

DEPARTMENT OF WATER AFFAIRS AND FORESTRY



WATER CONSERVATION STRATEGY

FOR THE

INDUSTRY, MINING AND POWER GENERATION

USER SECTOR

FIRST EXTERNAL DRAFT

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1. INTRODUCTION

The Department of Water Affairs and Forestry (DWAFF) is in the process of developing a National Strategy Framework for Water Conservation and Demand Management. The first phase of the strategy development is complete and a draft document outlining the broad strategy framework has already been distributed to key stakeholders for comment. Work is now commencing on the next phase, namely the development of individual water conservation strategies for the water User Sectors. These are :

- the domestic sector and Water Services Institutions;
- the agriculture and forestry sector;
- the industry, mining and power generation sector; and
- the environment and Water Resource Management Institutions.

The purposes for developing these sectoral strategies are :

- to provide the detail of specific water conservation strategies which would be acceptable for application in the various sectors;
- to provide the framework within which regional water conservation strategies and plans can be developed, and
- to allow for broader consultation for the development of the National Strategy Framework for Water Conservation and Demand Management through the process of developing the specific sectoral strategies.

This report concerns the development of the water conservation strategy for the industry, mining and power generation sector.

2. OVERVIEW OF THE USER SECTOR

2.1. WATER REQUIREMENTS

The industry, mining and power generation User Sector accounts for more than 10% of the total of $20 \times 10^9 \text{m}^3$ of water used annually in South Africa. **Figure 1** shows that the mines and large industries outside of the municipal areas use some $1.6 \times 10^9 \text{m}^3/\text{yr}$, or 8% of the total usage. The domestic and urban User Sector also supports industries, although these are generally of a smaller nature. Total use by this sector is $2.2 \times 10^9 \text{m}^3/\text{yr}$, which is 11% of the total. It is estimated that 20% of the water used in the domestic and urban User Sector in the major centres is by smaller industries, thereby bringing the total use by the sector to above 10%.

As would be expected, most of the industrial, mining and power generation businesses are concentrated in Gauteng and the surrounding areas. There are, however, significant users in this sector in KwaZulu-Natal and the Western Cape.

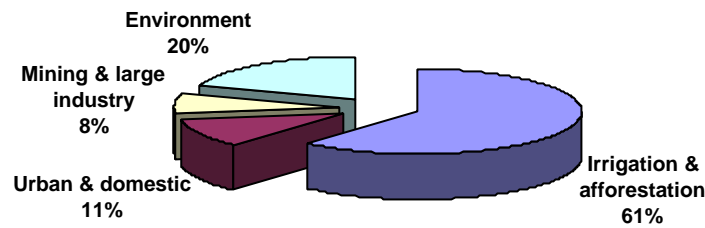


Figure 1 : Water usage distribution in South Africa (1996)

2.2. WATER USE

Unfortunately, there is no consolidated database of information regarding water services and water use within the industry, mining and power generation User Sector. As a result, the understanding about the use of water by the Sector is limited to anecdotal information. There is, however, a broad range of uses, and any one business may use water for one or more of the following functions :

- **Domestic** : Most office accommodation is fitted with kitchens, toilets and bathrooms, all of which can contribute significantly to the water use of a business. Furthermore, many larger businesses, such as mines, provide housing for their employees. The water requirements for day-to-day living purposes, such as health and hygiene, are the same as those in any other urban centre.
- **Irrigation** : Certain businesses develop landscaped gardens and lawns which are maintained to provide a pleasant aesthetic environment and which promote a good corporate image. These tend to be well watered, on top of which, many of the gardens contain exotic plants which are thought to have substantially higher water requirements than indigenous plants.
- **Process** : One of the major uses of water in the Sector is that related to the actual manufacturing processes and the end product. Water use may be consumptive, such as the water used to manufacture a product in a bottling factory that is then distributed for consumption. It may also be non-consumptive, such as the water used to die fabrics in a textile industry that is then discharged to a waste water system.
- **Cleaning** : Although water use for cleaning can be related to a process, it is also used for non-process related cleaning purposes. The washing down of the floors of a premises or the cleaning of a fleet of vehicles are such examples, and which can result in significant usage.
- **Cooling** : Again, cooling is often process related, however, there are a number of non-process related cooling requirements which utilise water. Refrigeration and air conditioning are typical examples thereof.
- **Fire fighting** : Reticulation systems in businesses are often designed to meet the requirements of fire fighting, which often well exceed the requirements for the other water uses within a business, especially in terms of pressure. The levels of service for the others uses may therefore be excessive leading to excessive use.

- **Water treatment** : Certain business treat their own water to achieve the standards necessary for their process requirements. Furthermore, some businesses also have to treat their effluent to a standard to meet receiving water quality objectives or the requirements to discharge into local sewer systems. Often these treatment facilities are inefficient which may lead to significant quantities of water being wasted.

3. REGULATORY FRAMEWORK

3.1. WATER RESOURCES

The National Water Act (No. 36 of 1998) regulates the management of the water resources. This Act provides for the regulation in the use of water through a system of water licensing, water allocation and water use charges. Furthermore, it also provides for the setting up of regional authorities to provide the regulation and monitor compliance, namely Catchment management Agencies. The Act also promotes water users to create organised bodies to represent regional level constituencies on issues of water resources management through the provision of Water User Associations.

Those businesses that are responsible for providing their own water services will have to comply with the requirements of the National Water Act and any regulations promulgated in terms of the Act.

3.2. WATER SERVICES

The Water Services Act (No. 108 of 1997) regulates the provision of water services. This Act allows for Water Services Providers to be responsible for the provision of water services to the end consumers. At present, most of the Water Services Authorities fulfil the functions of Water Services Providers, although these functions can be contracted out to third parties such as Water Boards or private sector companies. Water Services Authorities are essentially the local government structures such as the Local Councils in the urban areas and the Regional Councils in the rural areas.

Those industries that are provided with water services from a Water Services Provider will have to comply with the requirements of the Water Services Act and any regulations promulgated in terms of the Act. The Water Services Providers will in turn have to comply with the requirements of the National Water Act.

It should be noted that according to the Water Services Act, certain industries are defined as Water Services Intermediaries in that the supply of water is incidental to their core activities. As such, they should not be seen to take on the responsibilities of Water Services Authorities or Water Services Providers.

3.3. THE USER SECTOR

As alluded to above, businesses in this User Sector can be classified into two broad categories, namely :

- those who provide their own water services (mainly the mines, power stations and large industries); and
- those who are serviced by Water Services Providers (mainly the smaller industries).

Although many of the water conservation issues faced by the various businesses are similar, there are some subtle differences that arise from the divergent responsibilities for water services provision and water resources management.

Regulation of those businesses that provide their own water services will be the responsibility of Catchment Management Agencies. The primary mechanisms of regulation will be :

- the National water resources strategies;
- the specific catchment management strategies;
- the water use charges;
- the regulations requiring that a water use be registered; and
- the conditions and requirements for the issue of general authorisations and licenses.

Water Services Providers will regulate those businesses that are serviced by them. They in turn will have to comply with the requirements of the National Water Act. The primary mechanisms of regulation will be :

- the specific bylaws of the local authority;
- the model water services bylaws of DWAF;
- various regulations proclaimed in terms of the Water Services Act (No. 108 of 1997); and
- through the water services development plans.

4. METHODOLOGY OF STRATEGY DEVELOPMENT

4.1. GENERAL STRATEGY DEVELOPMENT

It is envisaged that the process of developing the strategy will follow a conventional strategic planning approach, whereby :

- policies are developed at the outset of the initiative;
- strategies are then developed to support these policies; and
- finally, action plans, programmes and budgets are put together to support the strategies.

This process seems to be one directional as it becomes more focused moving from the conceptual policy planning phases through to the more definitive action planning phases. However, there is an on-ongoing need to refer back to either the strategies or the policies and to review whether these are still relevant. This review is required as action plans are implemented and the focus of the strategies may change from that of execution to that of monitoring. It is therefore envisaged that this document will have a limited shelf life and will have to be updated on a regular basis.

4.2. WATER CONSERVATION STRATEGY DEVELOPMENT

In the context of Water Conservation and Demand Management, the policies have already been developed through the two sets of new water legislation, namely the Water Services

Act (1997) and the National Water Act (1998). DWAF are currently developing the supporting strategies, and the National Strategy Framework is the first step in this regard. This Framework :

- provides a motivation for water conservation in South Africa;
- outlines the role of water conservation in water resources planning and management;
- lists the objectives and goals of water conservation; and
- presents possible water conservation measures.

A pre-consultation meeting was recently held with key stakeholders representing the business sectors of the industry, mining and power generation fields. Certain expectations and principles were generated from this meeting. The minutes of this meeting and the National Strategy Framework form the point of departure for further strategy development.

As mentioned in **Section 2.1**, the strategies developed during this phase of the process will require further refinement before they can be broken down into individual action plans for which both programmes and budgets are allocated. Furthermore, the strategies will have to be updated and reviewed at regular intervals depending on :

- the success of any water conservation initiatives;
- changes in the water demand situation;
- variations in the economy relating to the business sectors in the industry, mining and power generation fields; and
- the availability of funding.

This report focuses on the development of more definitive strategies for the industry, mining and power generation User Sector a step further. Similar initiatives are underway for the other three User Sectors defined in **Section 1**. The objective of this report is to develop fairly generic strategies that may be applicable across the whole User Sector, describe these in some detail, and provide recommendations on how to implement these.

5. CRITICAL ASSUMPTIONS

5.1. GENERAL COMMENTS

In order to develop any strategy, critical assumptions should be made up front to provide the context within which the strategies will be developed. Although the promulgated water legislation provides the context from a Policy basis, and the National Strategy Framework provides much of the high level strategic context, further assumptions are required to contextualise the detailed strategies and action plans for this particular User Sector. The validity of the assumptions should also be checked during later reviews of this document.

5.2. APPLICABILITY OF A GENERIC STRATEGY

It is noted from the minutes on the pre-consultation meeting with key stakeholders that, in order to develop the goals and objectives for water conservation in this fairly broad User Sector, the delegates were split into two groups. The focus was specifically on

industry in one group and mining and power generation in the other group. Although some of the objectives and goals arising from these groups were similar, there were also some differences. This begs the question regarding the possibility of developing a generic strategy that is applicable to all of the businesses within this User Sector.

Given the diversity in both nature and size of the activities undertaken by the various businesses in this User Sector, and the varying water requirements, it is not practical for "one-size-fits-all" strategies to be developed. It is recommended that specific adaptive strategies be developed which can be applied after adjustment to the conditions relating to a specific business. Adaptive strategies also make sense if one considers the complexity of the interactions of water with the environment and the specialised nature of water resources planning and management. Furthermore, both of these aspects are not generally understood. The impacts of specific management interventions on the water resources and the supply thereof are, in many cases, only educated guesses, and these impacts can vary from site to site. This report therefore follows the recommended adaptive strategy approach.

If specific adaptive strategies are accepted, then guidelines will also have to be developed to direct the water resources planners and managers as well as the managers of the businesses in the User Sector to adapt and adopt a more site-specific strategy. Conceptual guidelines for implementation of the strategies have been provided in this report, however, these will require further refinement at a later stage.

5.3. FOCUS GROUPS

The focus groups for these proposed strategies are obviously the industry, mining and power generation business sectors. These strategies also cover the roles that DWAF and the other water institutions are required or expected to play. Although DWAF is expected to assume a regulatory role, many of the proposed strategies follow a partnership approach with less emphasis on regulation and more on facilitation. Furthermore, certain of the strategies are only applicable to the regulator and water institutions, and others are only applicable to the user. The perceived responsibilities are indicated in the specific strategies as far as possible.

5.4. BUSINESS REPRESENTATIVES

This strategy document has been developed on the premise that the User Sector is well organised and structured with a full complement of Institutions and Chambers that represent all the interests of the various business categories. Furthermore, it is assumed that all interactions in terms of both the development and implementation of these strategies will take place with these business representative forums. During implementation of the strategies, appropriate business representatives will be urged to utilise existing forums, such as those established to fulfil environmental audit functions. Failing this, appropriate business representatives will be urged to form Water User Associations (WUA).

6. RECOMMENDED STRATEGIES

6.1. CLASSIFICATION OF BUSINESSES

6.1.1. Classification system

Objective

In **Section 4.1**, the question was raised regarding the applicability of one generic strategy across the full spectrum of businesses in this User Sector. Should the assumption of specific adaptive strategies be valid, then one will have to consider the classification of the businesses. This is supported by the fact that the implications of water conservation will vary tremendously according to the type of business, the applicable processes and their water requirements. Furthermore, the extent to which a business, or group of businesses, is regulated, and the extent to which it will be expected to become actively involved in water resources management, will depend on the scale of its water utilisation and wastewater discharge.

Strategy

A system will be developed to classify businesses in the industry, mining and power generation User Sector based on individual water utilisation and wastewater discharge requirements. This will be the responsibility of DWAF and the Business Representatives and will take cognisance of the audit results mentioned in **Section 6.2.2**. The following aspects will be considered in the classification system :

- the type of business;
- the purposes for which water is used;
- the specific industry processes;
- the water licence requirements of the business (i.e. self serviced or serviced by a water services provider);
- the metered quantity and quality of water utilised and wastewater discharged;
- the extent to which water is recycled (i.e. the ratio of consumptive to non-consumptive use); and
- the efficiency and effectiveness of water utilisation.

Although there could be a large number of categories based on the above criteria, the classification will be kept as simple as possible. It will also take cognisance of the Industry Clusters Initiative of the Department of Trade and Industry. However, the primary purpose of the classification will be to identify those businesses that have the greatest impacts on the water resources in terms of water utilised, wastewater discharged and the efficiency and effectiveness thereof. The business categories will be classified and prioritised by the relevant Catchment Management Agency, or DWAF where Catchment Management Agencies do not exist, or the relevant Water Services Provider.

Guidelines for implementation

Short-term : Design a classification system.

Medium-term : Classify the businesses according to the classification system.

Long-term : Although the emphasis will be on self-regulation, businesses will be subject to varying degrees of regulation as described in the remainder of this document.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	Other
1. Design classification system	Y	!	!	!	
2. Classify businesses (note 1)	!	Y	Y	!	
3. Regulate businesses	!	Y	Y	!	
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies		Facilitator		
WSP	Water Services Providers	ⓘ	Stakeholder		
BR	Business representatives				
Other	None	!			

Note 1 : Those businesses which service their own water requirements will be classified by the Catchment Management Agencies when processing water licences, and those businesses serviced by Water Services Providers will be classified by the Water Services Providers. The Water Services Providers will notify DWAF and the relevant Catchment Management Agency through their Water Services Development Plans. It should also be noted that the classification will depend to a large degree on the specific purpose of water use.

6.1.2. Database of businesses

Objective

As mentioned in **Section 2.2**, there are no databases of information regarding water services and water use within the industry, mining and power generation User Sector. The purpose of such databases would be to provide information to make informed decisions relating to water resources management in the User Sector. Following the classification of businesses, it makes sense that certain businesses be monitored and tracked according to their water use and wastewater discharge performance criteria which are discussed in **Section 6.2**. The databases will provide a repository for this information and other audit results. The objective will be to facilitate self-regulatory performance monitoring.

Strategy

National, regional and local levels of databases will be developed for the purposes of monitoring the water-related performance of businesses. It is obvious that there are too many businesses for all of them to be included in the databases, and only those businesses that have the greatest impacts on the water resources will be considered (i.e. the high priority categories outlined in **Section 6.1.1**). The relevant Catchment Management Agency or Water Services Provider will have the responsibility for monitoring the performance of these businesses.

Guidelines for implementation

Short-term : Design a simple pro-forma database, and develop individual regional databases to be adapted for local conditions and requirements.

Medium-term : Populate the individual databases, develop self-regulatory performance monitoring mechanisms, and set acceptable time related targets for data capture.

Long-term : Maintain the individual databases according specific time related targets and ensure that data can be accessed by members of the User Sector.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	Other
1. Design pro-forma database	Y	!	!	Y	
2. Refine individual database designs	!	Y	Y	!	
3. Populate individual databases	!	Y	Y	!	
4. Develop self-regulatory mechanisms	!	Y	Y	!	
5. Maintain individual databases	ⓘ	!	!	Y	
	!	Y	Y	!	
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies		Facilitator		
WSP	Water Services Providers	ⓘ	Stakeholder		
BR	Business representatives				
Other	None	!			

6.2. PERFORMANCE MANAGEMENT

6.2.1. Water use and water balance

Objective

If one is serious about water conservation, as is the case here, then targets should be set and performance monitored. However, before targets can be set, the objective of a business should be to understand its use of water and waste water discharge requirements. Much in the same way that expenditure is analysed and budgeted, so too should the water related elements. They are, after all, items of expenditure. Furthermore, another objective of understanding the water use and wastewater discharge requirements is to determine the impact on the overall water environment, and to ensure that this is mitigated.

Strategy

If not already understood, businesses will develop an understanding of the interactions between their business processes and their water utilisation and waste water requirements. Furthermore, businesses included in the databases mentioned in **Section 6.1.2** will provide the relevant Catchment Management Agency or Water Services Provider with an indication of their future water utilisation and wastewater discharge requirements. The Water Research Commission has published several research projects on the drivers of water demand in various industries, which will be built upon to provide the businesses in the User Sector with requisite information. Further research and development into alternative processes that utilise less water and generate less wastewater will also be commissioned. Various pilot projects to assess the impacts of various water conservation measures in the various business sectors will also be commissioned.

Guidelines for implementation

Short-term : Determine the uses of water and the wastewater requirements for individual businesses.

Medium-term : Project future water utilisation and wastewater discharge requirements, and capture on the individual databases.

Long-term : Undertake pilot projects and commission research and development into the drivers of water demand (and wastewater) and into alternative processes that utilise less water and generate less wastewater.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Determine water uses & waste requirements	ⓘ	!	!	Y	!
2. Project future requirements	!	ⓘ	ⓘ	!	Y
3. Include in databases	!	Y	Y	!	!
4. Pilot projects & research and development	Y	!	!	!	!
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies		Facilitator		
WSP	Water Services Providers	ⓘ	Stakeholder		
BR	Business representatives				
IB	Individual businesses	!			

6.2.2. Performance auditing

Objective

Once a business understands its water utilisation and wastewater discharge requirements, it will be in a position to monitor its performance in this regard. The setting of performance targets is always a sensitive issue since the implications of water conservation are not easily quantified. The first step is to determine what the performance indicators should be and then to determine the current levels of performance of these indicators. The focus here should be on the specific industry processes. Thereafter, achievable targets can be set and the performance monitored and reported. The objective of this exercise is to achieve the optimal balance between effective and efficient water utilisation and wastewater discharge.

Strategy

Water utilisation and wastewater discharge performance indices for all appropriate business processes will be determined and published. Following this, all businesses will set targets and the performance indices will be monitored. It should be noted that certain infrastructure might have to be installed by businesses to enable them to monitor these indices. Businesses listed on the databases mentioned in **Section 6.1.2** will provide the relevant Catchment Management Agency or Water Services Provider with performance reports. The performance status of the businesses will then be entered into the database. Although self-regulation is being promoted, audits of those businesses listed on

the databases will be undertaken on a regular basis. Ad-hoc audits of the other businesses will also be considered.

Guidelines for implementation

Short-term : Determine water utilisation and wastewater discharge performance indices for individual industry processes.

Medium-term : Set performance targets, install meters and monitoring systems and submit performance reports.

Long-term : Design and undertake performance management audits.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Determine performance indices	ⓘ	⚠	⚠	⚡	⚠
2. Set performance targets	⚠	ⓘ	ⓘ	⚠	⚡
3. Install monitoring systems	⚠	ⓘ	ⓘ	⚠	⚡
4. Submit performance reports	⚠	ⓘ	ⓘ	⚠	⚡
5. Design audit systems	⚠	⚠	⚠	⚠	⚡
6. Undertake performance audits	ⓘ	⚠	⚠	⚡	⚠
	⚠	⚡	⚡	⚠	⚡
Key					
DWAF	Department of Water Affairs and Forestry	⚡	Main responsibility		
CMA	Catchment Management Agencies	⚡	Facilitator		
WSP	Water Services Providers	ⓘ	Stakeholder		
BR	Business representatives				
IB	Individual businesses	⚠			

Note 2 : Performance auditing will be part of the ongoing review process of water licensing. Catchment Management Agencies, or DWAF where Catchment Management Agencies do not exist, will be responsible for issuing and reviewing the licences in this regard. The history of performance of either individual businesses or Water Services Providers, whomever is applying for a licence, will become a criterion in the granting of future licences.

6.2.3. Benchmarking performance

Objective

Businesses are often unaware that they are performing above or below the norm in areas relating to water conservation. It is essential that some sort of feedback on performance be established. Ideally this feedback should be confidential, but it is important for businesses to get an indication of their relative performance for specific industry processes against established norms. This creates a competitive environment and provides and a positive result of all of their efforts in setting targets and monitoring performance.

Strategy

Benchmarking of industry processes against similar operations elsewhere (both in South Africa and abroad) will be undertaken to provide a relative indication of performance. The performance indicators already discussed in **Section 6.2.2** will provide the basic information for the benchmarking, however, other parameters will also be taken into

account. For logistical purposes, benchmarking will be limited to those businesses listed in the databases mentioned in **Section 6.1.2**. Performance norms and standards will also be developed and published so that the other businesses can compare their own levels of performance. Furthermore, industry norms and standards relating to best management practices in the various processes will be researched and developed. The emphasis will be on developing a category of the ISSO range of standards.

Guidelines for implementation

Short-term : Develop benchmarking criteria and identify partners to be benchmarked against.

Medium-term : Undertake and report on the benchmarking exercise.

Long-term : Research and develop industry norms and standards.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Develop benchmarking criteria	①	!	!	Y	!
2. Identify benchmarking partners	①	!	!	Y	!
3. Undertake benchmarking	!	①	①	!	Y
4. Report on benchmarking	!	Y	Y	!	Y
5. Develop industry norms and standards	Y	!	!	!	!
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies		Facilitator		
WSP	Water Services Providers	①	Stakeholder		
BR	Business representatives				
IB	Individual businesses	!			

6.2.4. Water conservation programme

Objective

When implementing water conservation measures, there are several important issues that must be taken into account. It is clear that reducing wastage in order to promote greater profit margins should be a fundamental issue that requires little additional motivation. This, however, is not normally the case. The measures required to reduce waste are often of a capital nature, whilst the savings will be reflected on an operating budget. Although such actions generally pay for themselves over a relatively short period, it is often difficult for businesses to motivate for, and to secure the required capital budgets. Furthermore, the cost of water is often a rather small item on a business's operating budget. The objective is therefore to develop water conservation programmes that are a prioritised and scheduled suite of interventions for individual businesses.

Strategy

With the help of the relevant Catchment Management Agency or Water Services Provider, businesses will develop a water conservation programme. The water balance analysis and the water audit, described in **Sections 6.2.1 and 6.2.2** respectively, will provide an indication of the extent of any water conservation problems and possible interventions. Typical technical interventions are :

- **Domestic** : retrofitting water saving devices;
- **Irrigation** : scheduling and application; use of indigenous plants; mulching.
- **Process** : new technologies and processes which utilises less water.
- **Cleaning** : alternative methods of cleaning; reclaimed water.
- **Cooling** : air cooling, multiple pass cooling; higher water quality tolerances; reclaimed water.
- **Fire fighting** : pressure management; separate systems; reclaimed water.
- **Water treatment** : management and de-watering of sludge; more efficient technologies and processes.

The elimination of leakage and measurement of water use are common interventions, no matter what the use. Education, awareness and marketing are also common and are addressed in **Section 6.3**.

The costs of implementing water conservation interventions and the benefits of the reduced water utilisation will be determined and assessed by means of a cost-benefit analysis. Furthermore, businesses that generate wastewater will benefit in that the reduction in use will have a corresponding reduction in wastewater and therefore reduction in the treatment and disposal thereof. The savings in water use costs discussed above will give an indication of the level of funding that can be justified, on purely financial grounds, for allocation to water conservation. Once accepted by the relevant Catchment Management Agency or Water Services Provider, a business will systematically implement its water conservation programme.

Guidelines for implementation

Short-term : Determine the water conservation problems and define appropriate interventions.

Medium-term : Determine the benefits and the costs of water conservation for individual businesses.

Long-term : Undertake cost-benefit analyses, develop and implement the water conservation programme.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Determine WC/DM problems & solutions	!	ⓘ	ⓘ	!	Y
2. Determine costs & benefits of WC/DM	!	ⓘ	ⓘ	!	Y
3. Undertake cost-benefit analyses	!	ⓘ	ⓘ	!	Y
4. Develop WC/DM programme	!	ⓘ	ⓘ	!	Y
5. Implement WC/DM programme	!	ⓘ	ⓘ	!	Y
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies	ⓘ	Facilitator		
WSP	Water Services Providers	!	Stakeholder		
BR	Business representatives				
IB	Individual businesses				

6.2.5. Wastewater reclamation

Objective

More often than not, businesses that discharge wastewater incur greater expenses in this regard than they do in the purchase and/or purification of water. As a result, there is always the danger that the wastewater is diluted so that it meets receiving water quality objectives. Although not necessarily a consumptive use, this practice can influence water resources allocations. Furthermore, wastewater discharges either to sewer systems, or into an open river system, are notorious in terms of their water quality problems and pollution. The objective is therefore to promote the practise of businesses containing all their wastewater on site and recycling it as much as possible. The principle of waste minimisation and clean technology should be the principal objective here. Furthermore, the Waste Discharge Charge System, which is currently under development, will provide incentives to minimise waste.

Strategy

Wastewater discharges will be monitored carefully by the relevant Catchment Management Agency or Water Services Provider. Although both the quantity and quality of the discharges preferably should be monitored, the emphasis will be on routine sampling of water quality for the businesses with large discharges for compliance with the requirements of the discharge permit. The water balance analysis described in **Section 6.2.1** will also be evaluated to ensure that excessive water is not being used for dilution purposes. Individual businesses will also determine the potential for wastewater reclamation, whilst the relevant Catchment Management Agency or Water Services Provider will evaluate the regional significance of wastewater reclamation.

Guidelines for implementation

Short-term : Monitor wastewater discharges of those businesses identified from the regional databases.

Medium-term : Assess water balances for excessive use relating to wastewater

Long-term : Determine the potential for reclamation and develop alternative methods of recycling water.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Monitor wastewater discharges	!	Y	Y	!	!
2. Reconcile demand and wastewater	!	Y	Y	!	!
3. Determine wastewater recycling potential	!	!	!	!	Y
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies	!	Facilitator		
WSP	Water Services Providers	!	Stakeholder		
BR	Business representatives				
IB	Individual businesses				

6.3. COMMUNICATION, PUBLIC AWARENESS AND EDUCATION

6.3.1. Terminology

Motivation

The various Water Acts, Regulations and other related documentation in circulation at present in South Africa contain a plethora of terms and definitions related to water resources management, many of which differ and conflict each other. The water industry is battling to come to terms with these and even the professionals are having communication problems. Furthermore, the User Sector also makes use of terminology that has the potential to be confusing. The success of implementing any water conservation strategy will depend to a large extent on communication, and the first step in this regard will be a common understanding of the relative terms and definitions. The objective therefore is to provide definitions of all terminology relating to water resources management used both in the water industry and in the User Sector.

Strategy

A concise, stand-alone document outlining all the water related terms and definitions will be drafted and reviewed by water resources professionals so that there is general consensus in this regard. Water resources management terms that are specific to the User Sector will also be included in the document. The document will be edited and supported with simple diagrams so that the layman or a member of the general public will understand it.

Guidelines for implementation

Short-term : Develop a comprehensive list of water resources management terms and definitions.

Medium-term : Review the terms and definitions with relevant professionals and industry representatives.

Long-term : Design, draft and publish the document. Circulate it to all stakeholders and ensure that it will be made available from resource centres.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. List of terms and definitions	Y	!	!	Y	!
2. Review the terms and definitions	ⓘ	Y	Y	Y	!
3. Publish the document	Y	!	!	!	!
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies		Facilitator		
WSP	Water Services Providers	ⓘ	Stakeholder		
BR	Business representatives				
IB	Individual businesses	!			

Note 3 : This strategy is applicable to all User Sectors and consideration should be given to making it a joint strategy.

6.3.2. Marketing and publicising water conservation

Objective

The current water related legislation promotes water conservation very strongly. DWAF and the other Water Services Institutions, however, have neither the manpower nor the budgets to regulate and monitor compliance in this regard. To this end, DWAF promotes self-regulation and therefore have to rely on marketing water conservation to the User Sector to communicate their requirements. On top of this, successful water conservation initiatives need to be publicised as do new technologies, processes and approaches to conserving water in the User Sector.

Strategy

A marketing campaign will be designed to promote water conservation amongst the User Sector. There will be a lot of overlap between the marketing campaign and the education and awareness initiatives proposed in **Section 6.3.3**. The focus of the marketing campaign, however, will be on promoting self-regulation and communication.

Guidelines for implementation

Short-term : Develop and design a national water conservation marketing campaign for the User Sector.

Medium-term : Develop appropriate marketing material and media for the campaign.

Long-term : Implement the campaign.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Design water conservation campaign	Y	!	!	!	!
2. Develop marketing material	Ⓜ	Y	Y	Y	!
3. Initiate water conservation campaign	Ⓜ	Y	Y	Y	!
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies		Facilitator		
WSP	Water Services Providers	Ⓜ	Stakeholder		
BR	Business representatives				
IB	Individual businesses	!			

6.3.3. Education and training programmes

Objective

Many businesses acknowledge that reducing water wastage in order to reduce costs and therefore promote greater profit margins is common sense, however, certain businesses continue to overlook this aspect. Furthermore, many businesses lack the technical insight on how to undertake water conservation and need guidance in this regard. Focused education and training programmes will go a long way to helping businesses in this regard.

Strategy

Initiatives will be developed to educate businesses on issues of water conservation. New material on water conservation in the specific business categories will be developed for distribution. Education and training opportunities will be investigated with all relevant

Sectoral Educational Training Authorities. Furthermore, the relevant Catchment Management Agency or Water Services Provider will set up training facilities for businesses in the fields of water auditing and monitoring. An education and training programme will be established, which will build on existing initiatives. It will also address pollution and wastewater management and the whole concept of integrated catchment management.

Guidelines for implementation

Short-term : Design an education and training programme.

Medium-term : Develop material on water conservation in specific business areas.

Long-term : Set up training facilities for water auditing and monitoring, and implement the education and training programme.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Design education & training programme	Y	!	!	Y	!
2. Develop education & training material	Y	!	!	Y	!
3. Set up facilities for training	ⓘ	Y	Y	Y	!
4. Implement the programme	ⓘ	Y	Y	Y	!
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies		Facilitator		
WSP	Water Services Providers	ⓘ	Stakeholder		
BR	Business representatives				
IB	Individual businesses	!			

6.3.4. Water conservation information centres

Objective

As discussed above, good communication will form the basis of successful water conservation. One of the biggest problems will be to provide the public with an easily accessible repository of information related to water conservation. On top of this, it is often difficult, if not impossible, for the public to report water conservation problems to the appropriate authorities. To this end, water conservation information centres need to be established.

Strategy

Regional and sectoral water conservation information centres will be established using existing structures such as the Public Affairs Departments of the relevant Catchment Management Agencies, Water Services Providers and large businesses. The existence of these information centres will be publicised in the marketing campaign mentioned in **Section 6.3.2**. This will enable stakeholders in the User Sector can gain access to appropriate water conservation and institutional information.

Guidelines for implementation

Short-term : Determine the need for information centres and the capacity within relevant institutions to fulfil this requirement.

Medium-term : Design the functional and resource requirements for typical information centres.

Long-term : Establish information centres and co-ordinate activities.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Determine the need for the centres	Y	!	!	!	!
2. Determine capacity for the centres	!	Y	Y	Y	!
3. Design functional/resource requirements	Y	!	!	!	!
4. Establish the centres	Y	!	!	!	!
5. Co-ordinate the activities	ⓘ	Y	Y	Y	!
	Y	!	!	!	!
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies		Facilitator		
WSP	Water Services Providers	ⓘ	Stakeholder		
BR	Business representatives				
IB	Individual businesses	!			

Note 4 : This strategy may be applicable to all User Sectors and consideration should be given to making it a joint strategy.

6.4. INSTITUTIONAL ASPECTS

6.4.1. Water conservation forums

Objective

An important aspect required for successful water conservation is the ability to network and share information, tactics and experience with colleagues. Workshops or forums will provide an opportunity for managers and planners to discuss any problems and/or successes they have had in their quest to reduce wastage and pollution. Existing and soon to be implemented forums, such as those for the Water Management Areas, will be utilised as far as possible.

Strategy

Water conservation forums will be set up, or existing forums will be expanded, so that the various issues concerning water conservation can be discussed within the various business sectors. These forums will be created on the lines of those envisaged for the Catchment Management Agencies, within which specific focus should be provided on each of the User Sectors. Representatives from DWAF, or the relevant the relevant Catchment Management Agency, will chair the individual forums. The Chairperson will be responsible for driving the various initiatives in the different business areas; arranging for presentations from various suppliers and/or specialists in the field of water conservation; and ensuring that all of the business sectors are aware of the latest developments and techniques in water conservation.

Guidelines for implementation

Short-term : Determine the need for water conservation forums and the capacity within relevant CMA to fulfil this requirement.

Medium-term : Design the functional and resource requirements for the forums.

Long-term : Establish the forums and co-ordinate the activities.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Determine the need for the forums	Y	!	!	!	!
2. Determine capacity for the forums	Y	!	!	!	!
3. Design functional/resource requirements	Y	!	!	!	!
4. Establish the forums	!	Y	!	!	!
5. Co-ordinate the activities	!	Y	!	!	!
	Y	!	!	!	!
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies	!	Facilitator		
WSP	Water Services Providers	!	Stakeholder		
BR	Business representatives				
IB	Individual businesses				

Note 5 : This strategy may be applicable to all User Sectors and consideration should be given to making it a joint strategy.

6.4.2. Investigations and pilot projects

Objective

Although many of the strategies described above comprise tasks that include pilot projects and investigations, these are better stated in a separate strategy. The increase in water prices in future and the ongoing need to review water resources allocations to ensure the most beneficial use of the resource both necessitate a need for increased knowledge and technology regarding water conservation. Some of the larger businesses have established research and development sections that can also concentrate some of their efforts on water conservation. The objective therefore is to compile a prioritised list of water conservation related investigations and pilot projects, and for both the businesses from the User Sector and the Government related institutions to become partners in addressing these research and development needs. It is understood that many of the businesses comprising the User Sector are in a competitive environment and it is not the intention to compromise confidential research and development programmes of individual businesses. The emphasis will be on collaborative research requirements.

Strategy

The requirements for research and development into water conservation in the User Sector will be determined and prioritised. Investigations and pilot projects will be conceptualised, designed and implemented according to the priorities.

Guidelines for implementation

Short-term : Determine the research and development requirements for water conservation in the User Sector.

Medium-term : Design and prioritise investigations and pilot projects in this regard.

Long-term : Undertake the investigations and pilot projects.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Determine the research requirements	Y	!	!	Y	!
2. Determine the research priorities	Y	!	!	Y	!
3. Conceptualise and design pilot projects	Y	!	!	!	Y
4. Implement pilot projects	Y	!	!	!	Y
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies	!	Facilitator		
WSP	Water Services Providers	ⓘ	Stakeholder		
BR	Business representatives				
IB	Individual businesses	!			

Note 6 : This strategy may be applicable to all User Sectors and consideration should be given to making it a joint strategy.

6.4.3. Support structures**Objective**

Many of the strategies described above have alluded to the establishment of support structures that can facilitate and promote water conservation in the User Sector. Once again, these are better stated in a separate strategy. The objective will be to determine the requirements for support structures and to develop mechanisms for implementing these.

Strategy

The type of support structures that are required will be determined, as will their roles and responsibilities, how they will function, and what their resourcing requirements will be.

Guidelines for implementation

Short-term : Determine the requirements for support structures.

Medium-term : Design institutional structures for the support structures.

Long-term : Implement the support structures.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Determine support structure requirement	Y	!	!	Y	!
2. Design support structures	Y	!	!	Y	!
3. Implement support structures	Y	!	!	Y	!
Key					

DWAF	Department of Water Affairs and Forestry	Y	Main responsibility
CMA	Catchment Management Agencies	Y	Facilitator
WSP	Water Services Providers	Y	Stakeholder
BR	Business representatives	Y	
IB	Individual businesses	Y	

6.4.4. Incentives and penalties

Objective

The savings realised can often cover the costs of implementing water conservation measures, but there is normally a need for some financial incentive or seed funding to initiate the process. The relevant authorities and the User Sector as a whole should strive to make water conservation a self-financing initiative.

Strategy

The Water Services Authorities, along with the Business Representatives, will devise a system of incentives and penalties that reflect the performance of businesses as is discussed in **Section 6.2.2**. These incentives and penalties could comprise part of the catchment management charge that will be levied to all users in future. . Cognisance will be taken of the investigations into economic instruments for general environmental management being undertaken by the Department of Environmental Affairs. Consideration could be given to amending the charge so that businesses that perform well will be given a rebate, and those that do not perform well will incur the full charge. The costs of the rebates will be determined such that they balance with the income generated from the full charges.

Guidelines for implementation

Short-term : Determine appropriate system of incentives and penalties.

Medium-term : Implement the system along with the performance management aspects.

Long-term : Review incentives and penalties according to current performance.

Responsibilities for implementation

Activity	DWAF	CMA	WSP	BR	IB
1. Design incentive system	Y	Y	Y	Y	Y
2. Implement incentive system	Y	Y	Y	Y	Y
3. Manage the incentive system	Y	Y	Y	Y	Y
Key					
DWAF	Department of Water Affairs and Forestry	Y	Main responsibility		
CMA	Catchment Management Agencies	Y	Facilitator		
WSP	Water Services Providers	Y	Stakeholder		
BR	Business representatives	Y			
IB	Individual businesses	Y			

Note 7 : This strategy may be applicable to other User Sectors and consideration should be given to making it a joint strategy.

7. GLOSSARY OF TERMS

The terminology used in the National Strategy Framework, as well the meanings of the terms, has been used in this document as far as possible. New terminology has also been introduced, the intended meanings of which are provided below.

Businesses

Reference is made in this document to the term "*businesses*", which is used to describe the collective business concerns in the industry, mining and power generation User Sector.

Water utilisation

The term "*water utilisation*" is used to describe the both the consumptive and the non-consumptive uses of water by the businesses, whether it be raw or potable water.

Consumptive use

"*Consumptive use*" of water refers to the water that is utilised by businesses in closed processes that do not generate wastewater and which effectively remove that water from the water cycle. A bottling plant is an example of a business that has closed processes where large volumes of consumptive use occur.

Non-consumptive use

On the other hand, "*non-consumptive use*" is the term used to describe the water that is utilised by businesses in open processes that generate wastewater and which can be recycled or discharged back into the water cycle for use by other users. It should be noted that many open processes are not efficient and that they often contain an element of consumptive use. Cooling is an example of an open process that can consume significant quantities of water, but which also discharges water.

Wastewater discharge

In this document, the term "*wastewater discharge*" is used very loosely and refers to both the quality and the quantity of water discharged. It refers to the discharge to sewer systems as well as to open river systems. Furthermore, the term also covers the diffuse discharge of polluted water into open river systems.

Water Services Authority

DWAF to insert definition.

Water Services Provider

DWAF to insert definition.

Water Services Intermediary

DWAF to insert definition.

Catchment Management Agency

DWAF to insert definition.