

Technical Component 5

Economics and Finance

5.1 *Background*

The water resources sector is one of the principal sectors with vital links to other sectors in the economy such as agriculture, tourism, hydropower generation, industrial development and health. The agriculture, tourism and manufacturing sectors have been identified as sources of growth for the country over the medium term. These sectors are among the major consumers of bulk water in the country.

Agriculture has continued to be a source of livelihood for the majority of the people in Zambia. Similarly, the generation of electricity, which also relies heavily on the availability of water, provides about 12 percent of national energy supply for Zambia. The electricity sub-sector contributes about 1 percent to formal sector employment in the country. The industrial sector, another major consumer of bulk water contributes about 25 percent to formal sector employment.

However, little attention has been given to the integrated management and development of water resources in Zambia. This is partly attributed to the fact that water has traditionally been considered as a public good, which is available in unlimited quantities and therefore should be supplied at zero or low cost. The National Water Policy (1994) states, however, that water should be recognised as an economic good.

Government budgetary allocations to the water resources sector have over the past years been inadequate. The massive investment in the sector has been made possible by the external financing from Zambia's co-operating partners. Donor funding as a share of total capital expenditure during the period between 1991 and 1995 ranged between 75 to 91 percent. However, about 90 percent of the investment programmes have been concentrated in water supply and sanitation.

The management and development of water resources has basically been the responsibility of government agencies. There have, however, been inadequate planning and poor water management practices leading to inefficient water use and very limited water conservation practices and insufficient investment into the construction of water storage facilities like reservoirs.

In terms of promoting water conservation and efficient use of water, neither the Water Development Board (WDB) nor the Department of Water Affairs (DWA) have shown capability to effectively encourage such practises. Insufficient funding for operations and maintenance, and lack of a systematic database for licensing and billing have also compounded the situation.

Furthermore, there has been very limited private sector involvement in the management and development of water resources in Zambia. The 'public-good' nature of the water resource discourages a private agent to invest in the preservation or improvement of the resource since it is difficult to recover costs from users.

5.2 Issues

The main objective of the Economics and Finance component is to ensure that the economic value of raw water is recognised and integrated into the overall decision making process of the country and to identify the financing mechanisms for the management and development of water resources. Hence, the economic and financial component will attempt to establish the economic value of raw water in such a way that it can easily be applied by decision-makers. Furthermore, mechanisms for mobilising funds for the development and management of water resources will be analysed.

Other objectives of the component include: establishing effective economic instruments for allocating water among competing users; developing mechanisms for bulk water pricing; and outlining the appropriate financing mechanism for water resource management and development.

5.2.1 Establishing the Principle of Economic Value of Water

Until recently, the water sector in Zambia has been characterised by a supply management approach. Water demand has been established on an ad hoc basis and solutions designed to meet this demand. Demand management seeks to maximise the use of a given volume of input by curbing low value uses through price or sometimes through non-price measures. As water becomes more scarce, it is essential that the user price be equated to the economic value of water, for instance by charging tariffs. These charges will then fulfil two functions namely:

- ensuring that water resources are being allocated to those sectors of the economy with the highest economic value creation, and
- generating sufficient revenues for operation, maintenance and investment in the sector to so as to secure financial sustainability of the Water Resource Management (WRM) sector.

5.2.2 Strategies for Water Allocation

The current criteria of allocating water among competing users in Zambia does not undertake an evaluation in terms of the social and economic impacts on the economy.

Strategies for water allocation are important to avoid over-allocation in areas where even little practical opportunity for reallocation may not be possible. Using water efficiently involves making choices aimed at ensuring that sectors or individuals are allocated water according to their contribution to the growth of the economy. Normally, water should be allocated to high-value uses, taking into account the economic, financial and social impacts of the projects on the community and entire economy.

5.2.3 Mechanism for Bulk Water Pricing

Economic principals require that sectors or individual users be charged for water at a rate equal to the full economic cost of water. The full economic cost of water is a summation of the full supply cost, opportunity cost, economic and environmental externalities.

Full supply cost refers to operations and maintenance costs and capital costs. The operations and maintenance costs include purchased raw water, electricity for pumping, labour, repair materials,

input costs for managing and operating storage, distribution and treatment plants. Capital charges refer to capital consumption i.e. depreciation charges and interest costs associated with reservoirs, treatment plants, conveyance and distribution systems.

Opportunity cost is a cost incurred when an individual or sector, by consuming water, deprives another user of the water. If the other user has a higher value for the water, then there are some opportunity costs experienced by society due to this misallocation of resources.

The environmental externalities are those associated with public health and ecosystem maintenance while economic externalities may be associated with the impact of an upstream diversion of water or the release of pollution on downstream users. Other economic externalities could be due to over-extraction from, or contamination of common pool resources such as groundwater aquifers and lakes which are available for use to everyone; and production externalities, for instance due to agricultural production in irrigated areas damaging the markets for upland non-irrigated agriculture or forcing them to change their inputs.

On the other hand, for reasons of equity, public health and amenity a minimum amount of water should be provided at low unit prices. For higher units of consumption, a progressive tariff structure ought be used i.e. charging a higher rate for higher units of consumption.

5.3 Financing Mechanisms for Water Resources Management

The financing of water resources management and development will among other factors be based on the principal of full cost recovery, which will ensure financial sustainability. This will entail establishing the full economic cost of water resources management and identifying sufficient income to make this objective realistic.

There is lack of good quality data and information for general planning and development of water resources in the Zambia. Currently, the Water Development Board does not have a systematically organised database for water right holders, which can easily be used for billing of raw water charges. The “data base” is manually managed files that are under the supervision of the Water Development Board Secretary. Available data on revenue generated from water tariff charges is inadequate and is of questionable quality. This leads to considerable loss of income from the water sector. Hence, it will be a challenge to identify and suggest better procedures for billing and collecting of raw water tariffs. Currently, raw water charges are levied for use of surface water only. There are no charges on the extraction of ground water. The exploitation of groundwater resources in the country takes place without any monitoring or regulation. This creates a problem in terms of lack of control of a large part of available water resources.

5.3.1 Revenue Generation from Water Rights

The Water Development Board generates its revenues from:

- water charges levied on water rights;
- fees for water right renewals; and
- offences and penalties charges

The WDB has shown a significant increase in self generated revenues in Kwacha terms in the recent past years calculated. Adjusted for inflation, however, the revenues have shown a declining trend in the last two years (see Table 1).

Table 1: Actual Collection of Water Charges, Advertisements and Application Fees at the Water Development Board for the Period 1996 – 1999 ('000 Kwacha)

| Period | 1996 | | 1997 | | 1998 | | 1999 | |
|--------------------------------|----------------|--------|----------------|---------|----------------|---------|----------------|--------|
| Currency | '000 kwacha | US \$ | '000 kwacha | US \$ | '000 kwacha | US \$ | '000 kwacha | US \$ |
| Water Charges | 46,010 | 34,988 | 196,885 | 130,994 | 259,167 | 118,049 | 204,383 | 82,746 |
| Advertisements Fees | 24 | 18 | 10,505 | 6,989 | 1,640 | 755 | N/A | N/A |
| Application Fees | 67 | 51 | 1,434 | 954 | 179 | 663 | 79 | 32 |
| Offences and Penalties Charges | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Total | 46,191 | 35,126 | 208,824 | 138,938 | 260,986 | 120,270 | 204,458 | 82,777 |

Source: Cash Book Water Development Board/MEWD/Lusaka, September 1999

1996 to 1998: 28.03.96 – 31.12.96

1999: 01.01.99 – 30.09.99

N/A: No advertisements for 1999 as at 30.09.99

However, total billed water charges could be much higher than what is shown in Table 1. Available data from the WDB indicates that only about 50% to 60% of all license holders actually pay for their licenses, and not all users of surface water are included in the WDB's water right holder database. This is partly attributed to the fact that the database has not been periodically updated. Furthermore, the WDB has not been collecting any revenue from offence and penalty charges due mainly to lack of institutional, legal and human resource capacity to enforce the law. Hence, the WDB is losing significant income every year due to an incomplete water right holder database. Currently, the renewal of a water right is done once every 5 years. The bill for an approved license is attached to the license the time it is sent to the license holder. Hence, it is possible for someone to have a valid license without having paid for it. The billed water charges per year could therefore be in the order of K430 to K520 million. In view of the foregoing, the need to improve the water right holder database as well as revenue collection procedures cannot be overemphasised.

The maintenance of a water right is subject to a license renewal fee, an advertisement fee, a water user charge, and a penalty charge for non-compliance with the Water Act. The license renewal fee requires payment of a fee at the time of lodging the application. The fee varies with the size of the land; 20 fee units, at the moment equivalent to K1, 000 for every application for a water right for land up to 250 hectares, for land above 250 hectares, the fee is 100 fee units or equivalent to K5, 000. The advertisement fee is a fee meant to cover the cost of announcement of the renewed water licenses in the printed media. The cost of eventual technical installations such as flow meters or other devices to ensure compliance with the license has to be borne by the license holder.

The water charge is levied on every water right holder according to how much water will be extracted from the source. The charge has two elements; (i) for allowed volume and (ii) charge for extraction in excess of what the water right specifies. The Act specifies that these fees shall

be paid when a license is being renewed. The current water charges are K 5,000 for extraction of up to 500 cubic meters per day, and K 2,000 for every excess cubic meter per day.

5.3.2 Present Cost of Operation of the Department of Water Affairs and the Water Development Board

The cost of water resource management is imbedded in the operations of a number of Ministries, agencies and private stakeholders, and includes recurrent expenditures and capital expenditures, required to ensure adequate management.

The full picture of water resource management cost is difficult to establish. The total cost of management activities under the responsibility of the Ministry of Energy and Water Development as detailed in the Government budget's expenditure estimates amount to K6.6 billion for the period 1999. This compares with K6.4 billion allocated in 1998 (see Table 2).

However, these estimates are not necessarily what the sector needs to function optimally. Estimates submitted by the institutions are normally cut before being included into the Government budget. The expenditure estimates in the budget are therefore, government authorised expenditure estimates, which are normally lower than the required funding. Actual releases of funds to the institution are usually lower than the expenditure estimates, mainly because of insufficient generation of Government revenues.

The Government expenditure estimates thus, have to be used with care. However, in the inception report, the estimates for 1998 and 1999 are sufficient to give a fair picture of the cost of running Zambia's most important water resource management institutions.

Table 2: Government Expenditure Estimates for Water Resource Management during 1998 and 1999 ('000 Kwacha)

| Type of Expenditure | 1998 | 1999 |
|---|------------------|------------------|
| Salaries, Wages and Other Staff Cost | 461,123 | 419,301 |
| Recurrent Departmental Goods and Services | 438,986 | 897,026 |
| Water Development Board | 320,000 | 200,000 |
| Total Recurrent Expenditure | 1,220,109 | 1,516,327 |
| Capital Expenditure | 5,229,496 | 5,085,047 |
| TOTAL EXPENDITURE | 6,449,605 | 6,601,374 |

Source: Government Expenditure Estimates 01.01.99 – 31.12.99, Lusaka, January 1999

During 1999, the operational cost of water resource management in Zambia is approximately K1.5 billion Kwacha, a fairly modest amount in view of Zambia's large area and long waterways. If capital expenditures were included, the total cost of Zambia's water resource management would require approximately K 6.6 billion on an annual basis (see Table 2).

A comparison of the water sector's estimated self generated revenues of K 260 million in 1999 with expenditure requirements of K 1.5 billion for recurrent expenditures alone, clearly shows that financial sustainability is far from being achieved.

However, the above revenue estimates are achievements in view of the sector's inefficient billing and revenue collection systems as well as the low tariff structure which has not kept pace with

the rate of inflation. The need to strengthen the capacity of the WDB in revenue generation and collection is therefore imperative.

5.3.3 Improvement of the Revenue Collection System

For the water resources management authority to achieve financial sustainability, it is necessary to develop the capacity to generate revenues as well as to have effective collection mechanisms in place. Essential in this regard will be the need to update the water right holder customer database.

Furthermore, there is need to adjust the current charges and fees, which were set in 1993. In view of the considerable depreciation of the Kwacha since 1993, an adjustment of the current tariffs seems justifiable. Generally, such tariff adjustments should take place on a regular basis to prevent erosion of the value of the collected revenues.

An illustration of what improved efficiency of the commercial procedures can achieve is shown in Table 3. The table has to be interpreted with great care. Only estimated actual revenue collection and the estimated recurrent expenditures can be documented. All other figures in the table are based on what are considered reasonable assumptions expressed by the WDB officers.

Table 3: Revenue/Billing Potential in Water Resource Management Sector (million kwacha)

| Particulars | Conservative Estimate | Optimistic Estimate |
|---|------------------------------|----------------------------|
| Estimated Actual Revenue Collection in 1999 | 260 | 260 |
| Add: Estimated Billed Revenues not Collected | 170 | 260 |
| Estimated Billed Revenues in 1999 | 430 | 520 |
| Add: Estimated Value of Unbilled Water Users | 80 | 150 |
| Estimated Billing Potential in 1999 | 510 | 670 |
| Add: Possible Billing Potential of Ground Water Rights (20% - 30% of Surface Water Potential) | 100 | 200 |
| Estimated Billing Potential Whole Sector | 610 | 870 |
| Add: Necessary Increase of Revenues through adjustment of 1993 tariffs to Finance 1999 Recurrent Expenditures | 906 | 646 |
| Total WRM Recurrent Expenditures 1999 | 1,516 | 1,516 |

Sources: Cash Book Water Development Board, MEWD, Lusaka, September 1999 and Government Expenditure Estimates, Lusaka, January 1999

It is likely that if an updated water right holder database and a suitable billing and revenue collection management system were in place, there would be a potential for Zambia's water resource management sector to cover its recurrent expenditures from its own generated revenues.

The ability of the water resource management sector to cover its capital expenditures is, however, dependent upon a number of factors. These include:

- up-dating of the water right holder data base;
- an efficient billing system;
- functioning revenue collection system;
- inclusion of ground water tariffs; and
- regular adjustments of tariffs to ensure that the real value of revenues is not being eroded

5.4 Linkages and Interactions with other Building Blocks

Of particular importance will be to arrive at more accurate estimates of the total available water resources, including the ground water resource. Similarly, better demand predictions will prove essential to enable the sector to plan congruently with the objective of financial sustainability as well as to ensure more correct raw water tariffs. These challenges will require close co-operation between Component 5 “Economics and Finance” and Component 4 “Water Resource Demand and Supply, and Infrastructure”.

Amendment of the Water Act to include ground water will require co-operation with the Institutional and Legal Component.

Updating of the water right holder database will require that the Economics and Finance Component work closely with the Information Component. Revenue collection mechanisms will be improved if appropriate human resources are put in place, hence the need for the Economics and Finance Component to work together with the Human Resource Component.

5.5 Interpretation of the Terms of Reference

The Terms of Reference given for this Component are very demanding. The scope of work includes the following items:

- Examine the relevant laws and regulations available of creative funding mechanisms.
- Identify and define financial and economic instruments for water allocations.
- Establish the value of water in different sectors and their contribution to the economy of the country.
- Carry out research on competition for water between sectors.
- Study and clarify parameters to be taken into account in calculation of various charges.
- Assess the different pricing systems and their effect on demand.
- Establish and recommend a tariff structure for bulk water.
- Identify the possible investment scenario in water resources development and management and consider financing alternatives.

Given the limited time and resources available for the WRAP process, the team has proposed to focus the activities on what they have considered to be the most critical financial and economic aspects of water management in Zambia.

The priority issues in the team's opinion are to:

- establish the principle and guidelines for introducing the “socio-economic value of water” in planning and decision-making, and
- improve the water charge structure and other revenue options in order to finance improved water resources management.

Activities specified in the Terms of Reference, will be covered as the above priority issues are being undertaken.

5.6 *Recommendations for WRAP Strategy Management Process*

5.6.1 Goal

The Goal for all the seven components is

“Zambia’s water resources being managed and utilised for maximum economic benefit in an equitable and sustainable manner with strong stakeholder participation”.

5.6.2 Objective

The contribution from this Component to achieve the above goal, would be:

“Economic value of water integrated in to the decision making process for water resource management and development”

The main focus of this effort would be to establish the principle of socio economic value of water. Guidance would be given on how this principle can be applied in different sectors and under different hydrological circumstances. This objective is expected to be one that can only be achieved over several years and then constituting the basis for efficient and sustainable management of Zambia’s water resources.

The achievement of financial sustainability of the water resources management is also essential. The WRAP process will identify, assess and implement options at hand for the achievement of this goal.

5.6.3 Activities and Outputs

The activities required for achieving the outputs of this Component are shown in the activity plan for the component, including assumed timing and requirements for external resources.

For the Economics and Finance component, four specific Outputs have been identified.

The **first output** would be to establish methods for deriving the economic value of water.

The **activity** necessary to achieve this output would be:

- To assess the various water using sectors' contributions to the development of the country and their relative importance. It would also be necessary to take into account the limitations given by the fact that waterways are being shared with neighbouring countries. The economic value of water in different parts of the country would also require consideration.

The **second** output would be to establish policies and mechanisms for raw water use pricing.

The **activities** necessary to achieve this output would be:

- Once the principle of economic value of water has been established, the principles would be applied in economic raw water pricing by establishing policy guidelines.
- Based on the policy guidelines, practices would be established for water tariffs based on the principles and mechanisms of socio-economic pricing.

The **third output** would be to establish the appropriate budget and financing for water resources management costs.

The **activities** necessary to achieve this output would be:

- Initially, to reach an understanding of how the water resource management institutions should be defined.
- Further studies would thereafter; establish the sector's current and future revenues and costs. It would also be necessary to identify inefficiencies in the present financial management of the sector and propose ways the sector in the future; could achieve efficient standards acceptable on commercial principles.
- Based on this, it would be imperative to establish suitable revenue collection systems and procedures, and market affordable economic raw water tariffs could be implemented.
- An amendment to the Water Act to include ground water issues.

The **fourth output** would be to apply effective economic instruments for water allocation amongst competing users.

The **activities** necessary to achieve this output would be:

- To establish the basic principles for allocation of water resources. Similarly, certain priority guidelines for sharing the same water resource would have to be set.
- Once the principles and priorities have been established, it would be up to Government to implement the guidelines and decide in what order the priorities should apply.

5.7 Resource Requirements

The activities would primarily be carried out by a team of local experts. The team would engage in a consultative process involving all relevant stakeholders.

Technical assistance would be required for the development of an appropriate water resource planning process at critical stages of the programme.

5.7.1 Assumptions

The first assumption to be fulfilled is that Government recognises the principle of economic value of water as a decision-making element in socio economic planning.

Once this has been accepted the second assumption for achievement of the goals and objectives related to the economic and finance component, is that the Government will ultimately approve a new water pricing policy based on economic principles.

5.8 Performance Monitoring

Monitoring is a continuous surveillance of the implementation of a programme. Monitoring entails checking the programme's achievements compared to the planned inputs, activities and outputs. There should be one format for monitoring and reporting throughout the life of the project. The format should be such that inputs, activities and outputs are monitored with reference to the goals and objectives of the programme. Monitoring will be based on indicators, and changes in assumptions, which are relevant to the development of the programme.

As for Component 5, monitoring will, to a large extent take the form of checking progress of planning, implementation and putting into effect improved guidelines and procedures as given by the component's outputs.