the Government through payment of fees and taxes. A system need to be developed that will ensure a fair pricing system.

Country Background

Somaliland locates in the horn of Africa, it borders Red Sea on the North, Djibouti to the West, Ethiopia to the south and Somalia to east. The country took its independence from the British colony on 26 June 1960 and unified with southern Somalia (Italy Colony) in 1st July 1960 to form Republic of Somalia. After along civil war that took place in the country the communities of the Northern regions agreed to separate from Somalia and declared Somaliland Government on 18 May 1991. The population of the country is around 2,800,000. 65% of these are nomadic. The economy of the country depends on livestock. The country consists of six regions which are Awdal, Hargeisa, Sahil, Togdher, Sool and Sanaag.

P=8 ?
Borama is the Capital town of Awdal Region. The water system dates from early thirties during the British rule and continued to expand since then. The first phase was limited to a shallow well at Dhamuug that met the needs of Government officials. At a later stage the system was expanded to several shallow wells and a reservoir at Sheikh Ali Jowhar hill. A4" diameter pipe line connects the source and the reservoirs with a distance of 4Kms.

During 1987-88, following years of shortage and crises, eight boreholes were developed with Chinese assistance four of which were in the vicinity of the booster station. The present system utilizes four of these wells.

In response to the rapid expansion of the population UNICEF assisted in the rehabilitation of the whole system. With the exception of the expansion and improvement at the source and the construction of water points these efforts rehabilitated the old system.

The limited capacity of Borama water system and observed deficiencies in the management system at Borama water agency would eventually lead to a acute water shortage unless a concerned action was taken to address these issues. In an attempt to address this problem, series meetings were held involving local institution, donor organization and the central administration authorities. In this regard, projects were proposed and studies completed to expand the system including the supply, storage and distribution aspects.

Alarmed by the rapid deteriorating water system that has literally become out of control, and in order to reactivate past proposal for providing adequate and sustainable water system in Borama, a group of intellectuals at university centre in Borama conducted an extraordinary citizen meeting to contain and eventually solve the alarming water crisis.

Project Background

Objectives

The objectives for the present extension are:-

1. To make a water supply system that will meet the water demand of the present population with a reasonable reserve
2. To enable the water to reach the extended town of Borama
3. Ensure that children and women can collect water within 400m walking distance in 90% of the cases
4. Support a Management system for sustainable use of Borama water supply system (private management and public oversight)

Activities

In order to achieve the set-up objective the following activities were planned

1. Rehabilitate four boreholes and make the necessary constructions.
2. Survey the water reservoir sites at Farahood hill, clear the tank site, do all the preparation works and place the tank.
3. Survey the main loop, procure the necessary pipes.
4. Excavate the trench and lay the pipes (200mm, 160mm, 100mm)

5. Construct Kiosks.
6. Manage the construction work in a participatory and transport manner.

Donor

The donor of the project is USAID through the administration of UNICEF, the target group is the community of Borama town as a beneficiaries of the project (120,000). The project implementation partner is a local contractor selected from a number of bidders who have signed a memorandum of agreement.

SWOT Analysis

| | POSITIVE | NEGATIVE |
|-----------|--|--|
| INTERNAL. | <p>Strengths</p> <ul style="list-style-type: none"> • community commitment exists • community awareness exists • investment allocated • security exists • community contribution exists although not as requires | <p>Weaknesses</p> <ul style="list-style-type: none"> • lack of effective management • payment constraints (75%) reimbursement • local contractors too much • lack of communication between stake holders • idea of public /private management new to the country |
| EXTERNAL. | <p>Opportunities</p> <ul style="list-style-type: none"> • Business men are ready to invest • Central Government and Local Government are ready to cooperate with private partners • Water policy encourages role of private sector involvement in the management of urban water systems. | <p>Threats</p> <ul style="list-style-type: none"> • conflict between the employer and contractors • bad security • Quotation of some contractors too low. |

Conclusion

There is a serious problem with the management of Borama water system, while there is enough water in the boreholes and other places there is never enough water in the pipeline. Most of the water in Borama town is through water tankers. In general population of Borama town pay almost more than any where else, the major cause of all these problems is due to the lack of proper management to the water system of Borama town.

The new water project gives the town of Borama a change to the management system by introducing the new method which is private management with public oversight.

There is need to understand that private management does not mean that ownership is with private sector, ownership is with the Ministry of Water or the Municipality on behalf of the community of Borama and the Government of Somaliland. Through a proper contract between the Municipality/Ministry with the private Management Company there can be no miss-understanding of the roles of the partners. The previous problems with the Water Agency that are out standing need to be cleared by organizing Workshops and trainings to all concerning parts and active role players.

The successfulness of Borama water project depends on the establishment of effective management system which can create mutual understanding between all concerning parts. This project will be an example for the introduction of private management public oversight system to the country

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The Role of Elsugya Charity Organization In Water Supply and Management

By Elhaj Mohamed Ali Tibin, Elsugya, Sudan

Country Background

Sudan is a huge country with an area of 2.5 million km² making it the largest country in Africa. It is characterized by several climatic zones, ranging from tropical rain forest in the South to Sahara Desert in the North. Respectively the annual rainfall varies from less than 50 mm to more than 700 mm in the country. The population is estimated at 31 million, 65% are rural, 28% are urban and 7% are nomadic. Agriculture and livestock production are the main economic activities in the country.

Water resources in Sudan are generally limited. They comprise rainfall, ground water, seasonal run-off and river flows. All of which are inter-related as part of the natural hydrological cycle. Surface water and ground water resources are mostly shared with neighbouring countries. The River Nile, which is shared between 10 countries is the primary source of Sudan's water. However a few kilometres away from the Nile and its tributaries, ground water is the main source of the water supply. Surface water (seasonal run-off) is erratic and short-lived mainly during the period August - October .

Currently the renewable available water from all sources in Sudan can be estimated at more than 150 milliard m³, as detailed in table (1).

Table (1) water used compared to water available, in Sudan.

| Resource | Available m.m3 | Used m.m3 | Percentage used |
|-------------|----------------|-----------|-----------------|
| Run-off* | 120 | 26 | 22% |
| Streams | 40 | 8 | 20% |
| Groundwater | 4.6 | 1.6 | 35% |
| Nile | 18.5 | 15 | 81% |
| Total | 183.1 | 50.6 | 27% |

* Exceeding 300mm/year.

Source: ministry of Finance and Economic Development, Social Sector Report, November 2001.

Investigation, planning, management of water resources are under the auspices of Ministry of Irrigation and Water Resources and its related departments and institutions. However, a number of private companies and NGOs are engaged in implementation of water supply projects.

The water policy implemented within the framework of the national comprehensive strategy is outlined as follows:

- Utilization and development of surface and ground water.
- Provision of safe water supply.
- Maximization of socio-economic benefits from water.
- Cost effectiveness of water projects.
- Capacity building and development of water sectors.

In 2000 a national water policy has been completed with the aim of providing a framework for effective development, management and protection of water resources in Sudan.

The Role of Elsugya Charity Organization

Elsugya Charity Organization, is a local NGO, established and registered in July 1999 in Khartoum. Its main role is to assist communities to construct and manage their safe water supply sources by securing funds from donors on charitable basis. Its main focus is on water

supply, management and planning, targeting the rural area inhabitants, in 11 states (out of 26) of the Sudan, mainly in greater Kordofan (3 states), greater Dar fur (3 states), Northern, River Nile, White Nile, Gazira and Khartoum state. In these states drinking water supplies are paramount problems, both in quantity and quality.

Elsugya Objectives

- Supply of drinking water for both human and animal consumptions.
- Raising the standard of the inhabitants in the target areas by solving the problem of scarcity and shortage of drinking water.
- Carrying out scientific researches and applied studies that aim at securing water to drought affected and needy areas.
- Participation in sustainable rural development in Sudan through provision of potable water. Building the capacity of the rural population in development and management of water supply.

Approaches

1. Execution of different water sources such as, water-yards, hand pumps, Hafirs, dams, water distribution networks, hand dug wells.
2. Rehabilitation and maintenance of water sources.
3. Mobilization support and partnerships of NGO's, charitable water institutions, individuals, companies, donors to finance the different related projects.
4. Initiation and assistance in preparation of community-based water projects.
5. Rationalization and mobilization of the organization funds to maximize the project outputs and benefits.
6. Mobilization of the communities and building their capacities in implementation and management of water sources.
7. Maximization of the communities partnership and participation in projects financing and management to assure sustainability, reduce the project cost and creating the sense of ownership.

The implemented Water Programmes

Within the contexts of the above stated background and objectives Elsugya has implemented a number of projects and water programmes, these are shown in table (2)

Table (2) Projects Executed by Elsugya (Nov. 1999 – June 2002)

| Year | New Hafirs | Rehab Hafirs | New Borehole | Installing Borehole | Maint Borehole | Cleaning Borehole | Dug Well | Dams | New IIP | Rehab HP | Network | Tanks | Total |
|--------------|------------|--------------|--------------|---------------------|----------------|-------------------|-----------|----------|-----------|-----------|-----------|-----------|------------|
| 2000 | 3 | - | 6 | 15 | - | - | 9 | - | 26 | 33 | 6 | - | 98 |
| 2001 | 7 | 14 | 11 | 37 | 6 | 6 | 24 | 4 | 23 | 7 | 6 | 6 | 151 |
| 2002 | 1 | 3 | 8 | 12 | - | 5 | 19 | - | 7 | 5 | 9 | 8 | 77 |
| Total | 11 | 17 | 25 | 64 | 6 | 11 | 52 | 4 | 56 | 45 | 21 | 14 | 326 |

The activities incurred in these water programmes included the following:

1. Construction and rehabilitation of Hafirs.
2. Drilling of boreholes and hand pumps.
3. Rehabilitation of boreholes and hand pumps.
4. Installation of boreholes and hand pumps.
5. Construction of small earth dam and water harvesting structures.
6. Construction of water distribution networks.
7. Erection of tanks.
8. Conduction of water investigation and design studies.
9. Construction of dug wells.
10. Formation and training of water village committee for sustainable management of water systems.

Funds of the programme

1. National donation and loans.
2. Governmental / non-governmental institutions.
3. Non-profit companies.
4. Zakat chamber.
5. Contribution of the beneficiaries.
6. Membership subscriptions.
7. Organization generated funds.
8. Charity-will projects.

Table (3) shows funds flow and the percentages allocated for the executed water programme.

Table (3) Funds Flow and the Percentage allocated for Water Projects

| Date | Fund flow \$ | Fund allocated to the projects \$ | Cost projects/ fund flow % |
|-----------------|--------------|-----------------------------------|----------------------------|
| 15/8-31/12/1999 | 34.629 | 2.387 | 6% |
| 2000 | 606.856 | 499.665 | 82.3% |
| 2001 | 899.253 | 699.616 | 77.8% |
| 1/1-30/06/2002 | 413.018 | 356.775 | 86.4% |
| Total | 1.953.757 | 1.558.528 | 79.7% |

Target Groups

The majority of the population who benefited from the implemented programs estimated about 500.000 in addition to their animals. Among them a specific targets beneficiaries are:

- Drought stricken population and deserted areas which were in urgent need for water supply.
- The displaced people affected by the war in south of the Sudan who were in need of water supply.

Analysis of Programme Achievements

Strengths

- Ability to provide water supply to the unable groups in remote areas.
- Participation in solving water problems, and co-operation with other organizations and governmental authorities.
- Ability to work with the grass-roots and mobilizing them to increase their financial and non-financial participation in the projects.
- Creating sense of ownership among the beneficiaries.
- Specialization of the organization in working with the community. Focusing only in solving their water related problems.

Weaknesses

- Lack of finance as many projects submitted are awaiting funding.
- The high cost of the different types of water projects as construction materials account for 75% of the project total cost.
- Conflict among users, and with local authorities regarding the issues of ownership, responsibilities and obligations.
- Weak linkages between water and health, sanitation and water hygiene projects.
- Differences in the communities socio-economic levels.

Opportunities

- Promotion of projects and attraction of donors support through water projects.
- Introduction of new technical modalities.
- Restoration of environmental through implementation of water projects.
- Reduction of water borne-diseases by providing clean water.
- Working with the people to identify their needs and socio-economic development perspectives.

Threats

- The official policies regarding water supplies are unstable and not clear.
- Lack of financial resources affects the efficiency of the organization and continuity of its programmes.
- Attraction of the water supply source to new people and livestock beyond the capacity of the system jeopardizes its sustainability.
- Shortage in logistic supports and back-up systems.
- Shortage in technical personnel and back-up institutions coupled with low capacity of the private companies.

Recommendations

- Water is a precious commodity, and our duty to look after its present and future uses.
- Urban water supplies should be privatized to increase the efficiency and cut down the wastage of water.
- More detailed specific policy for the development, management and protection of water resources is needed in Sudan.
- Priority must be given to the water supply and water related projects and programmes funded by external and technical assistances.
- Water projects must include components of capacity building and training.
- Strong system of networking is very important to co-operate and co-ordinate efforts of the NGOs and CBOs.
- Peace and settlement are pre-requisite for improved water resources management on sustainable manner.
- Multi lateral and bilateral agencies could play active role in supporting the water sector especially in water resources management and capacity building.

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Water Supply and Sanitation Project For Internally Displaced Persons, Kassala, Eastern Sudan

By Yassin Mohammed Nour, Oxfam GB, Sudan

Introduction

Kassala State is located in the area that lies between latitudes 36.7 –37 east and longitudes 16.8 – 17.5 north and lies in the eastern part of Sudan which borders Eritrea. It has a recorded population of 1.2 million of which 234,000 people inhabit Kassala province. The Beni Amer, Hadendawa, Bija, Amerar, Busharia and Rashaida are the main tribes in the area. The displaced community is mainly from the Beni Amer and the Hadendawa. These IDPs were relocated in Fatu, Fedayeib, Gulsa, Amara, Adarman and Dabalawate in Kassala Province and Shagerab in Setiet Province. The total population of IDPs is 28,294. There is also considerable number of displaced living with relatives in Kassala town and its suburbs. Income for the displaced groups came from cross border trading, seasonal agricultural labour, daily labour opportunities and small-scale agriculture and Pastoralism. Work opportunities in the areas where IDPs are relocated are very scarce and limited.

For a number of years sporadic fighting between the opposition forces and the army in different places within Kassala State – particularly at the border with Eritrea – has led to mass displacement of people from their original villages/areas. These war-affected people were forced to abandon their villages without being able to take their household assets or belongings. This new deteriorating situation has negatively affected people's livelihoods and coping strategies. Insecurity has caused unbearable living conditions among the displaced people and has drastically reduced rehabilitation and development opportunities.

As a result missions from different agencies conducted assessment surveys of humanitarian need. Humanitarian needs assessed within the IDP camps varied from camp to another. Water supplies were inadequate and unhygienic, the environmental sanitary situation was deteriorating, shelter was inappropriate and medical and health services were insufficient. There was a complete absence of infrastructure.

In response to the emergency situation Oxfam GB approached ECHO to fund water supply and sanitation project targeting four selected IDP camps namely Fatu, Fedayeib, Gulsa and Dabalawate. The project was implemented through a local contractor; the Water and Environmental Sanitation Project (WES). Community local structures have been formulated in the four camps with consideration of gender equity. In reality the project targeted women groups and worked towards empowering them through awareness raising and training. ITDG involved in manufacturing ten donkey carts for waste and garbage collection and supply of bricks for construction purposes.

Following the full registration, recognition and satisfactorily consolidation of CBOs the project was handed over to the communities. The CBOs have undertaken full responsibility of management of water resources and sanitation facilities. Links with government line ministries' departments and INGOs had been established for future collaboration and continuity of project. Oxfam GB closed down its office in Kassala and pulled out.

Project Objectives and Achievement:

Based on assessment Conducted by Oxfam GB, the overall aim of the intervention is to reduce morbidity and mortality associated with water and faecal borne diseases in four camps for war affected people in Kassala State. The project is designed and set up to achieve the following objectives:

1. To improve access to safe and reliable drinking water supply for displaced people at Fatu, Gulsa and Dabalawate camps through drilling of wells and installation of water hand-pumps by December 2000. Activities:
 - Drilling and installation of 20 hand-pumps at Fatu, Gulsa and Dabalawate
 - Construction of barbed wire fence for the 20 water sources
2. To develop local capacity of the selected IDP camps to manage and maintain the water resources and sanitation facilities through training and organizational development by December 2000. Activities:
 - Training of eight hand-pump caretakers and provision of hand-pump maintenance tools
 - Select and train Community Based Committees (CBCs) members in water management and cost recovery system
 - Official registration of CBCs with Government.
3. To improve environmental sanitation at the selected camps through awareness raising, vector control, waste and garbage collection and latrine construction by December 2000. Activities:
 - Conduct hygiene education workshops and meetings
 - Construct 28 communal latrines at the four camps
 - Manufacture eight donkey carts for garbage and waste collection
 - Vector control through provision of spraying facilities and chemicals

Achievement

| Site | A | BH | C | D | VIP | F |
|------------|----|----|---|---|-----|---|
| Fatu | 20 | 9 | 3 | 2 | 6 | 2 |
| Gulsa | 26 | 7 | 3 | 3 | 7 | 2 |
| Fadayeb | 34 | 0 | 0 | 3 | 7 | 2 |
| Dabalawate | 24 | 7 | 3 | 2 | 6 | 2 |

Table: A; Number of CBO members, BH boreholes, C; Number of trained hand pump caretakers, D Number of donkey cart. VIP double compartment pit latrines, F vector control campaigns

The community of the four camps had been mobilized and urged to undertake the community participatory development work in their area. A well-established and empowered community based committees (CBO) were formed of members ranging from 20 to 34 selected from both men and women. The main role of the committees is to mobilize and encourage the displaced to participate in improving their livelihood, properly manage water resources and sanitation facilities and to ensure sustainability of provided services and lobby the government, INGOs and charity groups to assist them to attain basic services. In each of the 4 settlements the community mobilized and supported to construct community development centre from local materials. The IDPs had generously contributed to establishing the centres with Oxfam's minor assistance. The centres have a vital role in bringing people together to think, share and exchange ideas and arrive to a consensus on the various matters brought about during their conventions. Regular CBO meetings, training sessions, communal work etc are always held in the centre.

Twenty-three boreholes have been drilled, nine borehole in Fatu settlements, 7 in each Gulsa and Dabalawate. All boreholes in Fatu and Gulsa have been fitted with Afridev hand pumps. Currently the inhabitants of Fatu and Gulsa settlement areas have access to clean drinking water for domestic purposes. In Dabalawate the situation was different, only four out of the seven boreholes fitted with hand pumps while the other three (3) were not installed due to dispute on land ownership. Furthermore, the installed pumps sabotaged and completely destroyed.

In each sites three hand pump caretakers had received theoretical and practical training on maintenance and repair of hand pumps. The mechanics are linked with relevant technical

departments e.g. Kassala Water Corporation and WES. The trainees equipped with essential tool and spare parts for maintenance. WES agreed to technically support those mechanics when repair of defects is beyond their capacity. The caretakers are responsible of organizing people when collecting water, prevent animals from getting into the fenced area to keep the environment clean and collect fees. The water tariff set by community and affordable to the majority. The poorer allowed collect water without pay. Amounts generated from sales of water remitted to treasurer and spent on purchase of hand pumps spare parts, small income generating activities and meeting community initiatives (education, supply of essential commodities, etc). The caretakers are supported to grow vegetable utilizing the waste water which prove to be a rewarding task.

In sanitation 28 double compartment pit latrines were constructed at the 4 camps. The commencement of personal hygiene and health educative sessions prior to construction of toilets had greatly assisted the displaced to immediately utilize these facilities following completion of construction. After realizing the significance of latrines beneficiaries had persistently asked for increasing the number of these essential services, as they described.

Each camp received between 2 to 3 carts with donkeys for solid waste collection. The respective communities assigned the cart to individuals to be responsible of garbage collection. It was agreed that an amount of 5 Dinar to be paid weekly as contribution by able households. Besides garbage collection the carts were designed to be used for water collection and cargo transportation. During days when carts were not used for rubbish disposal they were invested in income generation.

Two (2) intensive vector control campaigns were conducted in the 4 camps in coordination with the state MOH with involvement of 3 persons from each camp. Three permanent resident IDPs from each camp were adequately trained on spraying techniques using knapsack manual sprayers with powder and liquid chemicals. The selected trainees participated in the two spraying campaigns. By the end of the training and spraying campaign, each camp received two sprayers and some powder and liquid insecticides. A strong link between the trained IDPs, the CBO and MoH is established. The Ministry further assured that the three-trained IDPs would be their representative in the camp and will assist them by supplying chemicals and consider them for future training courses.

Conclusion

Training and capacity building of Community based structure is one of the crucial components of project success. Right from the starting point the capacity building and drawing an exit strategy is fundamental for smooth phasing out of implementing agency role. This entails different type of training, organizational training as well as technical beside access and links with the existing government institutions. Oxfam staff with other partners including experienced personnel from WES, MoH, and the Local Council delivered a variety of subjects and training materials to the CBO. Necessary package of health education and hygiene promotion was delivered with focus on personal hygiene and changing bad habits. Appropriate training and knowledge of PHC, women leaders and gender was also delivered. The CBOs are well trained on community mobilization, organization and management of meetings, participatory development and communal work, management of water resources and sanitation facilities. The CBO had also received training on simple financial bookkeeping, recording and report writing, feasibility study and proposal writing. Public health awareness sessions and weekly cleaning campaigns were carried out.

From the inception of the project, the targeted communities were aware of the project purpose, duration and intended outcome. This led to implementation with high community participation and ability to takeover management of project activities and delegates.

SWOT analysis

| STRENGTH | WEAKNESS |
|---|--|
| <ul style="list-style-type: none"> - Knowledge of the area and social context. - Mobilization of local resources. - Extensive consultation with intended beneficiaries and other agencies. - Existence of co-ordination body at the State levels that includes all government ministries, departments and relevant institutions. - Development of community based committees to ensure long-term maintenance and so on). - Throughout the region and in Sudan itself, Oxfam has a history of addressing emergency water and sanitation needs. | <ul style="list-style-type: none"> - In ability to raise fund timely. - Inability to link emergency with long-term development. - Knowledge of culture and norms of Beja community was not properly used to avert dispute over landownership |
| <p>THREAT</p> <ul style="list-style-type: none"> - The IDPs are not familiar with participatory development approach. - Disputes that frequently occur between the displaced and the host communities on land tenure. - Non-availability of sufficient water and poor aquifer in the selected sites for boreholes within the camps. - The escalating war between Ethiopia and Eritrea had resulted in massive influx of refugees fled their homes and crossed the border to Sudan | <p>OPPORTUNITY</p> <ul style="list-style-type: none"> - Existence of government technical department. - Change of donor agency approach of toward rehabilitation. - Availability of geophysics study equipment and trained cadre - Knowledge of culture and land tenure system. |

Low cost Technology gives hope to poor and disadvantaged

By John Rong & Tayalla Mohamed, WES Water & Sanitation Programme, Sudan

Summary

Universal access to safe water to day has become a right for all – the rich and poor of the world. Appropriate technology was developed as a result of World research study in mid seventies. The pace of population coverage is still low and meeting the declaration of UN of universal access to safe drinking water.

Access to safe water in the country is 40% (MICS, 2000). Water sector policy is not yet fully formulated, although water agencies were established at state and national level there is need for strengthening.

Water project in Gedarif State is an effective means of supporting peace building at grass root – Madardam village case. In addition to settlement of communities and increase children enrolment in schools. There are challenges to be tackled: full commitments of different partners, setting of legal framework for the projects Units and future sustainability of the water services after termination of the foreign support.

Country background

Sudan is located in the north east of Africa, it lies approximately between lat. 3 30 - 22 00 north and long. 22 00 - 38 00 east. It is one of Sub-Sahara countries. It is occupying an area of 1,000,000 square miles and bordered by eight countries. The total population is 31,913,000 (2001 estimate). The country is divided into 26 states as indicated in the attached map. About 65.7% of the population are rural. Most of the populations practice agriculture and animal rearing. The agriculture is mainly rain fed. The major irrigated schemes are Gezira, Rahad and Suki Projects.

The main water sources in the country are river Nile and its tributaries (11%), deep bore holes water yards (29%), Slow sand filters, Hand pumps & Hafirs (6%), hand dug wells (15%), piped water systems (public taps) 7% and pipes into dwellings 24%, (MICS 2000). However, according to the same source 40% of the total population have no access to safe drinking water.

In the past two separate national agencies; Rural and Urban Water corporations managed the water supplies. These corporations drilled, installed and managed drinking water supplies all over the country.

In response to decentralization policy in 1994, Sudan was subdivided in 26 states and the corporations were handed over to the states to operate and maintain the existing water facilities. At the national level National Water Corporation (NWC) was established with following mandate:

- Formulation of water sector policy.
- Planning and monitoring of water sector all over the country.
- Supervision of national and foreign funded projects.
- Specification and standardization of water equipment.
- Building the capacity of water sector all over the country, through training and other essential inputs.
- NWC work as consultant for the Federal & state government.

Up to date there is no legal framework developed to guide water sector. According to the Multiple Indicators Cluster Survey (MICS) held in 2000, 53% of the total population in the rural areas have no access to safe drinking water.

Water management in respect to O & M remains a challenge, because of low funding level and water tariff has not been widely adopted. In the recent past drinking water was provided free of charge, which has direct influence on the current situation, whereby many water systems are collapsing. Despite these facts some states formulated laws for water tariff application, collection and utilization e.g. Gedarif, Gizera, White Nile.

The World Bank research study in mid seventies resulted in development of low cost technology whereby, Sudan was the first country to benefit. Hand pumps were introduced as appropriate technology for the rural areas. Water and Environmental Sanitation (WES) Program then came into existence as one of the UNICEF supported projects, supervised by NWC, with state projects and grass root WES Units as implementers. The program structure is as follows: National WES Unit, Regional Coordination Units, State Projects, Mahalia WES Units and Village Health Committees.

Project background

Along the line of decentralization and to provide safe drinking water to the most needy people, Water and Environmental Sanitation (WES) Program was established in central Sudan. In 1997 the program was expanded to the east to include Gedarif State on state government initiative. The access to safe drinking water in this state is about 47% of the state population. Drilling of shallow wells fitted with HPs in the rural areas started early 1998. The users are managing these HPs, so it is a community – based project.

The main objectives of the project are to provide safe drinking water for rural communities/ displaced population in deprive areas of the councils, and to contribute to child survival, protection and development. The project succeeded to involve powerful CBO initiated by local farmers.

Project activities

To enhance sustainability of water supplies, and based on the lessons learned and past experiences in similar projects, demand responsive approach was adopted which resulted in effective community involvement at different project stages and this further reinforced decentralization system. Based on this the following activities were formulated at various levels:

At state level the project staff undertake the following activities:

- Advocacy at state level.
- Drilling of wells.
- Training of hand pumps mechanics.
- Community Mobilization.
- Provision of spare parts on cost.
- Monitoring.

Activities done by community/ Mahalia:

- Installation of HPs.
- HPs operation and maintenance.
- Tariff application, collection and utilization.
- Appointment of caretaker & HPs fencing.
- Monitoring.

The project is adopting cost sharing strategy. The overall cost of one complete HP is SD 1,500,000 (US\$ 5700), distributed among partners in the following manner:

- National government, responsible for clearance and transportation of off shore supplies.
- UNICEF provides offshore supplies and other essential inputs.
- State governments responsible to secure finances for operational issues.
- Mahalia contributes with some finances and local materials and labor.
- Community contributes provides volunteers and finances.
- Gedarif State peoples Water Organization (CBO) provide part of project funding.

The state governments meet 14% of the overall cost of complete HP. The available HPs are Indian Mark II & Afridev. Indian Mark II is community preference.

Project achievements

In the last four years 120 successful wells were drilled and installed with HPs in Gedarif State (18 Indian Mark II & 102 Afridev). The HPs located mainly in four mahalias; Hawata, Kassab, Bandiguo and Lukdi, distributed into 41 villages, these areas had no access to safe drinking water due to lack of suitable equipment for drilling in hard rocks.

They are providing safe water for 36,000 inhabitants in the rural areas. To back up O & M and to ensure sustainability the project undertook capacity building of the community through training and workshops as exemplified by the following activities:

- Drilling and installation of 120 HPs.
- Training of 130 Hand pump mechanics (HPM).
- Eight community mobilization workshops were conducted.
- Formation and training of six Mahalia WES Units.
- Formation and training of 156 village health committee (5 males & 5 females/ per VHC).
- More than 8000 household visits to raise community awareness were undertaken.
- Systematic monitoring to check HPs situations was followed.

Based on the lessons learned from the similar projects most of HPs were drilled in the most needy areas, according to criteria for site selection. Village Health Committees together with Popular Committees are responsible for management of these pumps and are supervised by WES Units at Mahalia. The major problem associated with these Units, is that they have not been legally institutionalized, may be due to lack of formulation of suitable legal framework. As a result some times conflicts occur especially on tariff revenue usage.

The project started with intensive community mobilization to take over responsibility of O & M and apply water tariff and management. Throughout 2001 the communities applied and collected water tariff for about 29% of the total HPs, and in May 2002, 50% of the total HPs were covered by water tariff through community based initiatives. Revenue so collected from water tariff has often been misused or diverted to other purposes. The tariff has different modalities depending on the community preference; per Jerkin, per household, per month and per individual. It should be noticed that communities in 50% of total HPs pay only when HPs break down; this affects negatively the sustainability of water supplies.

Water revenue that was utilized for O & M resulted in 86% of the total HPs functioning. However there are some constraints, which include lack of maintenance tools, spare parts, and small incentives for HPM.

Although the project endeavored to promote gender issues and community management approach, these concepts have not yet been entrenched in the community, which may be related to persistent traditional attitudes, in addition to misconception of these approaches by decision -makers.

SWOT Analysis

| | Positive | negative |
|-----------------|--|--|
| Internal | Strengths: <ul style="list-style-type: none"> - Strong partnership and community mobilization. - Water provided on demand responsive approach. - Application of water tariff on community based initiative. - O & M carried out by the communities in most of HPs. - Creation of enabling environment at grass root. - Participation of women in VHCs. - Involvement of potential local CBO. | Weaknesses: <ul style="list-style-type: none"> - Village volunteers often migrate. - Spare parts not available in the remote areas. - Technology limited. - Water tariff management. - Ineffective participation of females. - O & M is weak in some Mahalia. - Legal framework & Institutionalization of WES Units. |
| External | Opportunities: <ul style="list-style-type: none"> - Sale centers to be established by CBO. - Training of more village volunteers. - Social setting permits gender participation. - Improvement of hand dug wells. - Orientation for Popular Committees and traditional community leaders on tariff management - NWC take a leader role in development of water sector policy. | Threats: <ul style="list-style-type: none"> - Irregularity of financial contributions of Mahalia. - Absence of legal water tariff application and establishment of WES Units. - Lack of adequate logistic facilities. - Frequent inaccessibility by roads. - Poor water quality in some areas. - VHCSs training is limited due to limited budget. - Inadequate water sector policy |

Conclusions

The situation of water sector after decentralization began to deteriorate. In some states total collapse occurred due to lack of funds for up keep. In most cases resistance is met from communities and politicians, due legacy of past policies of free water services. Clear water sector policy must be in place to allow proper project working.

Throughout last four years the water project assisted some of communities to settle permanently and more children were enrolled in schools. Further more members of Women in Development began to produce some handcrafts products. The project contributed to peaceful coexistence at grass root e.g. Madardama village.

Effective advocacy and community mobilization assisted promotion of community management approach and gender issues. Despite the existing constraints, there is accepted level of sustainability of water services as indicated by 86% of total HPs functioning. Community preference is Indian Mark II but Afridev is the dominant technology.

The key expected issues to be addressed during the training are; water management, policy framework for integrated water sector, roles and responsibilities of partners at different levels, engagement of governments and communities in water sector management in effective way.

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Hai District Water Supply Project

By Immaculata Nshange Raphael, Tanzania

Executive summary

This case study envisages on the practical experience of the ongoing Hai District Water Supply Project in Kilimanjaro Region, Tanzania. The community initiated the project, and continued to be the main actor specifying their need. To enable implementation, the Tanzanian Government funded the project with assistance from the German Government through KfW.

Beneficiaries' contribution includes participates in activities such as trenching, back filling and ferrying construction materials to site. Schemes newly constructed and rehabilitated under Hai District Water Supply Project (HDWSP) are handed over to autonomous community based entities, after completion.

The project implementation started in 1990. Hitherto, one new and two rehabilitated water supply schemes have been completed and handed over to the beneficiaries to operate and manage through their community based Board of Trustees (Board). The Board is a supreme decision making body entrusted with planning, and policy making functions. It is also responsible for directing, managing and supervising.

The Board of Trustees contracts management staff for Operation and Maintenance, billing and accountancy and administration. The management team headed by qualified and experienced water engineer (Manager) carries day to day activities. The Manager is assisted by an Accountant, Assistant Accountant, Secretary and technical staff to provide a reliable and continuous water supply service.

HDWSP is a unique project in the country because of the following:

- The beneficiaries organise themselves, identify their needs, define priorities and participate in planning, implementation and management.
- No formal contractors are involved; all labour is done by unpaid self-help and local artisans.
- All water abstraction points are metered and hence billed according to consumption. The collected revenue is solely for operation and maintenance of the scheme thus projects sustainability.
- Community based independent legal entities to manage the completed schemes are established.
- During implementation, the project is managed on behalf of the Ministry of Water by the Steering Committee for Hai District Water Supply Project. The members of which originate from the project area.

The willingness of the beneficiaries to participate in planning, physical implementation and management of the completed scheme is a key measure of success.

Country water sector overview

Tanzania has a total surface area, including lakes, of some 945,000 square km and a land area of some 886,000 sq.km. (Kjell J. Havnevik and others 1988). It has approximately 30 million people with an annual population growth rate of about 3%. About 75% of this population live in rural areas where water supply and sanitation services are not adequate. To-date safe and portable water coverage is estimated at 50% and 64% in the rural and urban areas respectively.

The sector is facing a number of problems of which few are mentioned here under.

- A growing degradation of water resources from the cumulative consequences of poor water allocation, poor land use and pollution;
- A large number of non-operational schemes as a result of poor management and lack of proper operation and maintenance;
- Changing the concept of "free water" which is still held by communities who believe it is government's responsibility to provide water supply and sanitation services;
- Communities lack financial, technical and management skills to plan and manage their water schemes;
- Lack of collaboration mechanism among various actors for integration of water supply, sanitation and hygiene education for improved health;
- Lack of appropriate policy for the provision of water and sanitation services to the low-income groups in rural areas.

The government has taken some major steps in reforming the sector, attempting to solve the above mentioned problems. The five most important changes include the following:

- Redefining the roles of the Ministry of Water and Livestock Development (MoWLD) in the provision of water and sanitation services from that of direct provider to that of promoter, regulator and monitor;
- A revision of the roles of the consumer from that of a relatively inactive recipient of services to that of active participant in the development and provision of water and sanitation services;
- Opening of the sector to Non-Governmental actors;
- Decentralisation of decision making to the lowest appropriate levels; and
- The ongoing review of the 1991 National Water Policy.

Historically water provision has been the government's role. But experience shows that water supply facilities provided directly by the government without effective participation of the beneficiaries are not properly operated and thus unsustainable, due to the fact that the ownership of these facilities is not perceived to be vested in user communities. The changing socio-economic and political environment advocates community management in water supply systems. One of the new strategies for service delivery currently encouraged by the government is effective community management, where communities are empowered and assisted by the government and other agencies to choose, implement and manage a water system they are willing and able to sustain.

Project background

Hai District Water Supply Project (HDWSP) is a development project of the Government of United Republic of Tanzania co-financed by the Federal Republic of Germany through KfW.

Hai District is located in Kilimanjaro region along latitude 2°50' and 3°29' South and Longitude 37°00' and 37°18' East. The district has got an area of 2,168 square kilometres, an estimated population of 250,000 inhabitants, with an annual growth rate of 1.6%. The project area is situated along the Southwest slopes of Mount Kilimanjaro on elevations ranging roughly from 1,000masl to 2,000masl and extends down to the plains between Mt. Kilimanjaro and Mt. Meru in the West, and the Masai Steppe in the South. The rural settlements are mainly characterised by small holders keeping livestock and cultivating intensively coffee, banana, maize and vegetables in mixed cropping irrigated traditionally by furrows, which are diverted from rivers and springs emerging from the higher reaches of Mt. Kilimanjaro.

The project objective is to supply the target group with the basic demand of adequate clean and safe drinking water and improvement of hygienic situation.

The project implementation started in 1990 with the new construction of one water supply scheme (Phase I) followed by the rehabilitation of other schemes in phases as follows:

| Phase | I | II | III |
|----------------------------------|--------------------------------|------------------------------|--------------------------------|
| Type of project | New construction of one scheme | Rehabilitation of one scheme | Rehabilitation of four schemes |
| Population by 2010 | 90,000 | 65,000 | 94,000 |
| Water demand [m ³ /d] | 5,425 | 3,500 | 3,580 |
| Implementation period [month] | 60 | 36 | 48 |
| Pipelines [km] | 105.4 | 175 | 212.5 |
| Intakes [No] | 5 | 5 | 6 |
| Reservoirs [No/ m ³] | 15 / 2,360 | 26 / 1,720 | 27 / 2,337 |
| Pressure reducing tanks [No] | 28 | 128 | 55 |
| Public taps [No] | 185 | 250 | 400 |
| House connections [No] | 600 | 700 | 2,400 |
| Independent organisations [No] | 1 | 1 | 2 |
| Annual revenue (2001) [EUR] | 92,813 | 86,638 | Not yet |
| Annual expenses (2001) [EUR] | 84,063 | 73,925 | Not yet |

In all stages, the community participates fully through defining the areas to be supplied with water, locations of Public Taps, appointing public tap agents, give actual population and do non - technical physical works with close co-operation and proper organisation and supervision of the consultant.

After completion a scheme is handed over by the Steering Committee and the Government through the Ministry of Water to the beneficiaries who manage it through their independent legal entity.

Total cost amounts to 17.28 Mio EUR of which 15.85 Mio is foreign contribution, 0.66 Mio Local and 0.77 Mio self help contribution. By rehabilitation it means repairing of old concrete structures and full replacement of pipelines.

Project Achievements

The project has achieved a lot, first being able to provide reliable water supply service to the community for 24 hours a day, the whole year through. This success has resulted into a remarkable district development.

In the course of implementation, the community is educated on the National Water Policy and other accompanying issues to smoothly run and operate their schemes. It includes the following:

- Metering and billing according to consumption.
- Self-help activities.
- Establishing Village Water User Committees (where not existing) and training on the committee tasks and responsibilities.
- On job training for pipeline attendants.
- Representatives from different villages served by one scheme form the Board of Water User Committee.
- Registration of the Board and training of board members on their tasks and responsibilities. Overall planning and policy making
 - Liaison with government and donors
 - Pricing and tariff control
 - Recruiting and terminating employees
 - Appointing auditors
 - Ensuring observance of all rules and regulation established
 - Reviewing and submitting annual accounts to the auditors

- Sensitising the community on sanitation issues and proper use of piped water.
- Management training on performance oriented managerial skills and commercialised customer services outlook, financial skills and full autonomy.

For the three completed water supply schemes, now operating independently under their community legally autonomous entities, the water revenue collection efficiency is above 95%.

Neighbour districts regions and countries are coming to learn from the project achievements.

SWOT analysis

| | POSITIVE | NEGATIVE |
|-----------------|--|--|
| INTERNAL | <ul style="list-style-type: none"> - Availability of surface water sources tapped by gravity - Community willingness to effective participation, management and cost recovery for O&M - Joint efforts - Government (Central, Region and District authorities), consultant, religious leaders and other stakeholders. - National Water Policy - Appropriate technology (Hi - Tech) - Education investment - Availability of skilled manpower - Beneficiaries income status - affordability to pay for water service | <ul style="list-style-type: none"> - Free water concept - Some very poor households - Sharing water sources for drinking water and traditional irrigation furrows. - Degradation of water catchment area - Highly populated area therefore high water demand - Service purely for domestic use |
| EXTERNAL | <ul style="list-style-type: none"> - Financial support for rehabilitation of existing water supply schemes | <ul style="list-style-type: none"> - Change of donor policy (withdraw financing) - Conflict / misunderstanding between the two countries (Donor and Recipient) |

Conclusion and key issues

The success of the project has resulted into provision of reliable clean and safe water supply thus enhancing improvement of the community health and economy. The community owns and manages their water schemes through their legally autonomous entities.

Community participation in all stages of planning, construction and commissioning results in community empowerment and build a sense of ownership through control over resources, acquisition of new skills and confidence.

Metering of all water abstraction points and all consumers leads to billing according to consumption, self control over water usage, easy leakage tracing and control and unaccounted for water, is considered as the backbone for the schemes. The water revenue collected is solely used for Operation and Maintenance and hence scheme's sustainability.

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Mwanza Water Supply Phase II

By Zephania Mihayo, Mwanza Urban Water & Sewerage Authority, Tanzania

Executive Summary

Water supply in Mwanza city was being operated by central government up to June 1996. From July 1996 Mwanza Urban Water and Sewerage Authority (MWAUWASA) took over the operations, this came up after the government realised that there was deterioration in the state of urban water supply in the country. The urban water and sewerage authorities were established and given a mandate to run water and sewerage services using revenue collected.

Water supplied in the city of Mwanza serves estimated population of 320,000 inhabitants; this is about 70 percent of the total population. The existing system was expanded in 1989 covering mainly central part of the city and did not have enough storage tanks and conventional treatment plant. Small coverage and unreliable/poor water quality forced some people to have their own sources. There are many long distance connections due to inadequate reticulation and can not be easily monitored. A great part of the informal settlements (including the urban poor) do not have adequate accessibility to water. Unaccounted for water is also high.

This project was conceived to address the above issues in line with legislation pertaining to water sector draft water policies, donors and other stakeholders. The European Commission, the German Development Bank (KfW) the Government of Tanzania and MWAUWASA are partners in financing the Project with a design horizon of the next fifteen years. The project will cover expansion of pumping units, construction of treatment plant, storage reservoirs, transmission pipelines, distribution mains, reticulation network, booster stations, staff houses and installation of standby generators. The contracting Authority will be Mwanza Urban Water and Sewerage Authority. This is in line with current water policies. It is hoped and expected that water and sewerage in Mwanza will sustain itself in the future.

Country Background

The United Republic of Tanzania is one of the eastern African countries located between 1.00° - 11.00° latitudes and 29° - 40° latitudes with estimated population of 33 million people (Figure 1).

Water sources are mainly lakes, dams, rivers and boreholes. The coverage of water supply services in the regions differs due to various facilities, climate and topography. Due to policy changes, water supply has been split in to two sub-sectors Urban Water and Sewerage and Rural water supply and sanitation. There is also another sub-sector of water resources dealing with water resources management. The country is currently divided in to nine water drainage basins. The current policy is for beneficiaries to attain cost recovery with different stages depending on different factors. Urban Water and Sewerage Authorities were established in accordance with current legislation.

In summary the water authorities were established with the following objectives: -

1. To ensure that water, within acceptable Tanzania Standards, both in terms of quantity and quality is continuously supplied to the consumers.
2. To set water and sewerage tariffs that will ensure continuous supply of water and proper disposal of wastewater and which do not marginalize certain sections of individuals in the society.
3. To develop and maintain waterworks connected with the supply of water to the respective areas of operations.

4. To promote the conservation and proper use of water resources. And advice the Government in the formulation of policies relating to the development and conservation of water.
5. To plan and execute new projects for supply of water and collect fees from customers for water supplied and wastewater collected.
6. To educate and provide information to persons, in respect of whom the authority has been established, on matters related to public health aspects of water supply, conservation and related matters.
7. To liaise with the Municipal or Town Authorities on matters relating to water supply and waste water disposal on planning and execution.
8. To provide amenities or facilities, which the authority considers necessary or desirable for persons, who use the water supplied or the facilities provided.
9. To construct, operate and maintains sewerage disposal works on any public land acquired or which have otherwise been lawfully appropriated for that purpose.
10. Other general objectives: A memorandum of understanding is also signed between the Ministry responsible for Water affairs and the Urban Water Authorities giving responsibilities of each party and performance indicators to evaluate the water authorities.

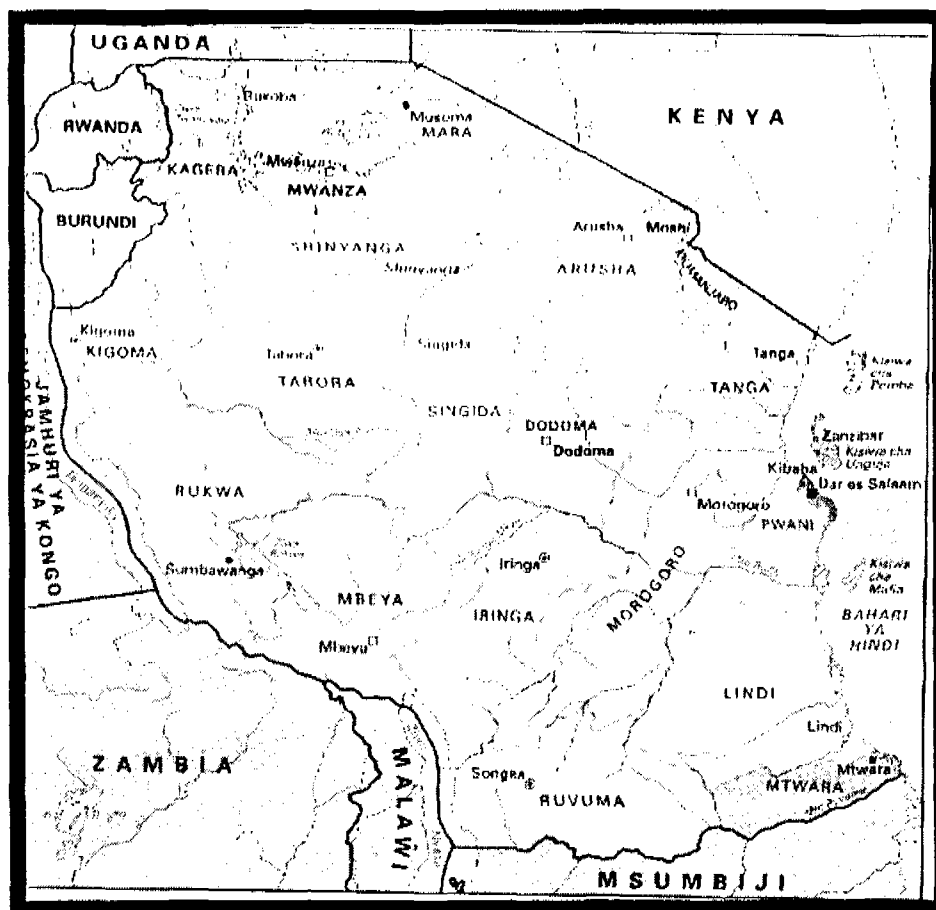


Figure 1: The Regions of Tanzania

Project Background

Introduction

Mwanza is the second largest city in Tanzania located between latitudes 2.15° - 2.45° south of equator and between longitudes 32.45° - 33.00° east with an area of 35,192 sq. km out of which 15,092 sq. km is under water and the rest is dry land. The temperature ranges between 18°C and 26°C while the average rainfall ranges between 800mm and 1200mm.

Based on the growth rate of 4.8 the estimated population of the city is about 450,000 people.

Background Information Of Mwaawasa

MWAUWASA was established in July 1996 as a semi-autonomous body and as a full autonomous body from January 1998 to date. The authority is charged with the responsibility of water supply and sewerage of the city of Mwanza, i. e. to operate, maintain and invest by using resources from water and sewerage services sales, donors, borrowing etc. Also water pricing should take into consideration of affordability, the poor etc.

Status of existing system

Water within the city is supplied through piped scheme from Lake Victoria and to a minor extent boreholes and shallow wells fitted with hand pumps.

The existing piped scheme has three pumping stations, namely Capri-Point (major), Chakula Barafu and Luchebele, five booster stations situated at Mabatini, Bugando, Isamilo, Nyegezi and Nyamanoro. All three pumping stations have estimated total production of 40,500m³ per day. This covers an estimated population of 320,000 inhabitants (this is about 70% of the population within the city limit). Apart from not serving the whole population the scheme contains some old pipes that burst and leak frequently. Water treatment is only by chlorination, which is done on daily bases. Due to pollution loading in the lake the quality of the water in the lake is continuously deteriorating.

There is a sewerage system that covers about 8% of Mwanza City and is mainly in the central business district. Pit latrines and septic tanks serve the rest of the population.

The sewerage system is currently under rehabilitation financed by the European Commission.

PHASE II Project

In cooperation with the donor EC, the government of Tanzania the Water Authority and other stakeholders, the project was conceived to address suppressed demand, deterioration quality of the lake water, reduction of non revenue water, provision of water to informal settlements and urban poor and sustainability.

Main objectives of this project are as follows:

- Increase water production and extension of distribution lines that will meet water demand of the year 2015 and reduce water losses, which are currently at 60% of the production.
- Ensuring water quality of the supplied water according to WHO and Tanzania standards.
- Sustainability.

Project activities

This project will cover expansion of pumping units, construction of treatment plant, storage reservoirs, transmission of pipelines, distribution mains, reticulation network, booster stations, staff houses and installation of two standby generators. Financing of the project is envisaged to take place in 2003.

Main activities

1. At Capri-point intake and Pumping Station: New intake structure with a DN 1100 pipe parallel to the existing one, extension of the pumping station building to accommodate three new pumps, and refurbishment of existing plant and equipment.
2. Capri-Point Treatment works: Construction of a new treatment plant at Capri-Point hill, main components are installation of flash mixer, flocculation tanks, rapid gravity sand filters, blower room, new chemical building, wash water recovery tank and new administration building.

3. Storage Reservoirs: Improvement of storage capacity in all supply zones by 4 new reservoirs (additional tank volume of 12,500 m³).
4. Transmission Pipelines: Laying mains from the intake site and tanks to plant and booster stations and from booster stations to storage reservoirs).
5. Main Distribution Pipelines: Upgrading and extension of the distribution network from the storage reservoirs to the districts.
6. Reticulation Network: Densification and extension of the reticulation network to distribute the water to the consumers including house connections and water kiosks all equipped with water meters.
7. Booster Stations: Upgrading of pumping capacity by rehabilitation and extension of plant and equipment of booster stations.
8. Electrical Installations: Installation of 2 new generators (1000 kVA and 300 kVA), and electrical equipment including switchgear, cabling and transformers (power supply is unreliable).
9. Housing: Construction of staff houses, meter houses and revenue collection houses.

The cost for the Project based on mid 2002 estimates is 38 million EUR. MWAUWASA shall contribute 0.65 million EUR. The rest of financing will come from EC and KfW

Project Achievements

The goals to be achieved by Mwanza Urban Water Supply project.

- There will be sufficient water for the inhabitants of Mwanza for the next 15 years.
- Water quality will be of WHO standards or similar standards.
- Water will be available to the poor at an affordable price.
- Sustained institution capacity.
- Reduction of water borne and related diseases.
- More time will be available for productive work instead of searching and fetching water.
- Social standing for good quality water supplied, reliable and efficiently managed utility.
- Reduction of pollution loading into the lake.

A brief SWOT analysis of the project and current situation

| | POSITIVE | NEGATIVE |
|-----------------|--|--|
| INTERNAL | <p><i>Strengths</i></p> <ul style="list-style-type: none"> - The water authority has a positive growth trend. - Abundant water source. - Enabling Legislation. - Government support. | <p><i>Weaknesses</i></p> <ul style="list-style-type: none"> - Non revenue water (unaccounted for water) is high. - Employee attitude is slow to change in line with changed operating conditions. - Customer response to paying their bills is not optimal (especially Government Institutions). - Quality of work is sometimes compromised to achieve immediate goals. - Inadequate office accommodations. - Public awareness of water being an economic good is low. - Public awareness that pollution damages the environment is low (but conscious when it is damaged). - Institutional capacity not very efficient. |

| | | |
|-----------------|---|--|
| EXTERNAL | <p><i>Opportunities</i></p> <ul style="list-style-type: none"> - Donor assistance is available when assistance criteria is achieved. - Competent personnel can be hired from the open market. - Growing industries as potential customers. - Government awareness and positive policy on conservation of the environment. - Improved service provider customer/relation.' - Potential for full cost recovery is high. | <p><i>Threats</i></p> <ul style="list-style-type: none"> - High investment cost because of poor quality lake water, consequently high operating costs. - High power cost due to hilly terrain of Mwanza - many booster stations. |
|-----------------|---|--|

Conclusion

Enabling legislation for sustainability of a project, enabling institutional setup, achievement of donor assistance criteria and government will make a potential project real.

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The Mid Western Towns Water Supply Project

By Fred Nuwagaba, Directorate of Water Development, Uganda

Executive summary

In Uganda, the period between the 1970s and early 1980s was faced with a problem of destabilisation as a result of political turmoil. The country's physical infrastructure was badly damaged during the civil wars and there was lack of investment and deterioration due to age and neglect.

Following political stabilisation, the Government's limited resources were initially concentrated on improving its major roads and urban infrastructure.

At the beginning of the 1990s, though the infrastructure to the major towns significantly improved, the water supply and sanitation infrastructure of most Uganda's small urban supplies remained in very poor condition. As a result of this, government revised the water development and management strategies to the current categories as listed below.

1. All rural towns operated by Directorate of Water Development (DWD) in conjunction with the local governments.
2. 11 major centres operated by National Water Sewerage Corporation (NWSC).
3. 29 other urban centres previously operated by DWD but now decentralised for operation by Urban Councils.

The case study of this paper is the **Mid Western Towns Water Supply Project** whose towns fall under the third category. The management of these water supplies is therefore the responsibility of the Town Councils, whose existing water and sewerage departments were established by transferring DWD staff. The project aims at improvement of water supply and sanitation facilities in the three towns of Hoima, Masindi and Mubende (in mid western Uganda) through rehabilitation and expansion of the existing infrastructure (more than 40 years old) in order to meet the existing and future demand (design horizon: 2016). The intervention will also include construction of small-bore sewerage systems to serve the central business areas of the three towns. This will promote better health conditions and will therefore improve the quality of life and economic development in the three towns.

In the three study towns, also like many towns in Uganda, Town Councils' budgets show that in all cases staffing levels are now below planned probably due to the precarious financial situation. Although the departments are autonomous with separate bank accounts, they cannot possibly cope to run effectively since revenue is barely sufficient to cover minimal operation let alone any form of maintenance, hence the urgent need for financial plan to rationalise grants, debtors and creditors, billing and revenue collection. The government is addressing this issue by the formation of Water Authorities linked to Local Government.

Another feature of the sector that requires attention is the entire aspect of sanitation. For instance, none of the towns covered by the project has water borne sanitation, and a conventional piped sewerage system is unlikely to be an affordable solution for the majority of the population in the foreseeable future. While water supplies were previously run by DWD, the Town Councils were responsible for sanitation. In recent years, emptying services for septic tanks have ceased to exist causing the population to revert to pit latrines. The advent of an improved water supply will have to address the whole question of sanitation from technical, institutional, and regulatory viewpoints.

Introduction

The Government of Uganda Policies and Strategies

Uganda is a landlocked country on the Equator in East Africa at 1 00N, 32 00E. The country has a total population of 21 million (1991 census), of which 11% is urban. It has a total area of 235880km², 15% of which is occupied by fresh water swamps and lakes such as L.Victoria (the second largest fresh water lake in the world). The whole of Uganda lies within the upper Nile catchment, with numerous rivers flowing into lakes Edward, Victoria, Kyoga and Albert, and also directly to the Nile (map of Uganda –Annex 1).

Uganda has a fairly reliable rainfall that varies from 750mm/year in the Northeast to 1500mm/year in the high rainfall areas on the shores of L.Victoria and around the highlands. More than two thirds of the country is at an altitude of 1000 to 2500 m in elevation and the temperatures range from 150 C to 300C.

Government Policies on the Water Sector

The Government of Uganda has put in place (1997) a Water Action Plan in order to realise the water sector objectives included in the 1995 Constitution. The Water Action Plan has provided the guidelines for a flexible approach to undertake the required reforms within the water sector to formulate the recently issued National Water Policy (1999). The basic legal framework for the provision of water and sewerage in Uganda is shown in Annex 2.

The above legislation therefore aims at decentralising the management of the smaller town water supply systems, such as the three study towns, to the Urban Councils, leaving the Directorate for Water development with planning and regulating the role rather than being an operator and the National Water and Sewerage Corporation as utility company for the larger towns.

While Urban Councils can provide the necessary political and administrative links to the government, they lack the technical and financial capacity to manage the water and sanitation facilities of the size and complexity of the three study towns.

Recognising these problems, the Ministry of Water, Lands and Environment, in collaboration with the Ministry of Local Government reviewed the situation for streamlining the management of water supply and sewerage services.

Unfortunately, the provisions of the Local Government Act and the Water Statute do not appear to be fully coherent with regard to the legal and institutional framework. While the Local Government Act decentralises functions to the districts and lower levels of Local government, the water statute devolves the same functions directly to the beneficiary communities under the supervision of the Minister and the Director, Directorate of Water Development.

The government has tackled the problem (in favour of the Water Statute provisions) and has commissioned a study (Urban Water Sector Reform Study), which has amongst its objectives, to suggest amendments to harmonise and solve any inconsistencies between the two documents. The recommendations of the study emphasise decentralization approach of management, institutional reform for sustainability through financial viability and private sector participation so as to develop local capacity and help to eradicate poverty in the long term.

The Mid-Western Towns Water Supply Project

Background

The Mid Western Towns Water Supply Project aims at improvement of water supply systems in the three towns of Hoima, Masindi and Mubende (in mid western Uganda) through

rehabilitation and expansion of the existing infrastructure. The intervention will also include the construction of new small-bore sewerage systems in the town core areas and improvement of sanitary arrangements in the fringe areas. This will promote better health conditions and will therefore improve the quality of life and economic development in the three towns.

The project commenced in December 2001 and is now in its first phase of system designs. The main consultancy to carry out detailed design and supervision of construction (DHV Water BV-Holland) for the water supply and sewerage facilities in Hoima, Mubende and Masindi is underway and the draft designs and tender documents for the facilities are expected in November 2002. A parallel consultancy, Technical Assistance (Dorsch Consult – Germany), for institutional strengthening in the three towns is also undertaking its assignments, which so far have included support to the formation of Water Supply and Sewerage Boards under the Authorities, community mobilization and hygiene promotion.

From the above project interventions, a total population of about 85, 000 living both in the core and fringe areas of the mentioned Towns will benefit from the project. Women who bear the greatest burden of collecting water, and the children who are exposed to the greatest risk to attract water related diseases, will be the main beneficiaries of the project. The safe water coverage is to be improved through provision of reliable and optimum quantities of piped water distributed through appropriate levels of service to the residents. The sanitation intervention is to be through both conventional sewerage systems in the town cores and on-site technologies in the fringes coupled with appropriate options for other solid waste management systems.

Objectives and Activities

The overall objectives of this project is of improving health and quality of life of the population through supply of potable water and improvement of the sanitation facilities in the three towns to meet projected demands up to the year 2016. This will be achieved through:

- Design, rehabilitation and expansion of water supply facilities
- Design and construction of sewerage systems for town core areas
- Support to establishment of appropriate management institutions
- Training staff for the newly formed Water Authorities
- Formulation of a financial strategy, tariffs and business plans
- Conducting health and hygiene education

Funding arrangement

The European Union through the 6th and 7th EDF will finance the water supply, sewerage and engineering at a total cost of 17.5 M EURO. The counterpart funding of 1.25 M EURO from the government of Uganda will finance the improvement of sanitation arrangements, public hygiene campaigns, cost of land and way-leaves, cost of construction of water offices and project co-ordination.

Achievements and factors of success

Progress

The financing Agreement between the European Union and Government of Uganda was signed in the year 2000. Procurement of the consultancies was finalised in 2001 and at the same time contact with the town councils was increased through support to the O&M of the existing water supplies in order to consolidate community support to the project. Below is an outline of the progress of the project so far.

- The consultancy for Detailed Design and Supervision of Construction Consultancy (M/S DHV Water BV-Holland) for the rehabilitation and expansion of Water Supply and Sewerage facilities in the towns of Hoima, Masindi and Mubende commenced in February 2002. The Consultant has finalized the inception report, water resource

assessment, socio-economic studies, sewage feasibility analysis and system sizing is now in progress.

- The Technical Assistance Consultancy (by M/S Dorsch consult –Germany); Institutional Specialist and Community Specialists for management of Water Supply and Sanitation facilities in Hoima, Masindi and Mubende towns started its assignment in December 2001. The activities regarding support to the established management authorities and community mobilisation are in progress.
- The project also continues to support emergency repairs of existing water supply systems in Hoima, Masindi and Mubende towns including replacements of water pumps, pipeline replacements and leakage repairs through its fully operational field town Project offices. Construction of the new Urban Water Offices in Hoima, Masindi and Mubende has just commenced.
- Final designs and tender documentation for water supply and sewerage facilities will be submitted to the supervisor (DWD) in November 2002 after which international tendering for works contracts under the EDF guidelines will commence for construction to begin mid 2003 up to the end of 2004. The Technical Assistance consultancy will continue with its activities through out the duration of the project.

SWOT Analysis

Factors for success

Uganda has a comprehensive set of policies, laws and regulations for the water sector. This will in fact help on reducing the scope of assignment to the Technical Assistance consultancy to concentrate on community mobilisation. Since the laws and regulations concerning the water sector provide a supportive environment for development within the sector, there is little to be done by the way of additional legislation except from finalisation of the legal framework for the operations of the Water Authorities.

The designs of the new water supply schemes will be based on surface water abstraction, with full conventional treatment prior to distribution. This technology is quite similar to the existing systems apart from the alterations in pipe material for improvement in regard to being non-corrosive and easily available on the East African markets. This will therefore be easy for the system technicians to operate and will not require any rigorous form of training.

In order to achieve the policy goal of sustainability, the project aims at building capacity at various levels to promote self-reliance. The impact of the proposed community representation, including, women on the Water and Sewerage Board members is showing the empowerment of the communities to have control over their own-development. The community specialists have started working together with the communities to ensure that their views are taken into account while the project is being developed. This has ensured the community ownership of the project, which is giving results of support to the project.

From the assessment of the project economic and financial viability, it is clear that the tariff in three towns will be manageable. From the household surveys done during the appraisal studies and even socio-economic study by the design consultant, residents pay 150 to 200 Uganda shillings for a 20 litre container (jerry-can), and people showed preparedness to pay 50 Ushs per 20l jerry-can which is the average tariff value in areas where similar projects have been completed. It appears therefore, that there will be affordability to pay for the water by the consumers.

Opportunities

The Mid Western Water Supply Project is going to use the results of experience from the other completed projects under the national program, Rural Towns Water and Sanitation Programme (RTWSP) to come up with a more practicable management arrangement in line with the policies. The implementation of the sister projects like Small Towns Water and

Sanitation Project (STWSP) and Eastern Centres Water and Sanitation Project (ECWSP) have so far provided an excellent basis for the implementation of the Mid Western Towns Water Supply Project.

The preparation studies are very elaborated documents providing reference materials for feasibility studies; financial management, willingness-and-ability-to-pay studies and the staff appraisal of the World Bank provide the overview and the visions of the RTWSP. However, to some degree these documents have been overwritten by the actual implementation experience gained in the STWSP, which are most valuable for Mid Western Towns Water Supply Project.

The Mid Western Towns Water Supply Project management will be able to learn from the experience already gained during implementation; the implementation activities can be developed or simply adjusted based on the Implementation Manual for the RTWSP.

Uncertainties and Risks Related to the Situation

The main risk of the project is that by the end of the project, the Water Authorities will not be functioning optimally, which would negatively affect the sustainability of the services delivered. The following measures will be taken to reduce and or eliminate this risk:

- The support provided by other donors will help to clarify the legal and regulatory framework necessary to establish the new Water Authorities.
- The Technical Assistance provided as part of the project will help to establish adequate management structures and strengthen the institutional capacity of the water authorities.
- The community experts will work with the beneficiaries to ensure that they are aware of the changing arrangements and fully cooperate with the new institutions.

DWD will ensure a close coordination and exchange of information and experience between the Projects under the RTWSP in order to improve the Policies and Guidelines for implementation.

The comment to this is that the institutional frame for the coordination is in place, but DWD must stress the importance of this networking exercise to all donors in the Programme and enforce that reporting happens on a regular basis.

There is a precondition to the Project that before the works contract is awarded; the Technical Assistance team should have put in place appropriate water authorities management options.

Conclusion and Recommendations

Conclusion

Much as provision of safe water facilities is a challenge, the greatest challenge is to ensure that proper strategies and policies on Operation and Maintenance of the systems are in place to ensure sustainability of the facilities. For us to achieve this, amongst other considerations, it is important that the beneficiaries and implementers in one country/region learn from others (countries/regions) with regard to ideas and experiences so as to adapt the advantageous concepts from such partners.

Salient Issues to be addressed

Considering the conclusion drawn above, I recommend the salient issues outlined below to be discussed with my colleagues during the workshop so that experiences and ideas are shared.

As already mentioned, a precondition was given that the Water Authorities have to be functional by the start of construction of the water and sewerage facilities. The project however envisages that they would not function properly as they would have done at the time

of commissioning of new systems because of the short timing though some measures have been put to address this. Ideas and experiences related to this kind of situation and other measures to arrest such a situation would be helpful to our project.

The sewerage feasibility analysis shows that residents will not be able to afford the combined costs of water and sewerage. Nevertheless, it was decided that onsite sanitation was no longer an appropriate or acceptable method of disposal of waste water in town core areas, where lack of space to provide adequate facilities is already causing poor environmental health conditions. We need to put this in perspective and reflect on what happens after the end of the project.

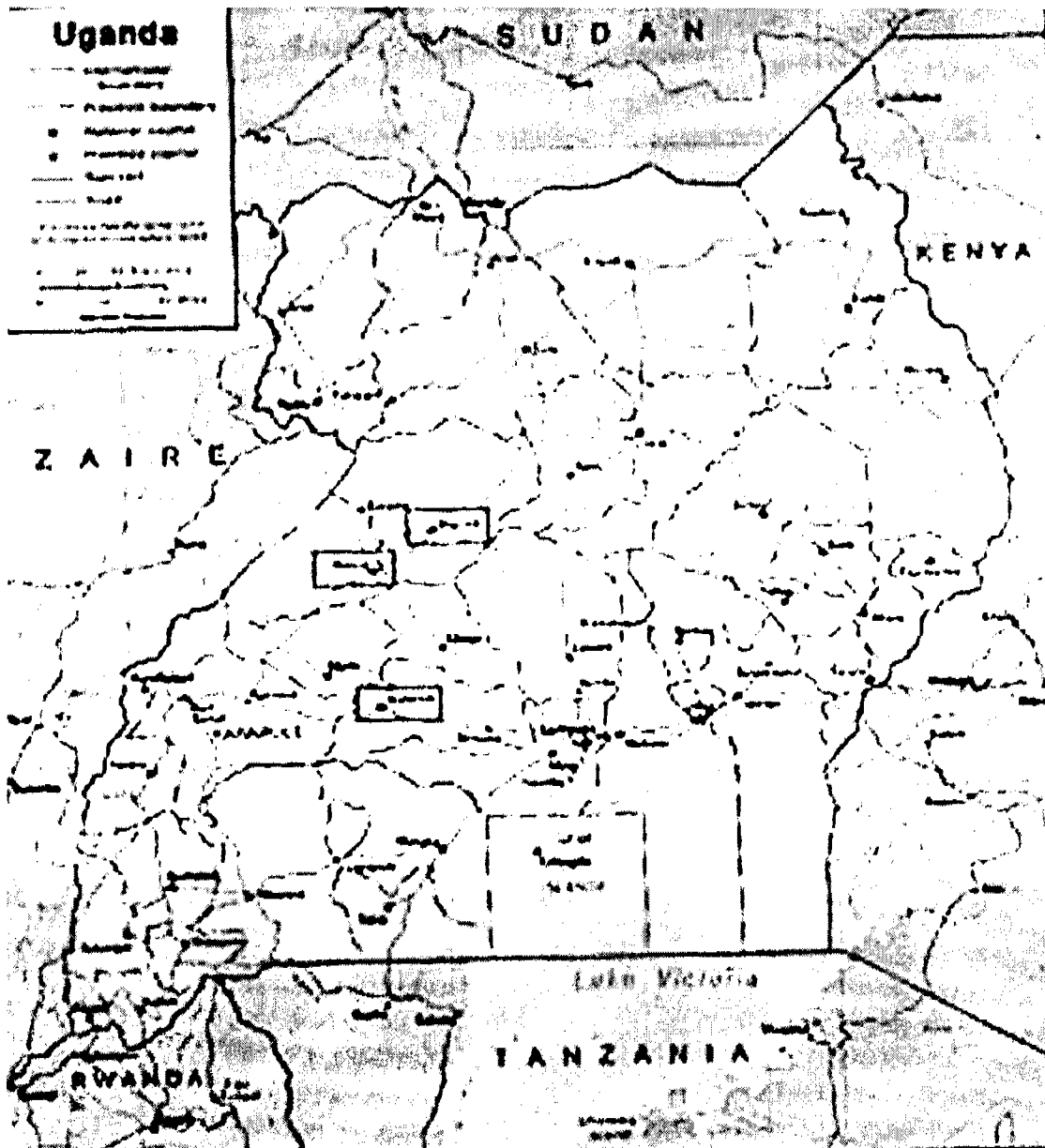
The issue of tariffs (water and sewerage) considering incremental costs with recovery and/or without cost recovery as a strategy for sustainability needs to be discussed. This because for example most of the existing water supply systems in Uganda have low levels of revenue collection efficiency and government has always come in to fill the gap of lack of break even situations. Most of the systems are receiving conditional grants from central government to be able to run.

There has of late in Uganda been a high rate of rural urban migration and as a result of this many shanty concentrations have sprung up in areas of the towns. Hoima, Masindi and Mubende (Project towns) are an example of towns experiencing such a situation. The people who live in such areas cannot manage to pay for water and yet they need it (some for all and not all for some). What strategies have other areas employed in such situations?

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9. Terms Of Reference For Technical Assistance; Institutional and Community Specialists for Institutional and Management Improvements for Water and Sanitation Services in Masindi, Hoima and Mubende Towns
10. Inception Report for the Design and Supervision of works consultancy (by DIH Water BV)
11. Inception Report for the Technical Assistance consultancy (by Dorsch consult)
12. Project activity progress reports

Annex 1: Map of Uganda showing lake, rivers, and the study towns



Annex 2: Basic legal framework

| Legislation | Essential provisions |
|--|---|
| 1995 Water Statute | The use, protection and management of water resources and supply. Provides for the formation of water user groups and associations to plan and manage water resources through water and sanitation committees. |
| 1995 National Water and Sewerage Corporation Statute | Empowers the National Water and Sewerage Corporation to provide services to eleven towns in Uganda. |
| 1997 Local Government Act | Urban Councils to be responsible for water supplies. Promotes decentralisation as its approach to service delivery outside the jurisdiction of the NWSC. |
| 1999 National Water Policy | Sets the stage for water resources management. Guides sustainable development of public facilities and services. Promotes the role of private sector and user communities. |

Mpigi District Support

By Paito Obote & Denis Okatch, WaterAid Uganda

Executive Summary

Water supply is one of the priority sectors in the government plan for poverty eradication and it is receiving massive funding through the HIPC initiatives. The district development plans, which are compiled from the sub-county development plans are funded through grants from the central government as well as from local revenues generated within the districts. This implementation strategy is in line with the decentralisation policy, which has devolved powers and functions to the lowest level of government. The district local government bears a lot of responsibilities in respect to development work in the district but in most cases there are *insufficient human resources in the districts to fulfil these roles.*

WaterAid Uganda strategic objectives are:

1. Work with partner organisations in 2 or 3 districts.
2. Support partner based integrated WES projects in 2 or 3 districts, which benefit not less than 40,000 people per year.
3. Facilitate district WES sector to build capacity to deliver integrated WES services in 2 or 3 districts.
4. Influence other actors in the sector to adopt a partnership based integrated approach to WES project implementation.
5. Initiate and contribute substantially to the co-ordination, information sharing, and national capacity building within the NGO WES sector in Uganda.

In line with it's new Country Strategy, WaterAid Uganda developed a 3 Year Integrated WES Programme in Mpigi District in central Uganda. The proposal has been developed and agreed with the potential partner organizations (including the District Administration) in the district. The main components of the proposal are:

- Increased access to potable water, improved hygiene practices and effective sanitation.
- Capacity building of actors (including the informal private sector) and stakeholders in the WES sector in various aspects of project management and organizational and institutional capacity.
- Facilitation of improved co-ordination and collaboration among all stakeholders in the district.

Increased Access to WES Services

WaterAid intends to support and strengthen the capacity of the *District Administration*, especially at Sub-County level, to supervise and monitor all WES activities in the district. It will also provide specialised technical and organisational training and support to Direct Delivery Partner Organisations to enable them to develop and mature as service providers and add more worth to the District WES Sector.

Capacity Building

The overriding capacity building strategy outlined in the proposal is to initially identify strengths in all Partner Organisations and to build on these to create resource base inside the district to meet other subsequent training requirements with minimal support by WaterAid.

WaterAid, through its direct delivery partner organisations, will support the development of the private sector in the WES sector by training community based masons in water source

construction and basic administrative and contract management skills to enable them operate as independent service providers.

The programme will support the District Water Office, the District Health Inspectorate and the Community Development Office to strengthen skills and capacity at Sub-County level.

Co-ordination and Collaboration

In order to encourage the efficient use of resources in the district, WaterAid will facilitate the process of co-ordination and collaboration of all actors operating in the district WES sectors. For this reason, WaterAid intends to focus its support to Partner Organisations through two already established forums; *The District WES Steering Committee* – a policy and co-ordinating body, and the *District Management Team* – co-ordination and implementation issues. All actors in the sector are represented on both bodies but the proposal recognises and responds to the central role and primary responsibility of the *District Administration* in sector co-ordination and monitoring. At a lower level, WaterAid will support the inter-sub-county co-ordination body (MIGAASS) to promote sector co-ordination.

The proposal takes into account the presence and plans of other donors and Support Agencies operating in, or planning to operate in Mpigi District especially the Government of Uganda WES Programme. Through the participatory planning and development process of this proposal, the possibility of duplication of effort has been eliminated.

Country Background

Uganda covers a total area of 236,580 sq. km, one sixth of which consists of lakes, rivers and wetlands. The geology of Uganda comprises mainly Pre-Cambrian crystalline basement rock, which can be categorised into the regolith (overburden) and the basement complex of weathered/fractured rock and un-fractured rock. The annual rainfall ranges from over 2000mm in the Lake Victoria region to approximately 500mm in the North east of the country.

The population is estimated 20 million with the growth rate of 2.5%; 90% of the population live in rural areas.

The Local Government Act (1997) aims to “consolidate and streamline the existing law on Local Governments in line with the Constitution to give effect to the decentralisation and devolution of functions, powers and services” to the lowest practical level. District and sub-county levels are referred to as Local Government, whilst county, parish and village are referred to as Administrative Units. The National Water Policy, The Water Statute, and The Water Action Plan set out the framework for development and management of the water resources in the country.

In 1998, the water supply coverage was estimated at 42.2% in rural areas and 60% in urban areas and in 1994 the percentage of households with latrines was only 47.6%. Diseases related to poor water supply and poor hygiene and sanitation practices account for almost 50% of child morbidity. The impact of AIDS on the country compounds internal and external economic constraints.

Institutional and Regulatory Environment

The private sector (including NGOs/CBOs) under the Water Statute, are now responsible for the provision of potable water. This should be done in accordance with the district WES Plan. All actors in the district, in theory, should participate in the development of this plan. The

Ministry of Water, Land and Environment, through the Directorate of Water Development, provide policies and guidelines.

The Ministry of Health is responsible for policy and guidelines for sanitation and water quality, whilst the Ministry of Gender and Community Development does so for community mobilisation and gender aspects of proposed projects (which require government counterpart funding). Key Organs in the Sector

The Water Policy Committee (WPC) co-ordinate the implementation and amendment (if necessary) of the Water Action Plan, advise the Minister (of Natural Resources), review laws (if necessary) relating to water, monitor issues relating to policy, use, control, management and administration of water in Uganda.

Inter-Ministerial Steering Committee (IMSC), composed of Permanent Secretaries and Directors from Line Ministries and NGOs representative, is a strategy and policy making body which is supposed to advise the Minister of Natural Resources.

Decentralisation and the sector-wide approach to funding

These are the key frameworks for the rural water sector. All funds from the HIPC initiative and development partners are pooled together and used to fund district plans.

Project Background

Mpigi district covers 6,278sq km with land area of 4514sq km area under water is 1,704sq km. The population is estimated at 1,071,006 with a growth rate of 3%. The district is divided into 5 counties, 33 sub-counties, 249 parishes, and 1698 village councils. The Resident District Commissioner represents the central government in the district; the Local Council V Chairman is the political head of the district, and the Chief Administrative Officer heads the civil servants.

The water coverage in the district is estimated at 43% while sanitation/latrine coverage is 47%. The country strategy identified many gaps in the sector, which are also relevant to Mpigi district. Some of the gaps are:

- Lack of Effective Planning in the district – actual community needs are not reflected in the plans.
- Inadequate monitoring leads to difficulty in ascertaining effectiveness of interventions and actual coverage.
- Lack of Co-ordination results in duplication of roles and efforts hence inefficient utilisation of resources and ineffectiveness. Approaches used and the standards adopted by different organisations vary widely across the district.
- Insufficient and inadequately skilled human resources that cannot measure to the task entrusted to them.
- Lack of suitable communication materials that promote participatory methodologies.

Justification

The WaterAid Uganda country strategy focuses on facilitating Districts to build capacity to deliver integrated WES services. At least two Districts will be supported in the FY 2000/1 and these include Katakwi and Mpigi. The District support is in line with the Government of Uganda decentralisation policy, which addresses issues of capacity building of the District structures.

Broad Objective

All actors and stakeholders in Mpigi District co-ordinate and collaborate to achieve effective and sustainable Water and Environmental Sanitation services.

Specific Objectives

Water and Sanitation Coverage

1. To increase access to potable water by 8.5% (90,000 direct beneficiaries)
2. To raise latrine coverage by 5% (8925 new or improved latrines)
3. To facilitate 8.5% of the population (90,000 people) to change at least 2 undesirable hygiene behaviours

Capacity

1. That the direct service delivery partner organisations have the capacity to effectively plan and implement sustainable community managed integrated WES projects.
2. That the District departments of Water, Environmental Health and Community Development have the necessary skills to monitor, supervise and co-ordinate all sustainable WES activities in the District.
3. That sub-county WES committees have skills to plan integrated WES programmes.
4. Sub-County based masons have the capacity to tender for contracts and implement the construction of water sources.

Co-ordination and Collaboration

To facilitate the WES actors and stakeholders in the district co-ordinate, collaborate, and share information.

Project Achievement & SWOT Analysis

- 477 water sources protected in Mpigi District.
- Effective sanitation improvement of over 8,950 latrines.
- At least 2 undesirable hygiene behaviours changed among 8.5% of the District population. (About 90,000 people with improved hygiene behaviour)

Capacity

- Four strong Direct Delivery Partner Organisations existing with skills and experience in project planning ...
- District Administration's and lower local government's capacity in effective service delivery is being addressed.

Co-ordination and Collaboration

A forum exists (Wakiso NGOs forum) whereby all the Non-Governmental Organisations (Implementers) operating in the district discuss common concerns and issues, share information and liaise with the District Administration and other organisations outside the District.

| | Positive | Negative |
|----------|---|--|
| Internal | Strengths <ul style="list-style-type: none">• Stable and reliable funding for programmes• Financial management system in operation• Local partnerships for increased sustainability of programme outputs.• Developed strong public relations with stakeholders. | Weaknesses <ul style="list-style-type: none">• Inadequate monitoring strategies at various levels of the programme• The decision-making processes are slow and consequently affect implementation.• Direct delivery partners are slow in adapting and developing technologies implemented.• Low morale among staff and limited staff development programmes. |

| | | |
|----------|---|---|
| External | Opportunities <ul style="list-style-type: none"> • Government water policy is supportive to programme mission • Availability of local partners for collaboration and community contributions. • Competitors could be worked with in the area of advocacy • Globalisation simplifies resource mobilisation. • Vision 21 • UPE | Threats <ul style="list-style-type: none"> • Rampant poverty could create apathy among the people. AGOA!!... • Unreliable an unprofessional partners • Insecurity could inhibit community participation and result in premature closure. • Dependence on HQ for funding may impinge on sustainability of the programme. • Capacity issues • Urbanisation |
|----------|---|---|

Conclusion & Key Issues

Decentralisation provided good opportunity for sustainable development. District focussed intervention ensures effective capacity building and co ordination of all actors which ensures effective utilisation of resources. The goodwill of donors and development partners ensured adequate fund for the sector though the capacity of at the district to absorb is still low in most cases.

- Community management especially in terms of skills to ensure sustainability may be lacking.
- Inadequate consideration of broader water resources issues...
- Weak local governments undermine implementation of projects since they cannot fulfil their roles as provided for.
- Co-ordination of private sectors and NGOs is still difficult given the different approaches the two categories.
- Sustainability of local NGOs is questionable since they depend on availability of funds, currently they are excluded from the district/PAF funding.

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