

Institutional implications, issues and necessities for effective Water Demand Management in Zambia

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Introduction

Water resource management entails socially efficient and sustainable use of water resources moving away from simply developing new supplies to meet the projected water needs as this approach has not provided water security to the southern African region. The region is characterised by natural water scarcity alongside a growing demand for water due to population and economic growth. The ever-widening search for new water sources against other pressing development needs calls for Water Demand Management (WDM), which is defined as “a management approach that aims to conserve water by controlling demand through the application of measures such as regulatory, technological, economical and social at all spatial and institutional levels.”

In Zambia, water is relatively “abundant” when compared to its neighbours particularly those to the south such as Botswana, Namibia and Zimbabwe. The annual rainfall averages between 700 mm in the south and 1400 mm in the north, with an extensive river network, lakes and a number of aquifers in various parts of the country (Figure 1). However, the management of these water resources is critical if equitable access by competing needs particularly the vulnerable poor, women and children is considered. In addition, there are significant variations across the country with a strong seasonal distribution leading to water deficits in specific localities. In certain locale, competition for available water resources has already manifested itself such as among the farming community in the Chalimbana Catchment area and this is expected to increase with the economic development in the country. For these reasons Zambia should serious look and implement WDM if she has to manage her water resources.

The Water sector in Zambia is primarily under the responsibility of two ministries. The Ministry of Energy and Water Development, through the Department of Water Affairs, Water Board and National Water Supply and Sanitation Council, is responsible for overall water resources management (planning, regulation, development) while the Ministry of Local Government and Housing, through the Local Authorities and Commercial Utilities, responsible for water supply and sanitation delivery services. These ministries play a key role in ensuring the sustainable development and management of water for urban, peri-urban and rural. However, there are number of institutions involved in the water sector as indicated in the Water Demand Management chain (Figure 2). In peri-urban and rural areas, the planning process is made together with the community through Community Based Organisations (CBO) on the current situation in a particular area and thereafter an appropriate intervention selected.

WDM considers the demand and usage of water and has a potential to increase water availability through more efficient allocation and use guided by:

- economic efficiency
- equity of access
- environmental protection
- governance based on maximum participation, responsibility and accountability; and
- the adoption of WDM into regional policy for shared water resources.

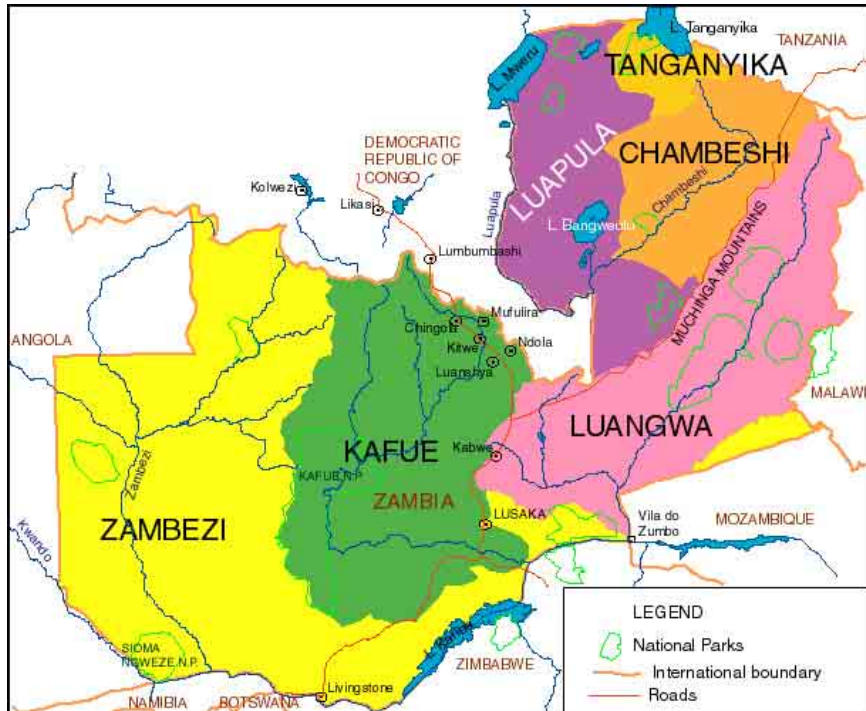


Figure 1: Map of Zambia showing some of the Water Resources and proposed Catchment boundaries. Catchments Luapula, Chambeshi and Tanganyika are proposed to be grouped as one in the WRAP process.

The main issues for an effective WDM in Zambia therefore appears to be hindered by the existing water sector policy and legislated institutional framework, which does not explicitly encourage WDM practices. These are further compounded by inadequate financial support. There are thus policy and institutional gaps in terms of which institution should be in charge of promoting WDM despite the numerous statements in both the National Water Policy (NWP) and the various pieces of legislation that deals with water, such as the WSS Act (1997) and the Water Act (1948), that support WDM principles. On the institutional framework, the inherent institutional incapacities in terms of WDM in government ministries that would normally be lead promoters of WDM could be explained by the fact that WDM is not an area of focus or priority in any of the ministry policies.

The necessities for an effective WDM in Zambia cannot be overemphasized judging by the number of advantages in implementing WDM which include:

- The possibility to reduce water demands by up to 50 % without any deterioration in the quality of life
- Significant reduction of capital requirements for the expansion of supply
- The possibility to help meet the water needs of a growing population particularly the peri-urban poor
- Reduction in the generation of pollutants, and therefore the requirements for new or expanded wastewater treatment systems
- Enhancement in the development and adoption of new technologies, which may possibly impact the management of energy use.

This paper examines the adequacy of the existing institutional arrangements, issues and necessities in promoting and implementing Water Demand Management in Zambia, and summarises the three studies undertaken in Zambia by Nyambe et. al., 2002, Kampata et. al, 2002 and Nkhuwa, 2002.

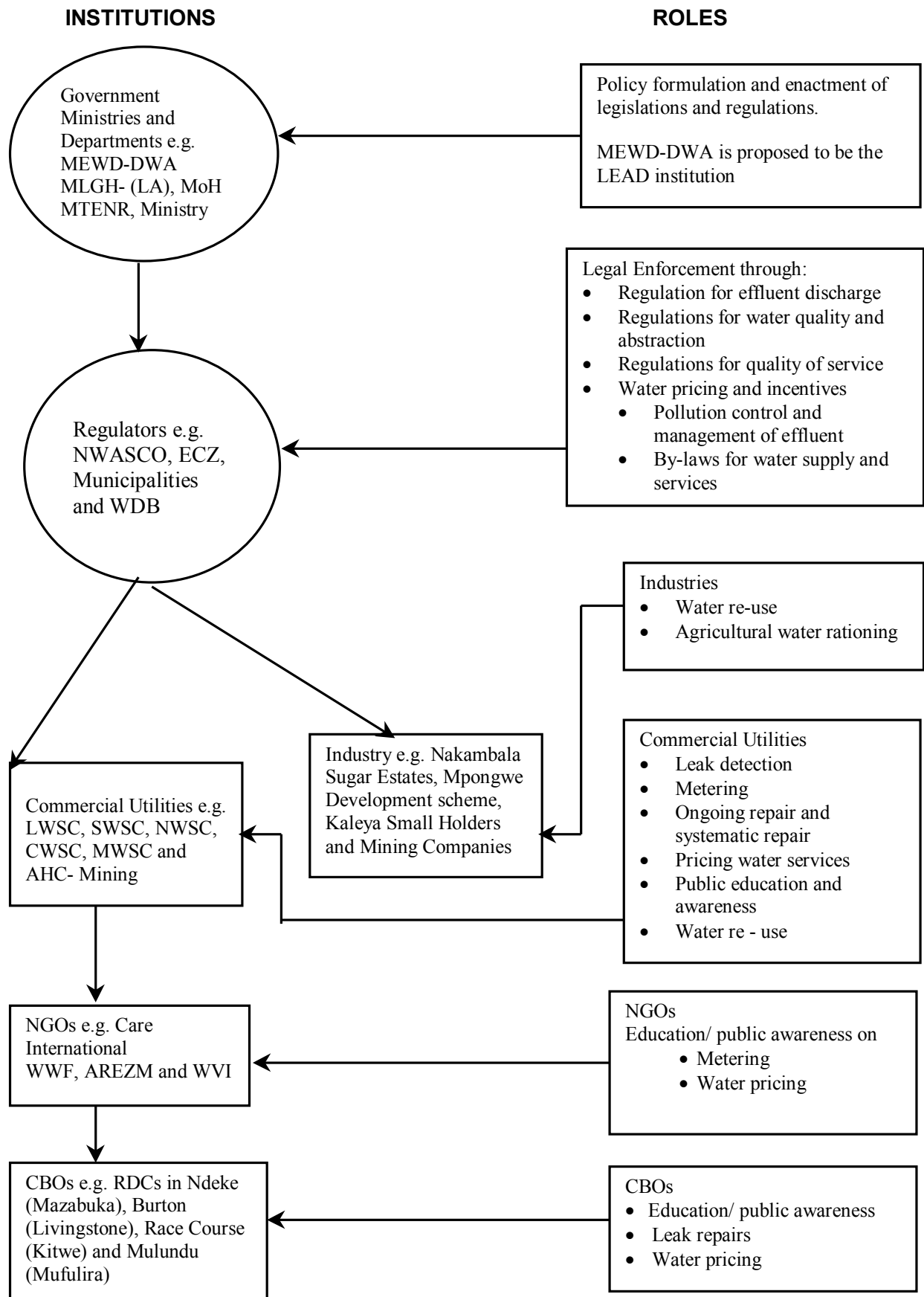


Figure 2: Institutions in the Water Demand Management Chain

2.0 Institutional Framework

As illustrated in Figure 2, there are number of institutions involved in water activities in Zambia categorized broadly into eight (8). Their nature of involvement ranges from policy/legal formulation and implementation, service provision and consumption. The eight (8) broad categories are:

(i) Government ministries and departments (e.g. MLGH, MEWD, MoH, DWA)

Government ministries and departments have over the years played various roles in both the water supply and water resources sub-sectors, often without clear responsibilities and co-ordination creating operational overlaps and gaps, leading to duplication of activities and thereby straining the resources. However, the reforms that began on the water supply and sanitation sub-sector have established very clear institutional structures from the national/central level to the local government level and it is expected that Water Resources Action Programme (WRAP) would do the same in water resources sub-sector.

(ii) Local Authorities (e.g. city, municipal, district councils)

The Local Authorities (LA) are, by the Water Supply and Sanitation Act (1997) obliged to provide water supply and sanitation services to the areas under their jurisdiction. Most LAs have entered into joint ventures with other LAs and established commercial water utilities under the Companies Act bringing the number of commercial water utilities to nine in the country.

The institutional arrangement in peri-urban areas for management of Water Supply and Sanitation (WSS) is done by the Residents Development Committees (RDCs) which forms a Community Based Organization (CBO) such as a Water Management Scheme or Committee. RDCs are non-political and development –oriented committees formed from community members in a specific locality. The RDCs are promoted by Local Authorities as a means of improving coordination of development and provision of services such as water to the communities e.g. in compounds such as George and Kamanga in Lusaka. This is usually supported by NGOs (e.g. JICA in George Compound), a Commercial Utility (Lusaka Water Sewerage Company) and the Local Authority (Lusaka City Council). Where there is no organized service, water is obtained from illegal connections from city supply, from individual households with connection or privately owned boreholes as well as hand dug shallow wells such as in Kanyama Compound or surface water sources of generally poor water quality.

In rural areas, the environment creates a major challenge with regard to provision of water supply services since the population is spread over a large area. The government has therefore developed and adopted the concept of Water Sanitation Health Education (WASHE) in handling rural water supply and sanitation. The strength of this concept is the recognition that no one individual/institution has total responsibility for the provision of these services. The Village WASHE Committees (V-WASHE) in rural areas is an inter-sectoral approach where the Government co-ordinates the planning and implementation of water projects together with other stakeholders through committees known as D- (District) WASHE. In this approach the communities at the user level are fully involved in the planning, implementation and eventual operation and maintenance of the water facility through the V- (Village) WASHE Committee. With the WASHE approach, out of the 72 Districts, 63 D-WASHES and hundreds of V-WASHES have been formed across the country and are active in facilitating water supply services.

(iii) Regulatory Authorities (e.g. Water Board, Environmental Council of Zambia (ECZ) and NWASCO)

Regulatory institutions in the water sector are statutory bodies established by acts of parliament. They are sector specific and their roles are defined in their respective establishing legislations. However, all the regulators are concerned with the economic, environmental and quality of service regulation. The main regulatory institutions are:

- The **Water Board** which is responsible for allocating raw water rights to the various sectors of the economy, operates under the Water Act, Cap 198 (1948). The Act empowers the Board to control the use of water resources by charging abstraction fees.

The **National Water Supply & Sanitation Council (NWASCO)** which was established under the water supply and sanitation Act (28) 1997 and is responsible for regulating the provision of water supply and sanitation services throughout the country. The water providers are now 'forced' to adopt measures that are aimed at reducing the rampant water wastage (national average of greater than 50%), at introducing metering and moving towards charging water rates that recover most of the costs and that consumers should conserve water through reducing wastage.

- The **Environmental Council of Zambia (ECZ)** which was established under the Environmental Protection and Pollution Control Act No 12 of 1990 is empowered to, among other things, establish water quality and pollution controls standards; determine conditions for the discharge of effluents into the aquatic environment and thus ensuring the preservation of the integrity of all natural water bodies in the environment, both surface and ground.

(iv) Commercial Water Utilities (e.g. Lusaka, Kafubu, Mulonga Water and Sewerage Companies)

Commercial water supply and sanitation utilities (CUs) have been established as a result of the water supply and sanitation reforms that began in 1994 to provide water and sanitation services in designated areas.

The mandate of CUs is to provide efficient and sustainable supply of water and sanitation services under the general regulation of NWASCO. There are currently nine established CUs throughout Zambia.

Recent studies have shown that there are high levels of unaccounted for water (UFW) (no-revenue water) in the water schemes run by the water utilities. This high UFW is mainly due to technical losses (leakages in the old and dilapidated pipe networks), commercial losses (poor billing and illegal connections) and high wastage on the part of the consumers. The utilities have introduced water demand management practices in their operations. Currently these include putting priorities on metering, reducing UFW, creating consumer awareness in water conservation, and on introducing cost recovering tariffs.

(v) Private Sector (e.g. Zambia Sugar Company, Chilanga Cement)

The private sector constitutes an important end-user category of the water supply. These include the manufacturing, food and processing industries, mining, agricultural and hydropower generation. Hydropower generation is the largest user of water in Zambia. For instance, approximately 90% of the water rights on the Kafue River are allocated for hydropower generation.

(vi) Academic and research institutions (e.g. University of Zambia)

Academic and research institutions' participation is mainly in the area of training personnel and in various researches and thus contribute to the much needed awareness campaigns and knowledge in this area.

(vii) Bilateral and multi-lateral institutions (KfW, DFID, World Bank, UNICEF etc.)

Bilateral and multilateral institutions have been the main financiers of water programmes in Zambia for over a decade now. They have provided over 90% of the total costs of all major programmes of the past decade, through direct finance and technical assistant.

(viii) NGOs and CBOs (Care International, Water Aid, Residents Development Committees)

There are a number of NGOs [e.g. the World Wide Fund for Nature (WWF) the Zambia Water Partnership (ZWP)] involved in water activities in both the water supply and water resources. ZWP is an organisation composed of partners (stakeholders) in the water sector with a mandate to champion the adoption of IWRM principles (which includes WDM) in Zambia. The role of NGO has also extended to mainstreaming gender roles in community water projects. CBOs such as RDCs, co-operate in the promotion of community-based management of water supply schemes.

2.1 Institutional Implications

Despite the identification of a number of constraints that affected the water sector (Box 1), during the formulation of the National Water Policy (NWP) in 1994, little seem to have changed in that the sector and still experiences the following constraints:

- Financial capacities/problems
- Lack of awareness/knowledge/education
- Lack of awareness among politicians coupled with negative interest
- Dilapidated infrastructure coupled with declining investment and sub-economic tariff adjustments that have led to financial hardships for water utilities, etc.
- Water pricing system
- Economic inequity and poverty
- Unmetered consumption
- Behavioural patterns (Attitude)
- Poor management practices and lack of incentives to retain qualified personnel, which has led to duplication of effort and wastage of the available meagre resources.
- Lack of enforcement of policies
- Poor cost recovery by utility companies
- Absence of infrastructure for recycling

Box 1: Constraints in the water sector before the formulation and implementation of the water reforms

- Inadequate legislation for water resource exploitation especially with regard to groundwater resources
- Lack of clear distinction between sector responsibilities leading to a situation where the Department of Water Affairs combined water resources management and operation of water supply scheme responsibilities
- Poor coordination of planning and management activities among the different institutions leading to duplication of effort and wastage of the available meagre resources.
- Declining investment and sub-economic tariff adjustments leading to financial hardships for water supply utilities

- Unsustainable water supply schemes resulting from perception of water as a cost free social good rather than as an economic resource.
- Inadequate community participation in the water and sanitation sector
- Lack of / inadequate institutional and logistical capacity for effective operation and maintenance activities
- Material supply and cost recovery system to operate water supply schemes.

Source: National Water Policy (1994)

Rural and peri-urban areas present another set of constraints in the application of WDM including:

- i. Limited Technological options
- ii. Varying capacities for community management
- iii. Inadequate public awareness
- iv. Financial constraints
- v. Weak Integration of WDM in the Planning Process for rural water supply
- vi. Inadequate monitoring of water use efficiency

Government departments and quasi-government institutions such as Water Affairs Department and Water Board, which are in a strategic position to adopt and implement WDM through the implementing of the NWP policy that advocates for integrated and sustainable water resources management and development have not done so. It seems that only the commercial water utilities have institutional set-up with capacities to implement WDM given the financial and human resource expertise. Other major categories that should be implementing WDM but aren't at the moment are the Local Authorities, the irrigation sector of the Ministry of Agriculture and the private sector institutions (manufacturing and processing industries). The Local Authorities are still in charge of water supply provision in a number of towns in the country. The LAs however have a number of inherent institutional inadequacies that make them unsuitable from implementing WDM. These inadequacies were at the root of government resolution to reform them by de-linking and commercializing the water section under their charge giving rise to Commercial Utilities and NWASCO.

NWASCO, the water supply and sanitation sector regulator, and the commercial water utilities are the only institutions with WDM intentions and part-plans that are currently practising some of these. NWASCO employs regulatory instruments to implement some of WDM tools in the sub-sector. These are:

- (i) imposing service standards aimed at reducing non-revenue water,
- (ii) obliging water utilities to develop public awareness campaigns aimed at encouraging water conservation;
- (iii) demanding for staged universal metering of all consumption and;
- (iv) approving tariffs that encourage water conservation.

On private companies, there are few private companies that practice Water Demand Management such as the Mining (e.g. Mopani) and Agricultural (Nakambala) companies mainly in the area of re-cycling and re-use. This is one sector that should encompass and implement WDM because of the high water usage and therefore it is an incentive to conserve water.

The training and research institutions provide the needed vertical education that form the basis for integration during implementation of WDM. As the water sector sees the benefits of WDM, these institutions provide tailored programmes to suit the needs of all in the country. Good examples is the WaterNet programme with its Integrated Water Resource programme.

The operational approaches taken by most NGO and CBOs in water sector on the other hand are not suited to implement WDM on their own. However NGOs would prove valuable partners in programme implementation especially in education and public awareness. The role of these institutions will also be valuable in the operation of the Water Watch Groups (WWG) under NWASCO.

Given the functions and operational roles of the various institutions in Zambia, it is very clear that the Commercial Utilities (CUs) would form the important vehicles for the practice and promotion of Water Demand Management given the enacted and enforced laws in this sub-sector. NWASCO has started this important role of monitoring and making sure that CUs conform to existing policy, regulations and the laws of the country which include the NWP and various Acts but particularly the Water Supply and Sanitation Act of 1997. NWASCO has followed-up with TV programmes on the roles of CUs, itself and the Consumers and it has also launched the Consumers Watch Groups in Lusaka, that will soon be extended to the Zambian Copperbelt. The main role of these groups are to monitor the operations of a water supply provider in a particular service area.

Unfortunately, the institutional set-up in which NWASCO finds itself is only operative in the Water Supply and Sanitation sub-sector. As highlighted in Kampata et. al, 2002 study in rural areas, where the WASHE institutional framework exists, it has basically strengthened the aspect of community participation and management of water supply and sanitation services as well as the water resources. For example, a survey for rural water development projects in Lusaka, Southern, Central and Copperbelt Province of Zambia conducted in April 1999, ASCO (1999) revealed that communities that had active WASHE committees had their water points well maintained. To this effect 86% of the surveyed water points were found to be in use. Leaking taps and broken pumps for instance are attended to promptly, water charges are effectively collected, and wastage of water is not entertained. In addition, it is realised that there is direct suffering resulting from inadequate water due to mismanagement and the communities do not expect to receive assistance from outsiders like Government to simply provide the water free. Thus demand management is applied since there is a sense of responsibility and ownership of the water supply facility to function in a sustainable manner.

It is very clear from this example that in order for WDM to succeed a holistic implementation approach should followed with clear policies, regulations and institutional framework. It is also clear that just like the WASHE concept that was developed and adopted by Government, WDM should follow similar path and a need for a rightful Government department for WDM implementation in Zambia.

3.0 Effective Implementation of WDM in Zambia

It is clear from the three studies that WDM should be located in the Ministry of Energy and Water Development under the Department of Water Affairs (DWA), which is sole provider of technical back-up and support of water resource management (WRM) in Zambia. As WDM is a component of WRM and that it embraces all sectors, this places DWA in a better position to host WDM. In addition, DWA) is currently hosting the Water Resources Action Programme (WRAP). How much WDM will be driven by WRAP is not clear but there is a need for DWA to champion WDM together with line ministries and other stakeholders. For this to be effectively implemented measures should be put in place to address the following issues:

(i) Should be a clear understanding and practice of WDM concept

Very few institutions in Zambia have a clear understanding of the concept of WDM with inadequate WDM policy or strategy at all resulting in very few practising WDM mostly from the water supply rather than in the water resource institutions. There is a need for one institution to refine this and provide guidelines and procedures for WDM adoption and implementation.

(ii) Inadequate legislation for water resources exploitation, especially with respect to exploiting groundwater reserves

Only the NWP implicitly advocates the implementation of WDM through the recognition of *promotion of sustainable water resources development to facilitate equitable provision of an adequate quantity and quality of water for all competing groups of users at acceptable costs, while ensuring security of supply under varying conditions*. In addition, different institutions have passed a number of statutes to regulate water resources in the country. However, their enforcement has been ineffective mainly because of the fragmentation of the Natural Resources¹ Act Cap 315 of 1962 into the Natural Resources Act Cap 315 of 1970, the Environmental Protection and Pollution Control Act N^o 12 of 1990 and the Forestry Act of 1999. This fragmentation, has not provided for an integrated or holistic approach as too many institutions service the sector, which in many cases, has resulted in the centralisation of certain aspects of water resources management and the duplication of roles among the various institutions. Implementation of the Water Resources Action Programme (WRAP) in 2001 would probably attempt to reform the water resources sector with a view to establishing self-financing authorities and to introduce community-based practices at the grass root level. However, implementation of WDM in this programme is yet to be seen.

(iii) Financial Issues

Adequate finances are a major pre-requisite to the effective implementation of WDM. The current financing positions of institutions would make it very difficult for them to implement successful WDM programmes. Most national level institutions such as ministries depend on budgetary allocations from central government and funding from bilateral and multilateral institutions for their programmes. Others such as the regulatory authorities depend both on central government grants as well as funds realized from licences (NWASCO and ECZ) and water rights (Water Board) as well as from external support. The commercial water utilities have been established against a backdrop of inadequate funding. The utilities were not recapitalised at the time they were formed leaving them with still run down infrastructure. The companies thus depend on total cost recovery to fund their operations, although none of them as yet to reach full cost recovery for various reasons. The Local Authorities also depend on water charges for their operations although the revenue from these are unable to meet the operations and maintenance.

The private institutions that use water as a major resource in their business (e.g. Zambia Bottlers) operate for profit and as such might be in a position to successfully implement WDM if that would cut down on their production costs.

The government budgetary allocations to the water sector is a meagre 1% per year, which would make implementation of WDM rather difficult unless it is externally supported or linked to human catastrophies such as HIV and AIDS or Cholera. The poor financial status of most institutions therefore has negative implications on WDM. It will be extremely difficult for any of

¹ In the Natural Resources Act Cap 315 of 1962, the term “*natural resources*” includes soils, waters, plant life and vegetation and animal life of Zambia including mammals, birds, reptiles, fish, insects and natural products derived from them and the vegetable products of the soil.

these institutions to embark on WDM programmes given the other competing needs for the same scarce resources. In such instances, WDM would not be a priority.

(iv) Human Resource Capacity and training needs

The water sector in general has for a long time suffered from a lack of adequate personnel to manage specialised programmes such as WDM. Most institutions only possessed staff with adequate qualifications for routine operations and this lack was also recognized at ministerial levels for personnel to drive WDM policies. The inadequacy of specialised staff in WDM is a serious hindrance to effective implementation. Until staff with ability to plan and implement WDM programme are in place when an institution decide to adopt the WDM concept, it would be extremely difficult for any institution to run an effective WDM programme.

If the profile of WDM is therefore to be raised, there is need for both institutional and human capacity building in WDM. This includes training in understanding the concept/objectives of WDM, and development and implementation of water demand management. In addition there is a need to train special WDM team. It was only at NWASCO where the institution indicated that it possessed staff with ability to implement WDM.

(v) Intra-sector linkages/interaction with other actors

There are various levels of interactions/linkages and networks in the sector. The study revealed that these were largely built during the vastly consultative water supply sector reforms and exists for various reasons. Some of these are collaboration in programme formulation and implementation, strategy developments etc. The study also revealed that most of these contacts are with the regulators, NWASCO, on the water supply and sanitation side, the water development board on the water resources side and the Environmental Council of Zambia for environmental regulation. There is no evidence of these interactions are in direct promotion of WDM, but are the beginnings of encouraging sector collaboration.

(vi) Existence of WDM tools/guidelines

Due to the non-existence of WDM programmes in the country it is perhaps not surprising that there are very few institutions with developed tools or guidelines for WDM. There however exist some tools in the following institutions: Kafubu and Nkana Water and Sewerage Company (leak detection manuals), LWSC (draft WDM framework/strategy), Mulonga (metering) and NWASCO (minimum service level guidelines). These are mainly water companies and the study indicate that there are virtually no such materials with the local authorities, which is rather sad in that the authorities would now take on an advisory role to both the community and the suppliers.

(vii) WDM tools/guidelines needed to be developed

While there was a cross-section of needed material, the common requirements were in the following:

- Guidelines on metering, leak detection and reducing unaccounted for water
- Guidelines on water pricing
- Guidelines on awareness and education

(viii) In rural and some peri-urban areas, issues include:

a. Source of water

Rural areas in Zambia obtain their water supply from ground water, springs and surface water from rivers, streams, lakes and reservoirs mainly dammed streams and dambos either directly or

through pumped and or gravity systems. Most of the water is obtained from point sources such as hand dug wells and boreholes fitted with hand pumps whereas in peri-urban areas most of the water is piped to communal tap stands.

For both rural and peri-urban areas, traditional water sources continue to be a significant source of water particularly as an alternative source. Rainwater harvesting especially from roof catchments has the potential to be exploited as a source of water.

b. Operation and Maintenance

The WASHE committees manage the water point in the interest of the community whereas Residents Development Committees (RDCs), usually supported by NGOs, by water vendors, as agents for a Commercial Utility or by, community based organisation such as neighbourhood Health Committees (NHCs) manage the water sources. Where there is no organised service, dug shallow wells or surface water sources used are of generally poor water quality.

In both rural and peri-urban areas, the participation of women is deliberately promoted by reserving a number of positions in the committees for women.

c. Conservation of the available water (at household level)

Rationing and prioritising water for various uses is the most common practice used.

d. Benefits of management systems in place

The quantity of water is enough to serve the community households and is sustained.

e. Key things to ensure effective management and use of the water source

Communities in both rural and peri-urban areas generally want an improvement in the water supply system. The coverage of safe water is still low. The education of the community on various aspects of water management is seen to be important.

f. Technology and management Options

Technology and management options in place in rural areas are mainly for management of the water for sustainability. The ones that are promoting WDM are:

- i) Metering for domestic water supply is mainly restricted to Peri-urban areas.
- ii) Payment for domestic water.
- iii) Establishment of community based water management committees.
- iv) The restriction on the amount of water drawn is a common practice.
- v) Setting the periods in a day when water can be drawn.
- vi) Having the water point manned by an attendant who controls the delivery of water.
- vii) Improving traditional water sources by protecting the water source by forbidding cutting down trees and cultivation and simple lining of hand dug wells and preventing of any developments around the source of water.
- viii) Securing the water point either by locking or removing the taps.
- ix) The use of appropriate containers to collect water.
- x) Construction of appropriate drainage facilities for gardening and livestock watering

Concluding Remarks and Recommendation

From the three studies, it is evident that institutional framework (Table 1) is fairly structured for the adoption/ promotion and implementation of WDM practices, but this needs an explicit policy/legislative back up that would identify a lead ministry at national level to spearhead WDM. The current set-up would indicate that the Ministry of Energy and Water Development should be the lead ministry in that it is currently implementing Water Resources Action Programme where WDM is expected to take a role. The Local Authorities structures however are not suited for WDM implementation for various reasons. These include bureaucratic administrative procedures due to the many departments making up the council and inadequate qualified personnel and financial capacity. It is also very difficult to prioritise and finance WDM in LAs due to other competing sectors such as health and education. This therefore leaves the commercial water utilities, private companies and the regulatory authorities to have the capacity in their present set-up, to implement WDM. Even these as we have seen face many constraints to effective WDM implementation.

In general, therefore, the implementation of WDM has to be done systematically and step-wisely. Nyambe et. al., 2002 summarised priorities that have to be taken into account for the effective implementation of WDM in Zambia including the following:

1. Awareness, knowledge and awareness
2. Formulation of policy and legal framework
3. Establishing of a national water coordinating body
4. Financial capacity and economic inequity
5. Poor management practices and lack of incentives to retain trained professionals
6. Dilapidated infrastructure
7. Low operation and maintenance cost recovery

Table 4: Summary of different institutions, their roles / potential role, source of funds, WDM awareness level, human resource capacity and training needs, existence of tools and guidelines and which tools / guidelines are appropriate for each institution.

Institution	Role/potential role	Sources of funds	WDM awareness	HR capacity/ Training needs	Existing WDM tools /guidelines	Appropriate tool/guideline required
Government Ministries & Departments	Policy formulation and enactment of legislations and regulations:	Central budget and external funding	Limited to line ministries /depts (MEWD/ DWA), MTENR, etc.	Inadequate. Awareness in WDM	Policy and Legal	Need to strengthen these to include explicit WDM elements
Regulatory Bodies	Legal Enforcement through: <ul style="list-style-type: none"> • Regulation for effluent water quality • Regulations for water quality and abstraction • Regulations for quality of service • Water pricing and Incentives • Pollution control and management of effluent 	Parliamentary allocation, licence fees, water right fees	Exists through the use of the various instruments	Adequate skills available, though inadequate in personnel numbers. Training needed in effective consumer awareness and economic aspects of WDM	Various regulations on quality of service, tariffs/rates, pollution, technological etc.	For public awareness and promotion of water conservation practices.
Commercial Utilities	<ul style="list-style-type: none"> • Leak detection • Metering • Ongoing repair and systematic repair • Pricing water services • Public education and awareness • Water re - use 	Water tariffs, limited central government grants; external support	Limited to top management.	Inadequate personnel trained in WDM. Skills required in community awareness in water conservation; leak detection and use of efficient water conservation technologies; efficient billing etc.	Metering, rationing, leak detection;	Economic water rates; public awareness and water conservation

Institution	Role/potential role	Sources of funds	WDM awareness	HR capacity/ Training needs	Existing WDM tools /guidelines	Appropriate tool/guideline required
Local Authorities (Municipalities)	<ul style="list-style-type: none"> • Regulations for water quality and prevention of pollution • By-laws for water supply services • Water pricing 	Water tariffs; government grants; external support	Non-existent	No capacity; needs training in all aspects of WDM	Water tariffs / rates; public awareness	Metering, economic water tariffs, public awareness and water conservation; raising finances
Industry	<ul style="list-style-type: none"> • Water re-use • Agricultural water rationing 	Self-financing	Conscious about need to conserve water to cut down on costs	Will vary according to need in a particular sector e.g. Agriculture and mining have required more skills than others	Water conservation through rationing	Awareness, technology options of water serving devices; implementation of WDM programme
Education & Research	<ul style="list-style-type: none"> • Education and public awareness • Competence Based Modular Training 	Government grants	Exists	Available but scattered in various departments. Training in co-ordinated and structured approach to WDM training and practice.	None	Training manuals in WDM theory and practice
NGOs	<ul style="list-style-type: none"> • Education and creation of public awareness • Metering • Water pricing 	External support agencies	Limited	Inadequate.	Public awareness and water conservation	Enhancement of public awareness and water conservation
Bilateral / Multilateral	Financing	Self-financing	Exists in some	-	-	-
CBOs	<ul style="list-style-type: none"> • Education and public awareness • Leak repairs • Water pricing 	External support agencies	None	Water conservation	Public awareness	Enhancement of public awareness

Strategies should be developed from the issues and constraints discussed above and details in some of these could be found in Sections 5.1 and 5.1.1 and Table 15 in Nyambe et. Al., 2002. In their report, Nyambe et. al., outlined steps and recommendations to Government of Zambia for the implementation of WDM and these included:

1. Identification of the Department of Water Affairs (DWA) in the Ministry of Energy and Water Development (MEWD) as an institution to host WDM as DWA already provides technical back-up and support of water resource management (WRM) in Zambia and also hosts the Water Resources Action Programme (WRAP). DWA could therefore champion WDM together with line ministries (e.g. MLGH and MAC) and other stakeholders.
2. WDM Sub-units to be set-up, one at the Ministry of Local Government and Housing under Department of Infrastructure Support Services (DISS) for water supply and demand sector, and the other at the Ministry of Agriculture and Cooperatives for irrigation sector.
3. The unit at DWA urgently develops a strategy on WDM that would serve a threefold purpose of:
 - (a) packaging the concept outlining the underlying principles, instruments and providing an in-depth analysis for clear understanding by actors,
 - (b) highlight benefits and promotional activities and
 - (c) creating clear understanding of the concept and promote efficiency of use and conservation of water.
4. Some of the elements to be included in this strategy would be:
 - Strengthen and enforce policy, legal and institutional capacities for implementation of WDM e.g. an inclusion of WDM in the current Water Act under review.
 - Develop an aggressive awareness campaigns /knowledge /education focusing on policy makers, professionals, gender and the poor to promote effective and measurable social change instruments across sectors
 - Strengthen and sustain human resource capacity within and cross-sectoral for WDM implementation and sustainance;
 - Develop WDM programmes across sectors (e.g. agriculture, environment, energy and tourism) that will provide WRM and WSS data for creation of management information systems for storage, dissemination and use.
 - Promote stakeholder and community participation and involvement in WDM through establishment of sector agency data base and discussion fora that would enhance participation
 - Develop and promote a standard approach to the use of water, that will eventually result in good policies, guidelines, tools, institutional set-up to monitor use and wastage in shared watercourses and an overall harmonised water and environmental management system in the region.
 - Promote development of best practices so as to address issues of community participation, integration, appropriate and effective technologies such as re-use technology.
 - Promote and set-up mechanisms for economic instruments such as metering, water pricing, billing systems, and incentives.
 - Promote and raise political will in WDM through advocacy, stakeholder participation and fora.
 - Develop capacity in conflict resolution among stakeholders.

- Further promote gender mainstreaming in WDM, and
 - Promote and establish broad based inter-sectoral collaboration, coordination and consultative mechanisms at all levels for the implementation of WDM.
4. Other initiatives that should be considered for a sustainable WDM strategy and spearheaded by DWA in consultation with other line ministries, departments and stakeholders include:
- Establishing research and development departments in all sectors
 - Sourcing, promotion and facilitating funding so as to encourage investment
 - Promotion of extension of WSS services to peri-urban and rural poor.
 - Developing a pro-active maintenance plan and provide resources for maintenance.
 - An awareness campaign to SADC Water Sector and Country representatives.

In principle, Zambia has adopted the WDM concept through these three studies and have included it in the Ministerial Statement at the World Water Forum in Kyoto, Japan in March 2003. This entails that the Department of Water Affairs (DWA) in the Ministry of Energy and Water Development (MEWD) will host a WDM unit that will formulate an explicit policy/legislative and strategies to back up the existing institutional framework such as the new commercial water utilities, NWASCO and Water Board that have taken the lead in promoting WDM through adoption of instruments and incentives (e.g. cost recovery & regulatory instruments).

In its operation, DWA would target a number of sectors in the adoption and implementation of WDM including:

- Water (including water supply and sanitation, water resources management and hydropower),
- Agriculture and Food Security,
- Health and HIV/Aids,
- Industrial (including mining and manufacturing),
- Tourism and Recreation (including wildlife) and
- Education.

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