

**WATER CONSERVATION AND WATER
DEMAND MANAGEMENT STRATEGY FOR THE
WATER SERVICES SECTOR**

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PLENARY

Definitions

Water Conservation: The minimization of loss or waste, care and protection of water resources and the efficient and effective use of water

Water Demand Management: The adaptation and implementation of a strategy by a water institution or consumer to influence the water demand and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and services, and political acceptability.

Integrated Resource Management: A way of analyzing the change in demand and operation of water institutions that evaluates a variety of supply-side and demand-side management measures to determine the optimal way of providing water services.

Demand-side management: Any measure or initiative that will result in the reduction in the expected water usage or water demand.

Supply-side management: Any measure or initiative that will increase the capacity of a water resource or water supply system to supply water.

Distribution management: Any function relating to the management, maintenance and operation of any system of structures, pipes, valves, pumps, meters or other associated equipment, including all mains, connection pipes and water installations that are used or intended to be used in connection with the supply of water.

Unaccounted for water: The difference between the measured volume of water put into the supply and distribution system and the total volume of water measured to authorized consumers whose fixed property address appears on the official list of water services authorities.

Water Institutions: Water institutions include both Water Management Institutions and Water Services Institutions as defined in the National Water Act and the National Water Services Act respectively.

Water Wastage: Water lost through leaks or water usage which does not result in any direct benefit to a consumer or user.

Inefficient use of water: Water used for a specific purpose over and above the accepted and available best practises and benchmarks or water used for a purpose where very little benefit is derived from it.

Abbreviations

WC	Water Conservation
WDM	Water Demand Management
WSA	Water Services Authorities
WSI	Water Services Institutions
WSDP	Water Services Development Plans
UAW	Unaccounted for water
IRP	Integrated Resource Planning
IWRM	Integrated Water Resource Management
CMA	Catchment Management Agency
JASWIC	Joint Acceptance Scheme for Water Installation Components
NWA	National Water Act
NWSA	National Water Services Act

1 INTRODUCTION

1.1 Conceptual perspective

It is often mentioned that South Africa's fresh water resources will be fully utilised within the next twenty to thirty years if the current growth in water demand is not altered. Conversely it can be argued that there is as much water as we will ever need in the sea considering that the technology exists to desalinate water. The question that needs to be asked is can South Africa afford to pursue such options and what are the economic, social and environmental costs of continuing to misuse and utilise our current available fresh water resources inefficiently. The opportunity of Water Conservation and Water Demand Management (WC/WDM) exists because most of the time consumers use water for the service they derive from it and not for the water itself. Through new technologies combined with a change in behaviour water usage can be reduced significantly without necessarily changing the desired outcome or the quality of life of individuals.

The need for WC/WDM in the Water Services sector, water usage through Water Services Authorities (WSA), is essential and perhaps of the highest priority despite the fact that this sector only uses less than 15% of South Africa's fresh water resources. Together with Industry this is the sector with the largest expected future growth in demand which requires the continuous development of new water resources and new infrastructure. The need to implement WC/WDM is also based on economic efficiency objectives due to the significant cost in the provision of water services. It is estimated that the potential economic benefit of WC/WDM over the next fifteen years in the Water Services Sector in South Africa is approximately R 50 billion. This could be achieved through cost savings in postponing capital infrastructure and savings in operating costs.

The WC/WDM paradigm and the principles proposed in these strategies integrate some of the relevant principles recognised in both the Water Services Act (No. 108 of 1997) and the National Water Act (No. 36 of 1998). The strategies developed are related to existing requirements promulgated through both Acts and in particular the Water Services Act Regulations, Water Services Development Plans and the Water Board Business Plans.

1.2 Contextual perspective

The Water Services sectoral WC/WDM strategy is one of five sectoral strategies that have been developed by the Department of Water Affairs and Forestry. The others include:

- Industry, Mining and Power Generation
- Agriculture
- Forestry
- Environment

The integration of all sectoral strategies will form the National Water Conservation and

Water Demand Management Strategy. Elements of the overall WC/WDM strategy will then form part of the National Water Resource Strategy and will be promulgated in the National Water Act.

The development of the sectoral strategies is based on the principles developed in the WC/WDM National Strategy Framework.

1.3 Aim, purpose and scope

Aim

The Water Services Sectoral strategy aims to develop model strategies to be implemented by various Water Services Institutions (WSI) and by others such as Water Boards and DWAF in support of such institutions. The end consumers that should be affected by this sectoral strategy are all consumers who receive water services from Water Services Authorities² (WSA). These include commercial, industrial and domestic consumers. The strategy does not describe WC/WDM activities and functions for the end consumers but describes the WC/WDM activities and functions of the institutions in order to ensure the efficient distribution of water services and to ensure that they influence the behaviour of the end consumers. Specific activities and functions for large industrial and commercial consumers are described within the “Industrial, Mining and Power Generation” sectoral strategy.

Purpose

The purpose of the water services WC/WDM sectoral strategy is as follows:

- Develop a model strategy that could be used as a guideline by WSA
- Develop a model strategy that could be used as a guideline for Water Boards and other bulk water suppliers
- Develop a model strategy for DWAF and other national bodies
- Develop governance and regulatory functions in order to ensure the development and implementation of WC/WDM by all WSI
- Identify the roles of the various key role players in the water supply chain in the development and implementation of WC/WDM

The strategy is not developed only from a regulatory and governance perspective. The format of the proposed strategy represents model strategies that need to be customised and prioritized according to each institutions specific circumstances. The intention of this strategy is to promote the implementation of WC/WDM through a balanced approach combining support, incentives and regulations for all WSI. These model strategies will be supported with the development of a number of tools and guidelines that can be used to achieve the objectives and goals identified. The governance and regulatory elements of the strategy will be abstracted for inclusion in

² Local Authorities are referred to as WSA in accordance with the definition in the Water Services Act

the National Water Resource Strategy and will be aligned with the proposed Water Services Act regulations and considerations for the National Water Act regulations.

Scope

The strategy is limited to defining the roles and functions of WSA, Water Boards (including other bulk water suppliers), DWAF and excludes the functions of a Water Services Intermediaries. The functions of a Water Services Provider are part of the strategy for WSA and no distinction or allocation of responsibilities is made between the two types of institutions.

Although the strategy is aimed to influence all WSA, some of the functions prescribed in the strategy may not be feasible by small authorities. As a target it is recommended that WSA with an average water demand in excess of 20 Megalitres per day should use the proposed strategy. Authorities with water demand less than 20 Megalitres per day should strive to implement elements of the strategy where feasible.

The strategy is developed from a review of the current constraints and opportunities and identifies objectives, goals and the activities to be implemented to achieve these.

1.4 Process in the development of the Strategy

This report is the result of a process that was initiated with the participation in a workshop of key stakeholders in July 1999. The output of the workshop was used as the basis for the development of this strategy that was further developed by a steering committee into the current document. The process to finalize the strategy consists of the following steps:

- Distribution of the draft document to all workshop participants for comment
- Review of all comments received by the steering committee
- Distribution of the edited version to a wider scope of keyrole players and interested parties for comment
- Consolidation and final review based on all comments received by the steering committee

2 BACKGROUND

2.1 Overview of Water Services institutions in South Africa

The provision of water services is the responsibility of WSA that comprise of Local Authorities and Services Councils. In South Africa there are approximately 847 local authorities. Currently there is a process to rationalise existing local authority boundaries and it is envisaged that they will be reduced to approximately 350.

The new Water Services Act (No. 108 of 1997) has also defined a Water Services Provider as a new institution who is responsible for the operation of the water works that supplies water services to the end consumers. The Water Services Provider has been created to distinguish the function and responsibility for the provision of water services. This allows for the development of water utilities within local authorities and the provision for concessions and Private-Public Partnerships to be developed.

Currently most WSA also carry out the functions of the Water Services Provider.

Water Boards are an organ of state that provide services to WSA with their main function to provide bulk potable water. South Africa's two largest Water Boards, Rand Water and Umgeni Water combined with Western Cape Metro whose function is similar to a water board, represent approximately 70% of the water supplied by the Water Services Sector. Not all WSA get their bulk water from Water Boards and it is estimated that Water Boards supply to only 500 of the 847. Although the majority of water demand for the Water Services Sector is through the metropolitan areas, it is important to note that up to 50 % of the population falls outside these metropolitan areas and are situated in rural and peri-urban areas.

2.2 Overview of Water Services in South Africa

The water services industry in South Africa is faced with enormous challenges that are mostly linked to the social-political past of South Africa. Two of these major challenges are:

- The enormous backlog of water services. It is estimated that approximately 25% of the country's population are without adequate basic water services.
- The financial viability of WSA. It is estimated that more than 50% of authorities are in financial trouble caused by inefficiencies and the non-payment of services.

As with other services that bear the testimony of South Africa' past, there are enormous discrepancies between the levels of service and the demographics of different areas which influence water demand and the provision of water services. For the purpose of the WC/WDM Water Services Sectoral Strategy four types of areas have been identified. These are, the "former white towns and cities", the "former urban black townships", rural areas and peri-urban areas.

A brief generic overview of the water services and the opportunities for WC/WDM is given for each of these areas:

a) "Former white towns and cities"

The water services in these areas could be characterised with first world standards. In the past the water reticulation systems were adequately maintained with levels of unaccounted for water (UAW) below 17% of the total water demand. Over the last seven years however capacity and resources have been reallocated or have been reduced with the result that in general the levels of UAW has increased significantly.

Most of the urban commercial and industrial consumers are located in such areas with very few commercial consumers in the "former black townships".

The majority of domestic water consumers have houses with large gardens. Flats are only common in city centres. The average domestic homeowner's water consumption in such areas is in excess of 35 kl /month. The opportunities of WC/WDM particularly with the domestic consumer are significant.

b) “Former urban black townships”

Limited level of water services usually comprising of a toilet and a tap for each stand can be found in most areas in the “former urban black townships”. In the past adequate operation and maintenance of the reticulation system was not carried out resulting in very high levels of UAW. Houses belonged to the Councils and were not adequately maintained resulting in significant plumbing leaks. The following general descriptions and examples characterise water services and the opportunities of WC/WDM in such areas:

- Plumbing leaks (past the consumer meter) in excess of 30 kl/month in more than 50% of all households. (This trend was identified in case studies in the Western Cape, in Gauteng and Kwazulu Natal.)
- Consumer metering and billing is almost non-existent in most “former urban black townships”.
- A flat rate is charged for water services irrespective of the volume of water consumed.
- Very low levels of payment.
- Very high levels of UAW.
- Very high level of inefficient water usage. Minimum night flows of bulk zone / district meters of 70 % of the average demand have been recorded in a number of townships throughout South Africa.

The opportunities of WC/WDM particularly with the domestic consumer are significant.

c) Rural areas

In the past most of the rural areas did not have access to water services and relied on water directly from water streams or bore holes. Over the last few years a number of projects have been commissioned to supply services and currently it is a national objective to supply basic water services to all people. The level of water services supplied to consumers varies according to the affordability of the community but usually consists of communal standpipes. The opportunity of WC/WDM in such areas is to contribute to the sustainability of the services once water services systems have been developed. Although the water allocation is very little in such areas, the importance of WC/WDM is not necessary for water resource purposes, but it is to ensure the sustainability, economic and financial viability of water services to the community.

Another important requirement of WC/WDM is the awareness and education of people in rural areas who don't have access to water services and rely on streams and bore holes. The focus of WC in such areas is with regard to water pollution and the preservation of water resources for health reasons to reduce the threat of disease and reduce the cost for treating water.

d) Peri-urban areas

Water Services in peri-urban areas vary from area to area and conditions can be

similar to both rural areas and the former urban black townships as described above. One of the key differences in rural areas is that with peri-urban areas there is often adequate institutional capacity by the WSA that can ensure the provision of services. Another key element to peri-urban areas is that a number of non-serviced communities do not even have access to untreated water resources unlike most rural communities. Peri-urban communities are also more densely populated than rural areas.

WC/WDM within peri-urban areas can play an important role in ensuring the sustainability and affordability of the provision of services and to protect water resources and the environment.

3 PRINCIPLES OF WC/WDM

The principles adopted in the development of this sectoral strategy are as defined in the WC/WDM National Strategy Framework. It is important however to highlight the three main principles promulgated in the Framework document in the context of the Water Services Sector. These are Water Conservation, Water Demand Management and Integrated Resource Planning.

3.1 Water Demand Management

Definition:

The proposed definition of WDM is as follows:

“The adaptation and implementation of a strategy by a water institution or consumer to influence the water demand and usage of water in order to meet any of the following objectives: economic efficiency, social development, social equity, environmental protection, sustainability of water supply and services, and political acceptability.”

WDM should not be regarded as the objective but rather a strategy to meet a number of objectives. One reason why the full potential of WDM is often not recognized is because it is often perceived or understood in a limited context. It is common for people to equate WDM only to programs such as communications campaigns or tariff increases. WDM should equate to the development and implementation of strategies and measures associated to managing water usage.

The scope of WDM includes both distribution management and customer or end use Demand Management measures.

3.2 Water Conservation

Definition:

The definition proposed for Water Conservation is as follows:

“The minimization of loss or waste, care and protection of water resources and the efficient and effective use of water.”

What is Water Conservation?

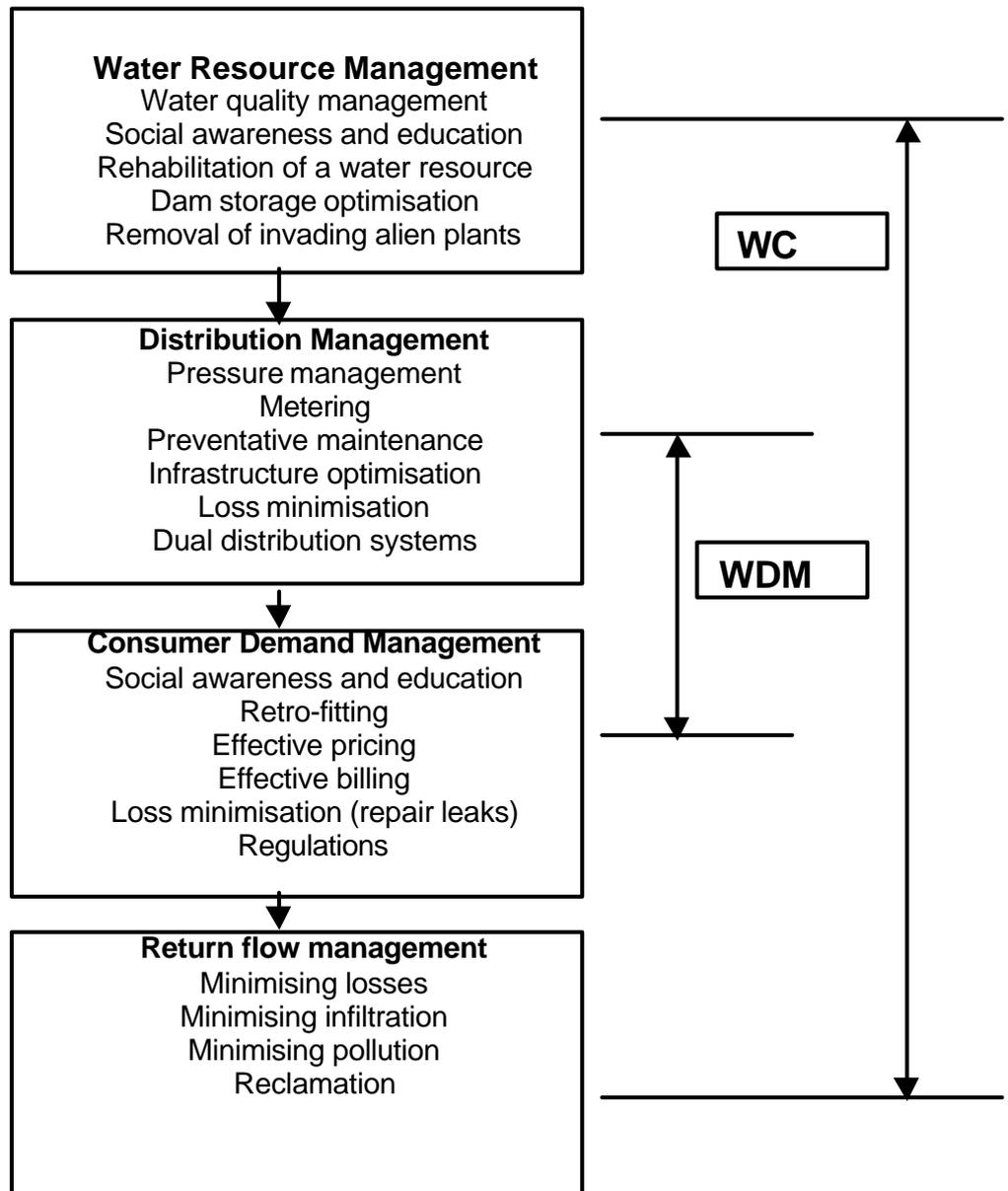
WC is the overall principle that requires the effective management and protection of water resources. WC should be considered both an objective in water resource management as well as a strategy for WSI. This implies that irrespective of the WDM objectives, it is necessary to also have long-term WC objectives that recognize that South Africa is a water scarce and water stressed country.

Link between WC and WDM

In general Water WDM can be considered a component of WC. Figure 1 below illustrates various types of WC measures in the entire water supply chain. A potential difference between the principles of WC and WDM is that WC focuses on the efficiency of water resources where WDM may focus on the efficiency of a combination of resources including financial resources. A typical example where WC and WDM may not be completely aligned is when a WSA does not target large affluent domestic consumers. A WDM strategy by the WSA may prioritize measures to reduce non-revenue consumption only and will not target large affluent water consumers to avoid reducing its direct income stream. The WC perspective however requires that all consumers and users adopt a conservation culture and ethic. Such an objective cannot be achieved overnight and activities to achieve this must be continuous and ongoing.

Although the above example highlights potential differences in WC and WDM objectives, it is not practical to separate them and the objectives developed in the proposed model strategies combine both the principles of WC and WDM.

Figure 1: Typical Water Conservation activities throughout the supply chain



3.3 Integrated Resource Planning

Definition:

The definition adopted for “Integrated Resource Planning” is:

“ A way of analyzing the change in demand and operation of water institutions that evaluates a variety of supply-side and demand-side management measures to determine the optimal way of providing water services.

3.3.1 What is Integrated Resource Planning?

Integrated resource planning (IRP), or integrated least-cost planning, is a process for determining the appropriate mix of demand-side and supply-side resources that are expected to provide long-term, reliable service to users at the lowest reasonable total cost and that, which maximizes benefits to society and minimizes the negative impact to the environment. IRP for water institutions is an evolving concept with certain parameters such as avoided costs and cost-benefit tests that need to be appreciated.

All demand-management activities that decrease the demand tend to affect supply management because existing system capacity is released for other customers and other users. The redirected capacity can be compared to that provided by the development of new capacity. Taking this concept further leads to the introduction of “**negalitres**”, water “produced” through conservation and efficient use of existing resources.

The opportunities for WDM exist due to the high levels of loss and inefficient use. It is also important to note that most of the time water is used for the service that is derived from it and not for the water itself. Some examples to illustrate this in the Water Services Sector are:

- Flushing a toilet. The objective is to clean the pan and contribute to the transport of sewerage to the wastewater treatment plants. If through new technologies the water required to flush a toilet is reduced to 4,5 litres rather than 11 litres, the consumer’s lifestyle is not altered but water consumption is reduced significantly.
- Watering a garden. The objective is to have a nice garden. This can be achieved with indigenous plants, by watering the correct way and even by recycling bathroom water. Such measures can reduce the total consumption of the consumer without necessarily affecting the desired objective of having a desirable garden.

It is estimated that in the Water Services Sector water loss and inefficient usage could be as high as 45%. The IRP process can determine at what rate and cost these inefficiencies can become an increased supply.

3.3.2 Link between Integrated Water Resource Management and IRP

One of the key principles often referred to in the water industry is Integrated Water Resource Management (IWRM). The introduction of Integrated Resource Planning may be confusing and is often incorrectly interpreted to have the same meaning as IWRM. The difference is that IWRM focuses on the integration of all water resources within a particular catchment. For example “ground water” is no longer considered as a separate resource to “surface water, and the approach promulgated under IWRM is to manage all water resources with the objective of achieving sustainable water resources. IRP on the other is a broader principle where one of the key objectives can be to achieve sustainable water services. IRP focuses on the integration of a number of criteria including water resources, environmental, financial and social. IRP considers the possibility of achieving the desired outcome by integrating various options in reconciling water resource demands and requires the planning integration of the entire water supply chain.

3.3.3 How is IRP different from traditional planning

It is wrong to regard IRP as something completely new or as the “same old thing” from what many water institutions are currently doing. There are four differences of IRP from the current planning practises that are worth identifying:

- Integration of planning to achieve the best results to society (end consumer). Current planning practises focus on the best-perceived solution from the institution perspective.
- Evaluation criteria must be comprehensive and include social, economic, and environmental.
- Water demand-side management measures are considered as an alternative resource option and not a separate campaign.
- Evaluation criteria must be looked at from the life cycle of the different measures and not just on implementation.

3.3.4 When and who should adopt IRP

All Water Institutions should adopt IRP as their planning methodology. The detail planning parameters and procedures will differ if it is a WSA planning the augmentation of a effluent treatment plant or if it is DWAF planning the augmentation of a large water scheme. Each Water Institution needs to develop its own planning procedures and protocol according to the principles of IRP.

3.3.5 Evaluation criteria in an IRP process

There are six key evaluation criteria that should be considered in the evaluation process to determine the best combination of demand-side and supply-side management measures:

(a) *Environmental impact*

The environmental index is a composite of four types of environmental impacts. These are Wetlands, Scenic resources, endangered species, and environmental water reserve.

(b) *Social impact*

The social impact index is a composite of five types of social impact. These are affordability, job creation, sustainability of services, public acceptability, and service delivery to new consumers.

(c) Risk

Risk is measured in terms of forecasting uncertainties. An index that indicates the uncertainty of a specific measure to supply or make water available must be determined for each option.

(d) Technical feasibility

The technical index is a composite of four types of technical criteria. Time constraints, availability of appropriate technology, availability of capacity to implement and overall practicality to implement.

(e) Economic (Cost)

(The economic criteria and financial evaluation considerations are described in more detail in the section below.)

The performance of each management option should be determined against each of the above criteria. The scoring for each criteria maybe in different forms, for example one may be in Rands the other in indices and the other in probabilities. The evaluation methodology of all the criteria must determine a weighting system for each of the criteria and also identify minimum and maximum parameters.

3.3.6 Economic efficiency considerations in IRP

One of the obstacles to the IRP process is whose costs are supposed to be the “least”: the institutions, existing customers, future customers, secondary consumers (consumers that use water downstream of the return flow of the initial consumers) or society at large. This becomes even more complicated when one considers that by implementing a WDM initiative there are participating consumers and non-participating consumers. It is possible that the implementation of a WDM initiative may be of financial benefit to community “A” who was involved directly by that initiative, but of a financial burden to community “B” who was not involved. One can argue however that the IRP process should aim to achieve the least-cost to society at large. It is important, considering South Africa’s socio-political background that the impact of any WDM initiative is looked at from various perspectives. Water institutions need to be transparent to their consumers and involve public participation in any significant planning process. A very important aspect of the principles of IRP is the need to look at the water supply chain holistically. This requires co-ordination and co-operation by all utilities and organisations in the supply chain. **IRP can only be achieved through the ethos of partnerships and customer focus.**

There are various economic tests that should be considered before deciding on any WDM initiative and these should also include environmental and even political costs if possible. Some of the economic tests developed by the Independent Pricing and Regulatory Tribunal of New South Wales (Australia) are given below.

a) Participating Customer Test¹

The net present value (NPV) from the participating customer perspective (PCT) is given by:

$$\text{PCT} = \text{RB} - \text{CC}$$

¹ Reference: Independent Pricing and Regulatory Tribunal of New South Wales; Water Demand Management: A Framework for Option Assessment; March 1996

Where;
RB = PV of all benefits to all participating customers from reduced bills;
CC = PV of customer costs (all net costs excluding rebates, incurred by all participating customers)

PV means the present value of the stream of costs and benefits over time.

b) Water institution Test¹

The net present value (NPV) of the WDM measure from the water institution perspective is given by:

$$\text{WIT} = \text{savings} - \text{costs}$$
$$\text{WIT} = \text{OCS} + \text{CCS} - \text{PC} - \text{FR}$$

Where;
OCS = PV of all Operating Cost Savings by the water agency
CCS = PV of all savings due to deferred Capital Costs
PC = PV all costs to implement the WC/WDM programme incurred by the water institution
FR = PV of foregone revenue for the water institution as a result of reduced sales

c) Total Resource Cost Test¹

The net present value (NPV) of the WDM measure from the total resource cost (TRC) perspective is given by:

$$\text{TRC} = \text{OCS} + \text{CCS} + \text{RB} - \text{PC} - \text{FR} - \text{CC}$$

3.3.7 Background information to IRP

In South Africa the term and principles of IRP are relatively new in the water industry. The IRP principles were first developed in the electricity sector and were later adopted in the water industry. A number of countries throughout the world are adopting the principles of IRP particularly in Australia and USA. There are a number of credible publications on IRP including a book published by the American Water Works Association entitled "Integrated Resource Planning: A Balanced Approach to Water Resources Decision making."

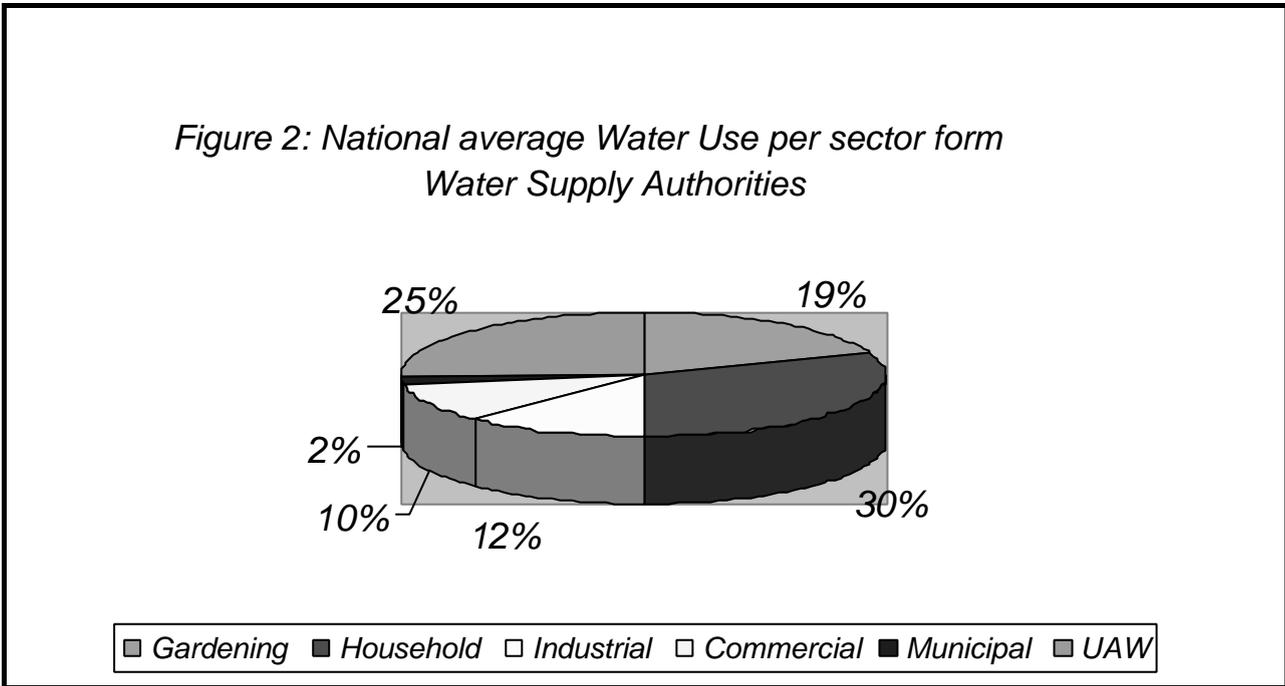
4 SITUATION ANALYSIS

In developing a strategy it is necessary to carry out a situation analysis that identifies the constraints and opportunities in implementing WC/WDM. This is necessary in order to ensure that the strategy developed can be implemented successfully.

The following is a list of some of the general key constraints and opportunities typical in South Africa that have a direct impact on the objectives, goals and actions developed in the model strategies. In using the proposed model strategies developed, WSI are encouraged to assess the opportunities and constraints according to their specific circumstances and make the necessary changes.

4.1 Opportunities of WC/WDM

The first requirement in determining the opportunities of WC/WDM is to carry out a detailed demand analysis. Currently there is no consolidated database of information regarding water usage per sector from WSA in South Africa. Figure 2 below indicates estimated averages based on information obtained from Rand Water, Durban Water and Waste and the Western Cape Metro.



The following analysis illustrates the opportunities in reducing demand in most water services areas and illustrates the methodology that WSA must undertake in developing their specific demand targets. (Estimates are based on sectoral usage information illustrated in figure 2 and on general information obtained from WC/WDM studies in various urban areas.)

a) Reduction in distribution leaks

It is estimated that by implementing effective distribution management measures the UAW can be reduced by half, which will result in a saving of 12.5% of the total demand.

This can be achieved through adequate and proper operating and maintenance

measures of the reticulation system. Related activities by WSI can include the following:

- Leak detection and repair
- Pressure management
- Zoning
- Repair of visible and reported leaks
- Pipe replacement / management program
- Cathodic protection of pipelines
- Meter management programme
- Illegal connection programme

b) Reduction in plumbing leaks within domestic consumers

On average it is estimated that by repairing plumbing leaks within domestic consumers the total consumption can be reduced by 7.5% or 25% of the domestic household usage. Plumbing leaks include any leaks past the consumer connection and include, leaks within the connection pipe, leaking taps, leaking toilets and leaking hot water geysers.

Repair of plumbing leaks can be achieved by the following related activities initiated by the WSI:

- Leak repair projects in the “former black townships” sponsored by the water institutions (re-addressing the apartheid plumbing of Council houses)
- Communication and education campaigns
- Ensuring payment of services through credit control measures

c) Retrofit of existing plumbing fittings

On average it is estimated that by replacing existing plumbing fittings with more efficient fittings the total consumption can be reduced by 14% or 50% of the domestic household and commercial water use. Opportunities in retrofitting of plumbing fittings include fitting dual-flush or interruptible toilets, user-activated urinals, low flow shower heads and tap controllers and aerators.

Retrofitting can be achieved by the following related activities of the WSI:

- Retrofit projects in the “former black townships” sponsored by the water institutions (combined with leak repair projects described above)
- Communication and education campaigns
- Grant incentives schemes where water institutions will pay part of the costs to retro-fit to the consumer
- Regulations and by-laws
- Marketing and research of new technology
- Schools audits

d) Reduction in gardening water use

On average it is estimated that by increasing the efficiency of gardening water usage the total consumption can be reduced by 5% or 25 % of the total gardening water use. Opportunities in reducing water used for gardening include water wise plants, mulching, efficient irrigation systems, irrigation scheduling, rain harvesting and recycling of wastewater.

Reduction in gardening usage can be achieved by the following related activities of the WSI:

- Communication and education campaigns
- Water-wise demonstration exhibits
- Block rate tariffs
- Regulations and by-laws
- Marketing and research of new technology
- Grant incentives schemes for lawn replacement, and zero-scaping where water institutions can pay part of the costs to change existing gardens.

e) Reduction in the demand by new consumers – reduction of natural growth rate

On average it is estimated that by increasing the efficiency of all new consumers the growth in water demand can be reduced by an estimated average of 30%. Opportunities in reducing water demand of new consumers include selecting appropriate level of services for different communities, efficient plumbing fittings, efficient reticulation design practices and pre-payment meters.

Reduction of demand by new consumers can be achieved by the following related activities of the WSI:

- Installation of pre-payment meters
- Communication and education campaigns
- Regulations and by-laws
- Negotiations and incentives to developers
- Improved reticulation design and plumbing standards

From the above analysis it is calculated that the total opportunities in reducing water demand in the water services sector in South Africa are approximately 39% of the total existing demand.

4.2 General Constraints

The following are some of the common constraints preventing or restricting the implementation of WC/WDM:

- Financial constraints. Although the economic benefits in implementing WC/WDM measures can easily be justified, WSI are financially constrained and do not have adequate financial resources to invest in such measures. Existing regulations

imposed on Local Authorities also limit the increase for capital spending to 6% per annum.

- Inappropriate planning practises. Existing planning practises in the Water Services Sector are supply side management focused that relate to infrastructure development and technical considerations. One of the major constrains in changing current planning practices is that most consultants used by the water supply industry promote the development of infrastructure without adequately reviewing WC/WDM measures as alternatives.
- Lack of integration and co-operation between the various institutions in the water supply chain. Until recently the planning process by DWAF in their function to develop Water Resources, the planning of Water Boards and the planning of Local Authorities has not always been well co-ordinated and IRP has not been practised.
- Institutional arrangements. The complex institutional arrangements particularly with water services in urban areas makes it difficult to integrate the planning of the entire water supply chain. This is further enhanced by the lack of clarity and responsibility in the legislation of the functions and role of the various water institutions in the water supply chain.
- Lack of ring fencing of the water services functions or the lack of integration and co-operation within the different departments of WSA.
- The low level of payment for services by a significant number of consumers and users.
- Existing planning practices choose the cheapest solution in implementation without regard to operating and running costs. (i.e. new housing developments use cheap toilets and taps).
- WC/WDM measures are perceived only as drought relief mechanisms
- Lack of understanding of principles, scope and the potential of WC/WDM as a strategic management tool.
- Supply side management options appear easier to implement.
- WC/WDM strategies are often incorrectly perceived and implemented as punitive measures to consumers.
- Water Services Providers lack the knowledge and understanding of the consumer and water usage patterns.
- Lack of appropriate information and information systems
- Lack of appropriate WC/WDM planning tools and guidelines available in South Africa.

- WSI do not have adequate knowledge of the drivers causing the growth in demand.
- Lack of political will and commitment by a number of Councillors and key role players of WSI.
- WSI focus on other challenges and WC/WDM is not perceived as a priority.
- Lack of adequate expertise and knowledge on WC/WDM measures and principles in the water services industry.

5 BACKGROUND TO THE MODEL STRATEGIES

The model strategies described are based on the information on the three principles of Water Conservation, Water Demand Management and Integrated Resource Planning.

The purpose of the WC/WDM strategies is to enhance the management of Water Services in order to achieve sustainable, efficient and 100% affordable services to all consumers.

The aim of the WC/WDM strategies is to influence all functions and business plans related to water services. The emphasis of the strategies is to influence water services to incorporate social, environmental, economic and technical considerations.

It is important to recognise that the WC/WDM strategy does not identify all the strategic initiatives of the water services functions of the WSI and needs to be combined with strategic initiatives that are related to the development of new services.

5.1 How the principles of WC/WDM are incorporated into the strategy

The principles of WC, WDM and IRP described in chapter 3 of the report, influence the WC/WDM strategy in the following way:

- **Water Conservation.** The development of a water conservation ethic and culture to all consumers, users and WSI officials. The role of WSI's in protecting water resources and the water catchment within its boundaries.
- **Water Demand Management:** The development and implementation of demand management paradigm that requires processes, systems and tools with the aim to understand the consumer, the behaviour of the distribution system and how water services are used. The implementation of demand-side management measures that will reduce water wastage and inefficient water usage.
- **Integrated Resource Planning:** To determine the nature, the timing and the resources allocated to specific demand side management initiatives. To determine the overall opportunity of WC/WDM measures and determine the overall future demand target that the WSI should aim to achieve based on resource economic principles. To determine the feasibility of using alternative water resources.

5.2 Overall demand performance goal

One of the most important aspects of the model WC/WDM strategies described is the requirement to develop both local demand targets and regional demand targets. The local demand targets are to be achieved by WSA and the regional is to be achieved by the consolidation of activities and measures of all WSA and WSI involved in that strategy. The local demand targets obviously make up the regional target and it is therefore important that an iterative process is undertaken to determine both the individual demand targets by each WSA and the regional target.

Once the demand targets are determine this will impact the nature and resources allocated to various demand-side management measures in order to achieve the demand targets.

Alternative water resources such as rain-harvesting, recycling and utilisation of groundwater resources should also be investigated in order to achieve a further reduction in the potable water demand.

5.3 Approach in the implementation of demand-side management initiatives

The approach suggested in the strategies is that water reductions will be achieved by focusing on demand-side measures in the following sequence of priority:

- (a) Reduction of UAW
- (b) Reduction of water wasted by consumers
- (c) Reduction of inefficient water usage by consumers

This does not imply that consumer demand management measures to reduce inefficient water usage should initially not be implemented. Consumer demand-side management measures should initially focus on quantifying the exact potential through pilot projects and through further research.

In the former urban black local authorities a holistic approach to rectify water services, reduce demand and make services sustainable is required to be implemented simultaneously.

5.4 Revision of the strategy

The WC/WDM strategies developed by WSI should be reviewed every two years and adjusted to include new information and developments. The development of demand targets should be done over a period of five years. Demand forecasting with a number of scenarios for the next 15 years should also be developed.

5.5 Scope of the WC/WDM strategy

The scope of the WC/WDM strategy proposed below is not only limited to achieving demand performance related goals but is also aimed at developing and implementing a new management paradigm for the water services functions of WSI. The new

management paradigm is proposed through various procedures and management tools. These procedures and tools should be used to regularly review and update the performance goals of future WC/WDM strategies and also prioritise the implementation of various demand-side and supply – side management measures. Measures such as carrying out a water balance for example will not directly lead to the reduction of the demand. Such a measure however is an imperative management tools that will inform the implementation of demand-side management initiatives.

6 WC/WDM MODEL STRATEGY FOR WATER SERVICES AUTHORITIES

The model WC/WDM strategy for WSAs consists of a number of objectives and goals. Existing and proposed governance requirements to ensure the implementation of WC/WDM are also described. The model strategy is developed for a medium to large size WSA. Smaller WSA should strive to implement as many aspects of the strategy that are feasible.

The elements of the model strategy as described below should be used by each WSA to develop its own detailed strategy. Detailed strategies should identify appropriate action and business plans that will meet the stated objectives and goals.

Although this strategy is aimed primarily at the role of the water department at WSA, the activities of other departments such as the treasury and planning will also be affected.

6.1 Objectives, goals of a model WC/WDM strategy

The following objectives have been identified in the model strategy for WSA:

- Objective A: Implement efficient distribution management measures.
- Objective AA: Implement efficient water effluent management measures.
- Objective B: Ensure adequate information to support decision making process.
- Objective C: Promote the efficient use of water to consumers and customers.
- Objective D: Adopt the ethos of partnerships and transparency.
- Objective E: Adopt Integrated Resource Planning (IRP) principles.
- Objective F: Ensure the implementation of WC/WDM best practises in new developments
- Objective G: Contribute to the Catchment Management Strategy

6.1.1 Objective A: Implement efficient distribution management measures

Goals

- A1 Establish and maintain the integrity of water zones and districts for the entire water supply system.
- A2 Monitor the level of UAW continuously for each district and zone.
- A3 Reduce and maintain the level of UAW to acceptable standards and benchmarks using best management practices.
- A4 Implement a consumer meter management programme.
- A5 Implement a pressure management programme.

- A6 Implement a pipeline maintenance and replacement programme.
- A7 Implement efficient water effluent management systems.
- A8 Install meters to all existing consumer connections.

SABS 0306 “the management of potable water in distribution systems” should be used as a reference guideline to achieve the above goals.

Some of the required actions to meet the above goals are as follows:

A1 - Water zones and districts

- Install bulk district/zone meters and meter monthly the quantity of water provided to each determined supply zone within its supply area
- Determine monthly the level of UAW by comparing the measured quantity of water provided to each determined supply zone with the total measured quantity of water provided to all user connections within that supply zone;
- Develop a system to monitor the minimum night flow of all districts and zone meters
- Develop and implement a system to continuously prioritise zones with the highest level of UAW and to monitor any significant increase in the level of UAW

A2, A3 - UAW

- Set target goals for reducing the level of UAW
- Determine the various components of UAW (through demand analysis and appropriate field surveys)
- Develop and implement an ongoing leak detection and repair programme
- Develop and maintain a service where the public can report a water leak 24 hours a day.
- Develop a policy to reduce and regulate illegal connection and illegal water use

A4 – Meter management

- Develop monthly deviation reports of meters that illustrate a demand pattern which is consistent with a faulty meter
- Develop reports annually that indicate if a meter is oversized or undersized
- Check the accuracy of consumer meters that are suspected to be faulty or inaccurate
- Ensure the compliance of all water meters to the Trade Metrology Act (Act 77 of 1973) as amended from time to time.

A5 – Pressure management

- Identify any areas with pressures higher than 900 kPa and any areas that have large fluctuations in pressures
- Where required or feasible install pressure control valves in the supply system
- Where required or feasible install pressure control valves at consumer connections to ensure pressures are below 600 kPa

6.1.2 Objective AA: Implement efficient water effluent management measures

Goals:

- AA1 Reduce and maintain the level of infiltration from storm water to acceptable benchmarks.
- AA2 Reduce and maintain the rate of effluent spillage and blockages.
- AA3 Increase efficiency in responding to reported leaks and bursts to below 12 hours.
- AA4 Develop and implement a effluent pipeline maintenance and refurbishment programme.

6.1.3 Objective B : Ensure adequate information to support decision making process**Goals:**

- B1 Determine WDM goals.
- B2 Produce a monthly a water audit and a water balance.
- B3 Develop an information system to assist with customer care queries.
- B4 Produce measurable target performance indicators.
- B5 Produce monthly deviation reports of water consumption's.
- B6 Establish and maintain a consumer database.

Some of the required actions to meet the above goals are as follows:

- Develop and Implement a Management Information System (MIS)
- Investigate at least every 5 years the drivers of new demand
- Standardisation and co-ordination with other Water Service Authorities in the same region

6.1.4 Objective C : Promote the efficient use of water to consumers and customers**Goals:**

- C1 Develop an appropriate and ongoing marketing, communication and education programme.
- C2 Implement water tariffs that promote social equity and promote efficient use of water.
- C3 Ensure the payment of water services by all consumers.
- C4 Develop and implement direct WDM measures identified to be viable through the IRP process (i.e. retrofitting of plumbing) .
- C5 Reduce illegal connections .
- C6 Assess the departmental water usage by WSA and establish, achieve and maintain appropriate demand targets.
- C7 Prohibit the wasteful use of water by consumers and users.

6.1.5 Objective D: Adopt the ethos of partnerships and transparency**Goals:**

- D1 Ensure the co-corporation and consultation amongst the various departments within a WSA that influence the operation and planning of water services.
- D2 Identify and consult with consumer representative bodies on a regular basis.
- D3 Participate in co-ordination meetings within Metropolitan Councils, Water

- Boards, DWAF and CMAs (network and exchange information and knowledge).
- D4 Publicise WC/WDM experiences in industry related media.
 - D5 Publish annually the authority's WC/WDM measures and performance.
 - D6 Publish a comprehensive breakdown of the cost of water services annually.

6.1.6 Objective E : Adopt Integrated Resource Planning (IRP) principles

Goals:

- E1 Integrate water supply planning with planning of effluent services.
- E2 Co-ordinate planning and WC/WDM measures with other water institutions in the water supply chain and in accordance with any regional WC/WDM and catchment management strategies or requirements.
- E3 Identify all possible WC/WDM measures and evaluate their feasibility.
- E4 Determine the best combination of Supply-Side Management and Demand-Side Management options when required. (Ensure the prevention of premature development of expensive infrastructure such as reservoirs bulk pipelines, pump-station and wastewater treatment plants)
- E5 Ensure the adequate allocation of funding and resources to WC/WDM measures.
- E6 Empower, by informing, educating and capacitating officials.
- E7 Develop a water demand scenario model and determine future demand goals. (Based on the IRP planning guidelines, appropriate demand analysis and regional demand objectives).
- E8 Implement measures to monitor the impact of WC/WDM.

6.1.7 Objective F : Ensure the implementation of WC/WDM best practises in new developments

Goals:

- F1 Ensure the development and implementation of appropriate standards for new developments which promote efficiency (particularly with low cost housing to ensure sustainable services).
- F2 Meter all new connections .
- F3 Where feasible ensure the removal of invasive alien plants before development takes place.
- F4 Implement incentive schemes for developers to adopt WC/WDM measures and standards.
- F5 Ensure that every water services work or consumer installation comply with SABS 0252: Water Supply and drainage for buildings and SABS 0254: The installation of fixed electric storage water heating systems.
- F6 Ensure that all plumbing fittings comply with SABS standards or the JASWIC list of accepted fittings.

6.1.8 Objective G : Contribute to the catchment management strategy (water resource management strategy)

Goals:

- G1 Ensure the quality of treated effluent meets required standards.
- G2 Minimise leaks of the effluent collection system.

- G3 Maximise recycling and reuse of water where it is feasible.
- G4 Promote the reduction of pollution by the authorities consumers.

6.2 Water Services Act Regulations relating to Water Services Authorities

The following draft regulations will be promulgated through the Water Services Act. The link between the objectives and goals of the model strategy and the various clauses are identified as follows:

- *A Water Services Authority must, within four months after the end of each financial year, undertake a water service audit – **Goal B2***
- *Meter the quantity of water provided to each determined supply zone within its area of supply area; - **Goal A1***
- *Every month determine the quantity of unaccounted for water by comparing the measured quantity of water provided to each determined supply zone with the total measured quantity of water provided to all user connections within that supply zone. - **Goal A2***
- *Measure the quantity of effluent received at each sewage treatment plant- **Goal A7.***
- *Every month, determine the quantity of water supplied but not discharged to sewage treatment plants by comparing the measured quantity of water provided to all user connections. - **Goal A7***
- *A Water Services Authority must take reasonable measures to reduce the quantity of unaccounted for water. - **Goal A3***
- *A Water Services Authority must ensure that any major or visible leak in its water services system is repaired within 48 hours, after the Water Services Authority became aware thereof. - **Goal A3***
- *A Water Services Authority must have a consumer service to which leaks can be reported. - **Goal A3***
- *A Water Services Authority must ensure that within three years after promulgation of these regulations, all user connections provided with water supply services are measured - **Goal A8.***
- *A Water Services Authority must ensure that every user connection made after the commencement of these regulations is individually measured, including but not limited to - **Goal F2***
 - a) *every individual dwelling within a new sectional title development, group housing development or apartment building;*
 - b) *every individual building, having a maximum designed flow rate exceeding 60 litre per minute, within any residential commercial or industrial complex*
 - c) *every irrigation system with a maximum designed flow rate exceeding 60 litre per minute that uses water supplied by a Water Services Authority*
- *Where the water supplied by way of a meter, that meter must comply with the Trade Metrology Act, Act 77 of 1973. - **Goal A4***
- *Every water services work or consumer installation must comply with SABS 0252: Water Supply and drainage for buildings and SABS 0254: The installation of fixed electric storage water heating systems. - **Goal C10***
- *Every water reticulation system must, after promulgation of these regulations, be designed and maintained to operate below a maximum pressure of 900 kPa- **Goal***

A5.

- *A Water Services Authority must install a pressure control device where water pressure in the supply system could rise above 900 kPa to prevent the pressure at domestic consumer connections to rise above 900 kPa. - **Goal A5.***
- *A Water Services Authority must ensure that where water pressure in the water reticulation system may vary by more than 50%, a pressure control device is installed by a water user at each connection providing water to an irrigation system, with a flow rate exceeding 60 litres per minute. - **Goal A5***
- *No person may three years after the promulgation of these regulations, install or replace: - **Goal C6***
 - a) *a shower head with a maximum flow rate exceeding 10 (ten) litres per minute where the dynamic water pressure is more than 200 (two hundred) kPa at the shower control valve, and where the plumbing is designed to balance the water pressures on the hot and cold water supplies to the shower control valve;*
 - b) *a tap installed on a handwash basin with a maximum flow rate that exceeds 6 (six) litres per minute;*
 - c) *a cistern, and related pan designed to operate with such cistern, where the cistern capacity is greater than 6 (six) litres;*
 - d) *a cistern intended for private use that is not fitted with flushing devices allowing interruptible or multiple flushes, excluding a cistern with a capacity of 4,5 (four and a half) litres or less; and*
 - e) *a urinal that is not user-activated*
- *A Water Services Authority must ensure that within three years of the promulgation of these regulations, the following wasteful practices are prohibited within residential areas in its area of jurisdiction: - **Goal C11***
 - a) *The deliberate waste of water*
 - b) *The hosing down of any hardened or paved area*
 - c) *The irrigating of a domestic garden, landscape, public open space between the hours of 11h00 and 15h00 and between October and March.*
 - d) *All existing visible leaks within a consumer water supply system*

6.3 Governance of WSA WC/WDM functions

The following are existing and proposed regulatory and governance requirements to ensure the implementation of WC/WDM by WSA:

6.3.1 Existing requirements promulgated under the Water Services Act

- WSA to meet the WC/WDM requirements as specified in the guidelines of the Water Services Development Plans (WSDP). See appendix B.
- WSA to comply to the proposed regulations and standards in terms of Section 9(1) and 73(1)(j) of the Water Services Act.
- WSA must adopt bylaws and supply conditions for their consumers that include WC/WDM requirements.

6.3.2 Proposed requirements to be promulgated under the Water Services Act

- WC/WDM requirements within the WSDP guidelines should be expanded to also include a submission of a WC/WDM strategy according to the model strategy

specified.

- DWAF or the CMA to review and comment on WC/WDM measures and strategy proposed by each WSA.
- Introduce a regulation requiring WSAs to contribute their WC/WDM strategies to Water Boards or any other bulk supplier in order to facilitate the establishment of a regional WC/WDM strategy and demand targets.
- Review the proposed Water Services Regulations and standards in terms of Section 9(1) and 73(1)(j) of the Water Services Act every 5 years.

6.3.3 Existing requirements promulgated under the National Water Act

Associated with a water use application a WSA must illustrate the following:

- The degree to which any proposed increase in water use associated with the application can be accommodated by means of WC/WDM.
- The degree to which the proposed water use meets efficiency benchmarks.
- The degree to which the WSA implements best management practises.

6.3.4 Proposed requirements to be promulgated under the National Water Act

The following are proposals for requirements to be promulgated through the National Water Act.

To be specified in the Catchment Management Strategy:

- WSA must submit their WC/WDM strategies to the CMA.
- A CMA may request changes to the proposed strategy in order to meet catchment management WC/WDM targets and objectives.

To be specified in the NWRS:

- A new planning protocol regarding the development of further water augmentation schemes where WC/WDM must be exploited as a priority option to water resource augmentation.
- Part of the new planning protocol should also relate to the development of large capital bulk infrastructure to be constructed by a WSA (in line with IRP)

Regulations according to section 26(1) regarding the use of water:

- (a) limiting or restricting the purpose, manner or extent of water use
 - Prohibit the waste of water by consumers and users.
 - Prohibit certain inefficient practises of water.
- (g) regulating or prohibiting any activity in order to protect a water resource or instream or riparian habitat
 - Prohibit settlements in river banks below 1:50 year flood lines
 - Removal of invading alien plants before development
 - Standards and clauses relating to effluent discharge

Regulations according to section 143 of the NWA regarding monitoring, assessment and information:

- Specify the nature, type of the demand data to be submitted
- Specify the nature and type of information regarding the description of various

WC/WDM measures

- Specify the guidelines and procedures to monitor and assess various WC/WDM measures

7 WC/WDM STRATEGY FOR WATER BOARDS

The objectives of a WC/WDM strategy for Water Boards and other bulk suppliers can be divided into three components.

- The first relates to the role and functions of a Water Board to ensure distribution efficiency of its own system. Objectives A' – C' below relate to this role and functions.
- The second relates to the influence and responsibilities relating to the overall water use efficiency within its entire Area of Supply. Objectives D' – F' below relates to this role and function. The overall regional role of a Water Board in terms of WC/WDM is to establish and co-ordinate regional WDM objectives and activities. This distinguishes its role from the CMA whose overall aim is water conservation and Water Resource Management. Water Boards could promote WDM for other objectives besides Water Resource Management such as economic efficiency and sustainability of services. The functions of the CMAs and Water Boards however in terms of WC/WDM, will have to be closely co-ordinated because of their significant overlap and similarity.
- A third possible component relates to activities by a Water Board as a Water Services Provider to consumers. In this role Water Boards should follow the WC/WDM model strategy as described for the WSA model strategy.

Where there is no Water Board, objectives E' – F' should be implemented if required by the regional offices of DWAF or the CMA. ***Water Services authorities that are service providers to other Authorities, as bulk water suppliers should develop the same strategies as Water Boards.***

Water Boards should identify their functions on WC/WDM within the Business Plan (required by the Water Services Act) according to the above three categories of functions.

7.1 Objectives and Goals for a WDM strategy relating to a Water Board's direct functions

The following objectives have been identified in the model strategy relating to a Water Board's direct functions:

Objective A': Implement efficient distribution management measures.

Objective B': Adopt the ethos of partnerships and transparency

Implement management information systems.

Objective C': Information analysis and research

7.1.1 Objective A': Implement efficient distribution management measures

Goals:

- A'1 Monitor the level of UAW on an ongoing basis.
- A'2 Reduce and maintain the level of UAW to acceptable standards.
- A'3 Implement a consumer meter management programme.
- A'4 Implement efficient water effluent bulk management systems.
- A'5 Implement a pipeline maintenance and refurbishment programme.

Although SABS 0306 “the management of potable water in distribution systems” is primarily designed for local authorities systems, the code can be used as a reference guideline to achieve some of the above goals.

7.1.2 Objective B': Adopt the ethos of partnerships and transparency

Goals:

- B'1 Ensure the co-corporation and consultation amongst the various departments within a Water Board that influence the operation and planning of water services
- B'2 Identify and consult with consumer representative bodies on a regular basis
- B'3 Network and exchange information and knowledge with other Water Boards
- B'4 Establish a “twining” programme with similar utilities from both developing and developed countries
- B'5 Publicise WC/WDM experiences in industry related media
- B'6 Publish annually the Board's WC/WDM measures and performance
- B'7 Publish a comprehensive breakdown of the cost of water services annually

7.1.3 Objective C': Information analysis and research

Goals:

- C'1 Identify and implement a suitable MIS system (MIS must provide adequate understanding of the water services and give measurable target performance indicators)
- C'2 Integrate information
- C'3 Identify research needs and implement research
- C'3 Analyse standard and deviation reports on a monthly basis

7.2 Objectives and Goals for a WDM strategy relating to a Water Board's regional co-ordination and facilitation functions

The following objectives have been identified in the model strategy relating to a Water Board's regional co-ordination and facilitation functions:

Objective D': Contribute to the development and implementation of a catchment management strategy

Objective E': Facilitate the co-ordination and implementation of regional WDM measures

Objective F': Assist and promote the implementation of WC/WDM measures by WSA's and all consumers

7.2.1 Objective D': Contribute to the regional water resource management strategy

Goals:

- D'1 Contribute to the development of a catchment management strategy.
- D'2 Contribute to the implementation of various catchment management functions.
- D'2 Ensure the quality of treated effluent discharge by the Water Board's works meets required standards.
- D'3 Minimise leaks of the effluent collection system it is responsible for.
- D'4 Maximise recycling and reuse of water where feasible.
- D'5 Promote the reduction of pollution by the Water Board's direct consumers.

7.2.2 Objective E' : Facilitate the co-ordination and implementation of regional WDM measures

Goals:

- E'1 Co-ordinate and facilitate with all industry partners regional awareness and communication campaigns
- E'2 Facilitate the development and implementation of a Regional WC/WDM strategy and demand targets in consultation with all water institutions (based on IRP guidelines, demand analysis and the WDM opportunities)
- E'3 Co-ordinate and facilitate with all industry partners regional educational campaigns within schools
- E'4 Determine the best combination of Supply Side Management and Demand Side Management for reconciling regional demand and supply
- E'5 Develop economic analysis models for various WDM measures that are appropriate for the region.
- E'6 Facilitate the development of a regional Management Information System
- E'8 Implement measures to monitor the impact of WC/WDM.

7.2.3 Objective F': Assist and promote the implementation of WC/WDM measures by WSA's and all consumers

Goals:

- F'1 Assist WSAs in acquiring adequate funds and resources to implement WDM measures.
- F'2 Assist WSAs in acquiring the necessary skills (Empower educate, capacitate).
- F'3 Develop incentives for WSA and other bulk consumers to implement WDM.
- F'4 Implement pilot projects and case studies.
- F'5 Facilitate the co-ordination, networking and sharing of information between the key role players in the industry.
- F'6 Develop measures to interact and understand society's water requirements and needs.
- F'7 Incorporate WDM requirements within the Water Supply Conditions to all consumers.
- F'8 Develop a tariff system that promotes efficiency and integrates the principles of 1st and 3rd tier tariff policies.
- F'9 Create financial incentives and penalties to WSAs to meet demand targets according to a regional WC/WDM strategy.

7.3 Governance for WC/WDM functions by Water Boards

The following are proposals on a regulatory and governance model to ensure the implementation of WC/WDM by Water Boards:

7.3.1 Existing requirements promulgated under the National Water Services Act

- Water Boards to meet the existing WC/WDM requirements as specified in the “Guidelines for Drafting and Appraising Policy Statements Business Plans and Annual Reports of Water Boards”.
- A Water Board must set conditions for the provision of services relating to WC and the prevention of wasteful or unlawful use of water provided by the board. (Part of clause 33 (1) of the NWSA)

7.3.2 Proposed requirements to be promulgated under the Water Services Act

- The existing requirements for WC/WDM specified within the guidelines for Water Boards should be expanded to also include a submission of a WC/WDM strategy according to the model strategy described in this document. The WC/WDM strategy could be a separate strategy or part of the overall strategy of the Water Board.
- Amendments / requirements to the Act should be introduced requiring Water Boards and bulk water suppliers (i.e. Cape Town Metro) to have regional co-ordinating functions and responsibilities.

7.3.3 Existing requirements promulgated under the National Water Act

Associated with a water use application a Water Board must illustrate the following:

- The degree to which any proposed increase in water use associated with the application can be accommodated by means of WC/WDM
- The degree to which the proposed water use meets efficiency benchmarks.
- The degree to which the Water Board implements best management practises specific to WC/WDM.

7.3.4 Proposed requirements to be promulgated under the National Water Act National Water Act

The following are proposals for requirements to be promulgated through the National Water Act.

To be specified in the NWRS:

- The Water Board’s role in co-ordinating the establishment and implementation of a regional WC/WDM strategy
- A new planning protocol regarding the development of further water augmentation schemes where WC/WDM must be exploited as a priority option to water resource augmentation.
- Part of the new planning protocol should also relate to the development of large capital bulk infrastructure to be constructed by a water board (in line with IRP)

To be included in the catchment management strategies:

- A Water Board must develop a WC/WDM strategy according to the model strategy and submit it to the CMA.
- Water Boards must contribute to the development of the regional catchment management strategies.
- Water Board to submit a regional WC/WDM strategy
- A CMA may request changes to the proposed strategy in order to meet catchment management WC/WDM targets and objectives.
- A CMA must approve the construction of any large capital infrastructure by a water board. The motivation for capital works must be according to the new planning protocol in line with IRP.

Regulations according to section 143 of the NWA regarding monitoring, assessment and information:

- Specify the nature, type of the demand data to be submitted
- Specify the nature and type of information regarding the description of various WC/WDM measures
- Specify the guidelines and procedures to monitor and assess various WC/WDM measures

8 STRATEGY BY DWAF AND OTHER NATIONAL BODIES

8.1 Objectives and goals of WC/WDM by DWAF and other national bodies

Objective A'': Develop guidelines, standards and tools to support the implementation of WC/WDM within WSI

Objective B'': Promote and encourage the implementation of WC/WDM in WSI

Objective C'': Monitor, regulate and establish adequate governance to ensure the implementation of WC/WDM

Objective D'': Co-ordinate the development of a WC culture of the South African public

Objective E'': Ensure the implementation of IRP in water resource planning

Objective F'': Co-ordinate and co-corporate with other government departments to facilitate the implementation of WC/WDM in the water services sector

8.1.1 Objective A'': Develop guidelines, standards and tools to support the implementation of WC/WDM within WSI

Goals:

- A'1 Develop and update benchmarks for various commercial and light industry clusters.
- A''2 Develop and update benchmarks for the distribution management performance of WSI.
- A''3 Develop and update benchmarks for domestic water usage.
- A''4 Develop guidelines and procedures for WSI to carry out water audits and water balance.

- A"5 Develop guidelines and procedures for efficient and effective distribution management practices.
- A"6 Encourage and promote the development of new technologies.
- A"7 Develop a resource library on WC/WDM case studies and literature.
- A"8 Identify and co-ordinate research requirements on WC/WDM related issues.

8.1.2 Objective B": Promote and encourage the implementation of WC/WDM in WSI

- B"1 Promote the implementation of WC/WDM and the use of the various guidelines and tools developed to all WSI.
- B"2 Acknowledge excellence and performance by WSI and users.
- B"3 Develop a rating system for WSI.
- B"4 Promote the organization restructuring of WSA to facilitate the water departments to function as utilities.
- B"5 Illustrate the role of WC/WDM to WSI through the implementation of pilot projects.
- B"6 Develop a WC/WDM web page for WSI.
- B"7 Assist WSI in developing adequate capacity and resources to implement WC/WDM.
- B"8 Develop a National Water Conservation committee / forum to integrate and co-ordinate initiatives nationally

8.1.3 Objective C": Monitor, regulate and establish adequate governance to ensure the implementation of WC/WDM

- C"1 Develop adequate WC/WDM parameters in the National Information system Data-base.
- C"2 Develop, update and monitor appropriate WC/WDM related regulations promulgated through the National Water Services Act.
- C"3 Develop, update and monitor appropriate WC/WDM related regulations promulgated through the National Water Act.
- C"4 Incorporate WC/WDM requirements in the licensing conditions for WSI.
- C"5 Develop WC/WDM policies within the National Water Resource Strategy.
- C"6 Review the WC/WDM related requirements of the development plans of WSAs.
- C"7 Review the WC/WDM plans of Water Boards.

8.1.4 Objective D": Co-ordinate the development of a WC culture of the South African public

Goals:

- D"1 Co-ordinate the implementation of a National Water Conservation awareness campaign.
- D"2 Co-ordinate the implementation of a national education campaign for schools.
- D"3 Influence the development and implementation of WC/WDM in water related tertiary education disciplines.
- D"4 Ensure WC/WDM is a priority in water related conferences and workshops.
- D"5 Facilitate the introduction of a water efficiency labelling system for plumbing fittings and appliances.

8.1.5 Objective E’’: Ensure the implementation of IRP in water resource planning

Goals:

- E’’1 Develop guidelines on Integrated Resource Planning (IRP) for the Water Services sector.
- E’’2 Implement in partnership with WSI studies to determine the potential and role of WC/WDM in all water stressed areas.
- E’’3 Promote the principles and guidelines of IRP to WSI.
- E’’4 Develop and promulgate under the National Water Resource Strategy a planning protocol for water resource development which incorporates IRP.
- E’’5 Ensure the implementation of WC/WDM to its potential as the first priority before approving the development of further water resources augmentation schemes.
- E’’6 Promote the co-ordination/integration of planning and strategies with other industry partners in the supply chain (i.e. Establishment of Regional Water Services planning forums).

8.1.6 Objective F: Co-ordinate and co-corporate with other government departments to facilitate the implementation of WC/WDM in the water services sector

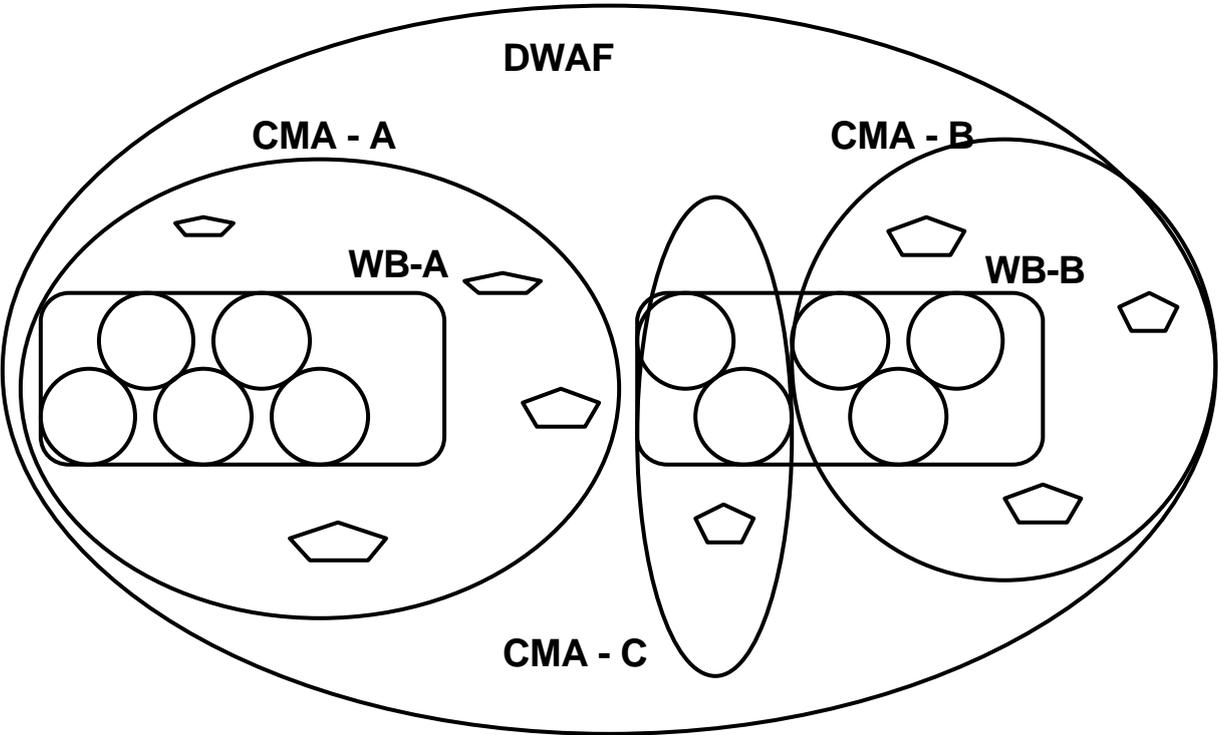
Goals:

- F’’1 Facilitate and co-ordinate with the Department of Housing for the implementation of new efficient plumbing standards in new housing.
- F’’2 Facilitate and co-ordinate the review of plumbing standards and the effective import control with the Department of Customs and Excise.
- F’’3 Promote the co-ordination and possible integration of WC/WDM with electricity efficiency policies and measures.
- F’’4 Co-ordinate and integrate where possible WC/WDM related policies and measures with the Department of Environment.
- F’’5 Promote and co-ordinate the implementation of WC/WDM measures within government and public buildings.
- F’’6 Create an awareness to WC/WDM within government.

9 OVERVIEW OF INSTITUTIONAL ROLES

The roles of the various institutions regarding WC/WDM are indirectly defined in the model strategies described in the previous sections. The following diagram and supporting comments give a consolidated overview of the different roles and functions of the various water institutions regarding WC/WDM.

FIGURE 3: ILLUSTRATION OF THE WC/WDM ROLES FOR THE VARIOUS WATER INSTITUTIONS



- INDEX:
- Water Boards – WB
 - WSA
 - Water User Associations or other users

The role of DWAF

The role of DWAF in terms of WC/WDM can be summarised as follows:

- co-ordinate national functions
- Develop generic tools and guidelines
- Develop policies and regulations
- Co-ordinate measures to create an education and awareness culture throughout South Africa
- Promote WC/WDM to all water institutions

The role of a CMA

The role of a CMA in terms of WC/WDM can be summarised as follows:

- Develop WC policies and parameters within the Catchment Management Strategy.
- Governance body for licensing conditions.
- Governance body for regulations promulgated in the NWA.
- General regulatory functions

The role of a Water Board (or bulk water supplier)

The role of a Water Board in terms of WC/WDM can be summarised as follows:

- Co-ordinate the establishment and implementation of a regional (within its Area of Supply) WC/WDM strategy. The strategy must incorporate the WC policies and parameters developed in the Catchment Management Strategy and determine demand regional demand targets.
- Assist WSA in the implementation of WC/WDM measures
- Implement WC/WDM measures directly related to their own service provision functions
- Co-ordinate the implement of regional WC/WDM measures (I.e communication campaign)
- Participate in the development and implementation of the Catchment Management Strategy

The role of WSA

The role of a WSA in terms of WC/WDM can be summarised as follows:

- Develop and implement their own local WC/WDM strategy in line with the regional WC/WDM strategy and in line with WC/WDM policies of the catchment management strategy.

The role of CMA versus the role of a Water Board

The diagram illustrates part of the institutional complexity in the regional co-ordination functions of water management and WC/WDM. There are some Water Boards that may be part of more than one catchment management area and there are some catchment management areas that may have more than one Water Board. The

difference in the regional functions between Water Boards and CMA is that a CMA will determine certain parameters and policies on WC that the regional WC/WDM strategies within a Water Board's area of supply must incorporate. The reasoning for this proposal is that the economic and social benefits that can be derived by integrating the supply chain of the water services institutions is perhaps more significant than if the CMA determined a WC/WDM strategy by integrating the water resource considerations. If a CMA was to be responsible for a regional WC/WDM strategy within its water management area there is a possibility that not all the opportunities of WC/WDM may be recognised and it will be difficult to determine the strategy according to the IRP principles. The complexity however is that the current legislation does not give a Water Board adequate authority and responsibility in co-ordinating the development and implementation of a regional WC/WDM strategy. It is for this reason that a proposal is made to modify the current policies and legislation to allow Water Board to adopt these functions.

10 CONCLUSIONS

In South Africa the role of WC/WDM as a strategic management paradigm for water institutions is a relative new concept. Financial management is currently being promoted as the predominant strategic management paradigm for WSI and the value and need for WDM is often ignored. It can be argued that WC/WDM is perhaps more significant as a predominant management strategy because it relates to the following key elements of water services:

- Managing purchase and consumption behavior
- Managing the consumer
- Managing the environment
- Managing resources
- Managing the interaction with other institutions in the supply chain
- Managing the operational efficiency of water services

The Water Services WC/WDM sectoral strategy provides both a model strategy and identifies some of the key issues that should be considered in the development of governance and regulatory requirements of the water services industry in terms of WC/WDM. It has been comprehensive and inclusive of the various legislative requirements and perceived challenges of the Water Services Industry within the context that South Africa is a water scarce and water stressed country. The perceptions and understanding that this document is based on needs to be tested and it is therefore imperative that key stakeholders comment and participate in the further development of this WC/WDM sectoral strategy.

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