

IUCN (The World Conservation Union)
South Africa Country Office
Attn: Ms Ruth Beukman, Project Manager
Water Demand Management Programme: Phase II

Overcoming constraints
to the implementation of water demand management
in southern Africa

SOUTH AFRICA COUNTRY REPORT

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ABBREVIATIONS

ANC	African National Congress
CMA	Catchment Management Agency
CMIP	Consolidated Municipal Infrastructure Programme
DG	Director General
DDG	Deputy Director General
DPLG	Department of Provincial and Local Government
DRA	Demand Response Approach
DWAF	Department of Water Affairs and Forestry
EIA	Environmental Impact Assessment
GDP	Gross Domestic Product
HO	Head Office
IRP	Integrated Resource Planning
IWRM	Integrated Water Resources Management
LED	Local Economic Development
MAR	Mean Annual Runoff
MIIU	Municipal Infrastructure Investment Unit
MWAF	the Minister of Water Affairs and Forestry
NDA	National Department of Agriculture
NGO	Non Government Organisation
NIS	National Information System
NWA	National Water Act no 36 of 1998
PCP	Public Community Partnership
PPP	Public Private Partnerships
PUC	Public Utility Company
SSA	Support Services Agent
TBVC	Transkei, Bophuthatswana, Venda, Ciskei
UAW	Unaccounted-for Water
UBIG	Universal Basic Income Grant
UN	United Nations (Organisation)
WDM	Water Demand Management
WMA	Water Management Areas
WSA	Water Services Authority
WSI	Water Services Institution
WSP	Water Services Provider
WUA	Water User Association
ZAR	South African Rand

OVERCOMING CONSTRAINTS TO WATER DEMAND MANAGEMENT IN SOUTHERN AFRICA: SOUTH AFRICA COUNTRY REPORT

1 COUNTRY PROFILE

South Africa is a country with a highly developed infrastructure for supplying the water demands of the following sectors:

- commercial irrigation, and
- industry, mining, coal fired electricity generation and the majority of urban domestic users.

The current demand of these sectors, in the year 2002, is about 20 000 million cubic metres of water per annum. The population of South Africa is approximately 40 million people. Therefore the infrastructure supplying these sectors is capable of supplying 1 370 litres of water per day to each man, woman and child resident in the country.

Despite this, in the year 2000, the South African Department of Water Affairs and Forestry (DWAFF) estimated that 17,5 million South Africans did not have a basic water supply, as defined in section 3 of the regulations relating to compulsory national standards and measures to conserve water. If existing infrastructure were effectively managed, this number would fall to less than 7 million. Thus the management of water services in poor areas is currently a critical deficiency in the implementation of South Africa's water supply policy. WDM can play an important role in overcoming this shortcoming.

But a basic water supply is defined as a reliable water supply that brings 25 litres of water per day to each person in the community. That is less than 2% of the average 1 370 litres of water that could be delivered to each South African from the existing infrastructure. But worse than the basic inequity of planning water services on the basis of enabling the poor to have access to only 1,8% of the average that could be obtained from equal sharing, is the inevitable outcome of such planning. By planning water for the rural and urban poor almost exclusively on the basis of the minimum adequate amount required for **direct personal use** and not having any dynamic plan for making water available for **productive use** is to condemn these people to continued poverty. As the 1994 white paper on *Water supply and sanitation policy* states, this amount 'is not considered to be adequate for a full, healthy and productive life'.

South Africa's estimated mean annual total utilisable water comprising utilisable mean annual runoff (MAR) + return flow + available ground water – reduction in runoff due to forestry – net cross-border allocations, is about 37 000 million cubic metres of water per annum. Thus before allocating the reserve to protect aquatic ecosystems, as required by the National Water Act no. 36 of 1998, over 50% of South Africa's available water resources are already being utilised. Against this background South Africa's top macro planners are claiming that the country's water resources will be fully utilised 30 years from now.

This brief country profile therefore demonstrates:

- that there is an urgent need to implement basic WDM techniques to ensure that existing infrastructure is used effectively, especially in poor areas, and

- that there is an equally important need to investigate where the implementation of more advanced WDM techniques are required, over a period of time, to ensure that the eradication of poverty, the attainment of equity, continued beneficial economic development and the protection of aquatic ecosystems are not frustrated by water resource or infrastructure shortages.

2 CRITICAL NEEDS FOR WDM

Critical needs for WDM in South Africa include:

- In many areas of the country people do not have access to basic water supplies because users close to the water source are accessing all the water in the supply system. This is making it virtually impossible for government to address the inequity of the past.
- In other areas the water is currently available but the water services institutions are in a state of near financial collapse because demand is not managed and a high proportion of the water entering the system is not paid for. Water not paid for includes:
 - unpaid accounts,
 - system leakage losses,
 - national equitable share subsidies not being transferred to pay the recurrent costs of delivering basic amounts of water to the poor, and
 - water that has not been billed.
- The exclusive focus of national government and donors on the supply of basic water supplies for domestic and hygiene purposes is depriving people in many rural areas of any water for productive purposes, which keeps these people trapped in poverty. Thus people in these areas and even those who flee the poverty to seek a better life in informal urban settlements remain over-dependent on handouts from others in order to survive. (In 1995, 39,4% of households claimed an average of ZAR 267,25 per month from relatives and other community members, and 32,4% claimed an average of ZAR 430,55 per month from the state.)
- The water demand from existing infrastructure is rising and approaching the yield of the source or the capacity of the distribution system. In the meantime, very often, no serious analysis will have been carried out to check if the demand for water can be reduced at a social and economic cost that is less than the total cost of providing for the new demand. In addition, planners generally do not even check if the demand will still exist after the price of water has been increased to pay for the new infrastructure.
- Uneven development causes an unnecessary demand for water in some parts of the country, whilst in other parts of the country there is an abundance of unused water resources.
- Poor water demand management is causing an unnecessary increase in water treatment costs and/or water pollution. The neglect of wetlands is aggravating the problem.
- Groundwater is being abstracted at a rate in excess of the recharge rate.
- The existing water abstraction rates are damaging aquatic ecosystems and/or are making it impossible to satisfy the basic and developmental needs of people who are now, or who will be, relying upon water from the relevant resource.
- The mining sector tends to regard on-site water as a nuisance to be got rid of as cheaply as possible, with no thought to its management or possible economic or social value. As a result

water wastage, ground water depletion and surface water quality deterioration have all been caused by uncontrolled abstraction and dumping of water from mines to make it easy to allow mining operations to proceed without the threat of flooding. In addition, mine-dump management has also caused serious water pollution to both surface and groundwater, which can continue long after the mine has closed without the mining company leaving any provisions for a clean-up operation.

- Poor forestry practices and poor control of other vegetation, but in particular alien vegetation, are creating an unnecessary demand for water.
- Poor grazing and agricultural landcare practices are causing silt-laden water run-off to reduce the water storage capacity of existing dams. These practices are reducing the water demand that can be safely supplied by the dams.

3 CONSTRAINTS TO WDM IMPLEMENTATION

The critical needs for water demand management are frequently not being met because implementation is being frustrated for the following reasons:

- A lack of ongoing water management, and operating and maintenance financial resources at all levels, but particularly at the local government level, which leads in turn to poor managerial leadership, and a lack of institutional capacity and skills availability, in the geographical areas where this set of ongoing human and financial resources is most needed
- A lack of understanding by a critical mass of water sector stakeholders of many of the critical needs for WDM listed in section 2
- A culture of mistrust exists in which water users feel no obligation to pay for water services or control usage. This situation must not be confused with other water users that do manage their water use stringently and thereafter decide that it is more important and correct ethically to spend their meagre cash resources on basic foods etc for their family rather than paying for water services.
- A society which is willing to provide capital funds free, or make them easily accessible, to build new infrastructure, without even checking if it is really required and without checking if the institutional capacity and money resources are available to manage, operate and maintain the infrastructure after it is built. It should be noted, however, that when capital funds are in the form of a loan, interest rates are relatively high. The interest repayments in turn make it more difficult to collect the necessary financial resources for the ongoing management of the resultant scheme. (Refer the first bullet in this list.)
- Really large schemes like the Lesotho Highland Water Project get uncritical support and acclaim from the most surprising sources. The mission of The Endangered Wildlife Trust, a member of the IUCN, is to initiate and manage projects to protect endangered species and ecosystems throughout southern Africa. However Dr John Ledger, its President, in the trust's fifth annual published in September of 1997 writes: *Never before in Africa has so much attention and care been placed on the environmental impacts of a major engineering project.* Elsewhere he is negative about current WDM measures, stating: *The signs seem to indicate that South Africa will delay the construction of phase 2 as long as possible, by trying to control consumption through high tariffs and other water saving mechanisms that will be imposed on the embattled consumers of Gauteng.* Organisations like the IUCN need to take care that their organisations' names are not used to support dubious claims of this nature,

which appear to support the vested interests of big business, foreign and local, more than any of Gauteng's consumers, rich or poor. As they work for environmental protection, they must also work for environmental justice and be in the forefront of ensuring that the voice of the weak is heard.

- Of all the sectors, constraints in the agriculture and livestock farming sector are probably the most severe and complex. Very few resources are currently used to encourage or implement WDM in this sector, despite the fact that it receives more than 50% of all the water delivered in South Africa.
- In the large-scale established commercial sector little effort is being made to monitor and stop irresponsible wastage. The lack of WDM has many unwanted outcomes: unnecessary pollution and land damage; the unsustainable exploitation of groundwater resources; the withholding of all or an equitable share of what should be common resources from surrounding groundwater and downstream surface water users. Such irresponsible use also destroys the possibility of making water available to emerging commercial farmers at a reasonable cost.
- The previous comments refer to the substantial water savings that could be made from the more efficient use of water using existing distribution irrigation infrastructure. The next constraint is a lack of financial resources, incentives and interest within the sector to invest in more water efficient irrigation practices even when existing worn out infrastructure is being replaced. There also seems to be no instruments whereby the state can upgrade a WUA's or a farmer's infrastructure with the purpose releasing water for other users. Current advocacy emanating from government sources indicates that, if such instruments were developed, they are likely to be used almost exclusively to support urban use. Looking at equity and food security in the region as a whole, more imaginative planning is required (refer for example to the next two paragraphs). However there are no short cuts to progress, and merely increasing irrigation tariffs without understanding farmers' employment practices and total costs may cause mass retrenchments, as farmers take defensive action by trying to modernise their farms or abandon irrigation completely. The latter is most likely to occur when farmers' existing equipment needs replacing or their aging vineyards or orchards need pulling out and replanting. Demands for substantial increases in irrigation tariffs are not new. They were very prominent in the early 1900s when the Rand Lords sought to gain control of more water by reducing irrigation demands. We also need to reduce irrigation demand by the large-scale commercial sector, but it needs to be planned carefully and the resultant gains used mainly to increase water access to those most deprived and in need.
- In the emerging commercial farming sector, no one is taking responsibility for ensuring that beneficiaries of the current meagre land reform programmes are obtaining access to adequate water supplies, nor are they being taught the fundamentals of good WDM. The former could cause major conflicts in the years to come as the Government expedites its land reform and restitution programme in the wake of the Zimbabwe experience, as many land reform beneficiaries have staggeringly high expectations with respect to new irrigation development. The latter will be a lost opportunity, both in terms of getting one section of the agriculture sector managing water well before bad habits become entrenched, and in terms of defusing unreasonable expectations.
- But it is the subsistence farming sector in the ex-homeland areas that grow crops and tend livestock for family use, and consumption by local poverty-stricken neighbours which is taking on the major burden for poor WDM. This burden is likely to continue until there is a

comprehensive economic development policy specifically designed to reduce the growing gap between the rich and poor districts and people of South Africa.

- A lack of pollution monitoring and implementation of the polluter pays principle is also a cause for concern, in that it reduces the volume of useful water available for other purposes or at least increases water treatment costs. As reported in section 2, the mining sector is probably the worst offender in this regard but other industries are also not monitored sufficiently.
- Although South Africa has a well-managed focused programme to clear alien vegetation, known as the working for water programme, there is only a much smaller programme to deal with wider landcare issues. The importance of these two programmes to WDM is explained in the last two bullets of section 2.

4 OVERCOMING CRITICAL WDM CONSTRAINTS

4.1 Introduction

This section is divided into two main subsections. The first will examine **what** WDM needs implementing and **when** it should be implemented. It lays the foundation for the second section, which will examine **how** WDM should be implemented. The first section is required because unless one knows what needs to be implemented and when, it is not possible to decide how implementation should be carried out. Whilst being broad in content, the second section will have a strong emphasis on equity.

4.2 The ‘what’ and ‘when’ of WDM implementation

Table 1 gives a brief summary of different orders of WDM implementation for each sector and when they should be applied.

Each sector has unique features but there is one important principal that cuts across all sectors. As water demand approaches the current scheme’s capacity it is essential that all the stakeholders communicate well with each other. The aim of the communication should be to delay the development of new resources whilst WDM is the preferred option in terms of integrated financial, environmental and long-term planning considerations. In contrast, the following two scenarios where communication is lacking can have serious consequences:

- The bulk water suppliers assume the retailer’s customers will implement WDM to prevent significant increases in the price of bulk water, so they do nothing. The result: serious water shortages during the next drought, which cause loss of industrial and agricultural output.
- The bulk supplier goes ahead and builds a new scheme whilst the retailer and their customers implement WDM. The result will be excessive bulk water charges as the supplier tries to recoup all his additional costs without being able to spread these costs out against a greater demand. In addition, these costs will have to be added to customers’ now wasted expenditure, incurred to ensure that the new scheme was unnecessary.

4.2.1 Domestic water supplies

In section 3 it was reported that the most important constraint to the implementation of WDM and indeed the effective management of water supplies is a lack of financial resources for the ongoing operation and maintenance of schemes. Issues that impinge directly on both water demand and the paucity of financial resources include a high level of unaccounted-for water (UAW) and, even when bills are delivered, a high level of unpaid accounts. Figure 1 indicates approximately to scale the ratio between revenue and non-revenue producing water for the domestic water supply business of a typical

municipality in South Africa. In managing demand, the first items that need to be reduced are the non-revenue components. In South Africa it is government policy at the national level to supply **all** households with 6 kilolitres of water per month free. Therefore, **whilst there is no shortage of water in the current supply system**, it would be foolish for the retailer to discourage customers who are paying for their water to reduce their demand. It is also clear from figure 1 that, for the average South African municipality, the greatest gains are to be made by reducing high UAW and non payment levels.

Table 1: Different orders of WDM implementation and when they should be applied

Sector Classification of action	Domestic	Industry and thermal power generation	Mining	Agriculture	Stream flow reduction activities (forestry)	Catchment management
Urgent or ongoing	Control/reduce: water system losses other unaccounted-for water introduce strict credit control	Control pollution	Full IWRM not just WDM. Mines often cause serious pollution	Plant: high income crops low water demand crops	Care for beneficial indigenous vegetation	Collect information as described in section 4.2.5
Strategic	When extending coverage use DRA and multi-option feasibility study When planning any new waste water treatment plant, check the possibility of keeping domestic waste separate from industrial waste	When planning new industries or thermal power plants examine best strategy for the next 25 to 30 years	All mines: Ensure polluter pays the full cost of clean-up before mine closure New mines: minimise necessity for dewatering, maximise on-site water reuse	Control/reduce: bulk water losses When replacing worn-out equipment, take the opportunity to change the irrigation method to the most water efficient	Manage plantations Judiciously remove alien vegetation	Update and refine as and when necessary
As water demand approaches the current scheme's capacity	Ensure ongoing accurate demand forecasting and ongoing high level WDM implementation Increase the price of water gradually to the price it would be after the development of a new resource so that the true future demand is known					
	Consider retrofitting water-saving devices water-wise gardening	Investigate: treated sewage make-up additional on-site recycling reusing treated effluent elsewhere Consider alternative water-saving technologies. For example it may be possible to replace a part of the plant's evaporative cooling load by a non-evaporative alternative	Consider capital investment in more water efficient irrigation equipment	Consider transferring any expansion of stream flow reduction activities to a less developed area with more unallocated water	Focus on issues which affect equity, can beneficially delay the construction of infrastructure, and/or assist with integrated resource planning, as directed by the information collected	
NEVER DEVELOP NEW RESOURCES BEFORE ENSURING THAT WDM IS NOT THE PREFERRED ALTERNATIVE IN TERMS OF INTEGRATED FINANCIAL, ENVIRONMENTAL AND LONG-TERM PLANNING CONSIDERATIONS						

Some of the water use practices regarded by many as inefficient, for example, having a bath instead of a shower, or ignoring water-wise gardening principals, may be regarded as worthwhile activities from a particular customer's viewpoint, even after concerted WDM awareness-building by other stakeholders. However, not repairing leaks, on-site, and within the house, is irrational as the repair will have to be carried later as the leak gets worse.

Water supplied per month kilolitres/household	11	Revenue water	11	Metered, billed, paid for and used efficiently	21%
			10	Unmetered, billed, paid for and used efficiently	
	7		9	Metered, billed, paid for and used inefficiently	13%
			8	Unmetered, billed, paid for, and used inefficiently	
	3		7	Paid-for leakage on customer's property	6%
	13	Non-revenue water	6	Unpaid bills	24%
	19		5	Unbilled authorised consumption	36%
			4	Unbilled unauthorised consumption	
			3	Leakage on mains	
			2	Leakage on overflows and storage	
			1	Leakage at delivery point connections before any installed meter	

Figure 1: Typical components of a domestic water supply balance in South Africa

When coverage is being extended, even from an existing scheme, it is time to consider options carefully, with the future customers if possible. As Mike Rabie, the Head of the Water Section at Mogale City, said in an aside at a workshop, *'we had to offer expensive prepayment water meters to our customers, in order to help us and our customers manage water demand. This was because of the manner in which uncontrolled mains pressure connections were installed at each household's property, without realising that in poor areas such uncontrolled connections would be a management and affordability nightmare to both the customers and the municipality. Alternatives, such as converting the uncontrolled mains pressure connections to flow-controlled tank-head-pressure connections, were not regarded as viable since our customers had already being using the mains pressure connections for several years'*. The importance of Mike's aside is not the extent to which we agree with him but rather how it expresses the need for strategic thinking about the future when water supply services are being planned.

Although often not immediately beneficial, when a municipality is planning any significant water treatment plant upgrade it is good practice to examine the practicability of keeping the domestic sewage separate from industrial effluent. In this way the municipality will be laying the foundation for flexible treated wastewater reuse. When suitably treated, domestic sewage can even be safely reused as potable water.

When fittings are being replaced, gardens being re-laid out, or new properties being developed, it is always worthwhile investigating the use of water efficient options and checking out the long-term present worth value, based on anticipated future water prices. However once there is a need to consider augmenting current supplies it is essential that WDM alternatives be evaluated. In this

evaluation equity needs to be considered carefully. Suppose a municipality currently makes a surplus from all households using more than 18 kilolitres of water per month, and augmentation would require a 10% increase in such households' bills to retain the status quo. Is it equitable to increase such households' bills when it is the households using more than 36 kilolitres per month and new businesses that require the scheme augmented? Since the answer is no, it is important to negotiate with customers on the basis of the high volume users, who can most easily reduce their demand, being charged the tariffs needed to recover the full additional costs from the proposed new scheme. In this way many customers who usually ignore awareness building will be won over and the long-term growth in demand will be beneficially and equitably managed.

4.2.2 Industrial water supplies

Apart from ensuring that water system losses, other UAW figures and outstanding accounts are kept under tight control, it is imperative that WDM related to industrial water supplies also includes regular pollution monitoring and control, even on schemes where water is currently plentiful. Inefficient water use is often discovered in this way and the water quality is preserved so that it does not damage downstream ecological systems or become unusable for other downstream users.

Further WDM would generally impose an unnecessary additional cost on industry and reduce any surplus cash generated by the water services provider (WSP). Whilst the current demand is lower than the scheme's capacity, it is better to continue generating a surplus. The surplus can then be used to ensure that all urgent and ongoing WDM is maintained in an effective manner and, for example, to help upgrade the supply to domestic customers with an inadequate basic supply.

The majority of WSPs in South Africa charge industrial users for their water using a fixed monthly charge plus a single or two block volumetric tariff. The volumetric block or blocks are priced close to the top block for domestic customers and higher than the average cost of supplying water in the municipal area. Thus, industrial customers help WSPs to have sufficient resources to tighten up on UAW, billing and credit control in all its areas of supply. Once this tightening up has been achieved, the WSP should be generating a surplus, which should generally be used in poorer areas as per the example suggested above, rather than for subsidising a rich area.

When building new industrial facilities and even institutions like hospitals and office blocks, it is cheaper at least to plan from the design stage for the desirable optimal water usage rather than the WSP surprising the facility owner at a later date with sudden water or effluent tariff increases. Therefore, when new facilities are being planned, it is good practice for the WSP and the facility designer to get together to brainstorm different water supply and usage, and effluent disposal options, so that the facility designer can decide how best to handle likely future service price increases.

As intimated earlier, well before the WSP or a bulk-water supplier decides to augment a scheme, existing industrial water users need to be warned so that they can decide if further WDM is preferable to the augmentation. The Mogale City case study (refer volume 4) postulates that curtailing the demand through gradual water services price increases, so that no augmentation is necessary, may strengthen the WSP financially without causing any additional **unnecessary** burden on customers.

Water services costs are normally less than 3% of an industrial business' operating costs. They therefore usually absorb price increases without moving, going out of business or reducing their workforce. Such knowledge must never be used to increase tariffs unnecessarily.

4.2.3 Mining

Mining is a particular type of industry that can cause serious environmental damage both from the mining operation itself and subsequent refining, washing and surplus material dumping processes. The negative effects of mining can even continue long after the mine has closed. This situation demands that before a mine opens, a comprehensive environmental impact assessment (EIA) be done to plan how the mining and all other on-site activities will be carried out. This planning process requires fully integrated water resources management (IWRM), not just WDM. After opening, it is imperative that monitoring and corrective action continue to ensure that all the agreed procedures are carried out and new situations are properly catered for.

Regardless of whether a comprehensive EIA was carried out before any particular mine opened, it is imperative that the polluter pays principle is fully enforced if at all possible. Fully enforced includes ensuring that there is money available for any ongoing clean-up that may be required after the mine closes. At the same time it would not make sense to close an old mine on the basis of suddenly enforcing the polluter pays principle and then still leaving government with the clean-up work. Mine de-watering can affect other people's rightful access to water, and the ecological reserve. Such mining outcomes need to be foreseen, allowed for, and monitored. Finally, corrective or compensatory action needs to be taken, such as treating the water and returning it to those who previously relied on local groundwater.

In addition when a new mine is being planned special attention should be paid to WDM.

- De-watering should be minimised.
- De-watering water, even when minimised, can often supply the full needs of the mine and all other related activities. Assuming this is the case, no outside water should be provided.
- If de-watering water is plentiful, care must be taken not to use it indiscriminately. Just returning it to the stream flow for ecological purposes could well be the preferred option, even when there are currently no unfulfilled downstream human demands.

On any mine the full range of WDM techniques should be used where water that is currently being used by the mine could be beneficially transferred to other users.

4.2.4 Agriculture

Water use in South Africa is still dominated by large-scale irrigation. In addition, many writers claim that water usage efficiencies in the sector can be improved by up to 30%, whilst in other sectors the comparable figure is 15%. Under current circumstances, however, much of the 30% improvement cannot be realised because it requires capital investments which the sector is unable and, in a few instances, unwilling to invest, mainly due to the low profit margins from investing in the sector.

Against this background, the only options that the sector is likely to be able to implement widely are changing to high income and low water demand crops. When worn out equipment is replaced it is important that the opportunity is used to change the irrigation method to the most water efficient available. The irrigation sector has high bulk-water transmission losses. Every opportunity should be used to reduce and control these.

When the water demand in an area approaches the capacity of current schemes in the area, whether or not there are other water resources available, capital investment in more-water-efficient irrigation equipment should be evaluated holistically against developing new water resources.

4.2.5 Stream flow reduction activities

There is a continuing need for:

- the protection and care of beneficial vegetation, which must never be exploited in an unsustainable way,
- the effective management of commercial plantations and community wood-lots,
- the judicious removal of alien vegetation (and other landcare programmes as a part of effective IWRM)

When large commercial plantation owners wish to expand their operations, the total economic and social benefits of insisting that further expansion take place in a less developed area with plenty of unallocated water should be compared holistically with the benefits of allowing the expansion to take place contiguously. Often contiguous expansion means buying out productive farms. This may add value to total earnings but total earnings would be even higher if the existing farms were left intact and forestry expanded to more marginal land. Such expansion would have better equity impacts and could even be used to rehabilitate degraded land.

4.2.6 Catchment management

South Africa is divided into 19 water management areas (WMAs). From the beginning WMAs need to collect data to enable them to plan for the equitable, effective and sustainable use of the area's water resources. The resultant planning should include WDM.

When the three cornerstone principles of equity, effectiveness and sustainability are considered in an integrated way, the following action needs to be taken in each of the 19 WMAs to assemble the necessary information:

- Estimate the ecological reserve and promulgate rules for groundwater use to ensure protection of wetlands, lakes, estuaries, rare vegetation and game and other valuable ecosystems, as generally required by clause 1(1)(xviii)(b) of the NWA.
- Estimate the basic human needs reserve not already included under current demands. The basic human need reserve is defined in clause 1(1)(xviii)(a) of the NWA and in clause 3(b) of the regulations relating to compulsory national standards and measures to conserve water promulgated in terms of clauses 9(1) and 73(1)(j) of the Water Services Act. It is based on a figure of 25 litres per person per day.
- Estimate a basic productive use reserve equal to an average minimum of 75 litres per person per day in each community not already included under current demands. This reserve is proposed in this report as a minimum quantity to be put aside to promote equity and poverty eradication.
- Estimate the total existing gross demands:
 - domestic
 - industrial, institutional and commercial

- thermal electric power generation
- mining
- livestock watering
- irrigation, vegetable gardening and fruit tree cultivation
- forestry
- other demands within the WMA
- inter-basin transfers
- cross country border allocations.
- Gross demands include distribution losses and return flows
- Estimate return flows.
- Estimate total utilisable water.
- Estimate the yield of existing dams and bulk supply infrastructure, highlighting areas where the demand is approaching the available water.
- Estimate future demands, making sure to note when demands from outside the WMAs only represent one option for satisfying a future demand. For example future water demands from the Upper Vaal WMA could be satisfied by Lesotho or the Thukela WMA.

The above information will indicate in which WMAs the following issues are, or are soon likely to become, critical, so that they can be targeted for corrective action:

- equity issues
- current scheme assured yield or capacity issues
- total water availability issues

This knowledge in turn will indicate which WMAs have the greatest need to refine information and update it annually, and on which issues they need to focus their WDM initiatives. It is assumed that WDM measures that ensure the day-to-day financial wellbeing of WSPs and WUAs are firstly the responsibility of the WSPs and WUAs themselves and that WMA institutions should focus on IWRM and integrated resource planning (IRP). Until they are called upon to allocate more water, WMA institutions will not probe UAW or non-payment issues.

IWRM however includes:

- the registration of water users and the allocation of water ‘use’ licences, as intimated above
- the monitoring and control of all stream flow reduction activities and unplanned manifestations of same, and, perhaps, the decentralised management of alien vegetation removal projects (known as the working for water programme) and other landcare programmes.
- the monitoring and control of all de-watering and water usage at mines
- the monitoring and control of water pollution activities and occurrences
- the monitoring of rainfall, stream flows and dam and groundwater levels
- the monitoring and control of ground water levels.

The above activities are included in a WMA institution's responsibilities, because their control does not immediately benefit individual water users or retailers. Although it is essential that WMA institutions see that all these monitoring and control activities are carried out, each of them, except the registration of water users and the allocation of water 'use' licences, could be delegated to a variety of stakeholders, including water users themselves.

4.3 How WDM should be implemented

4.3.1 Equity a central issue

A central theme of South Africa's National Water Act no 36 of 1998 is equity. In faithful response, this paper prioritises those WDM constraints that prevent equity being achieved as one of the most important set of constraints to be overcome. In doing so, optimal water allocation objectives will also be dealt with, as will many of the issues concerning sustainability and the fears of top macro planners that all the country's exploitable water resources will be fully developed and in use 30 years from now.

Traditionally, potential water users have claimed the right to use water on the grounds that by transferring the right from the water's current user, South Africa's GDP would be increased. Even using very traditional economics this argument was often invalid because if the new claimant moved somewhere else, where 'new' water could be allocated, South Africa's GDP would increase more. However this paper argues that increased GDP is a poor measure of a country's improved wellbeing. Other factors also need to be taken into account. These are:

- will the new water-using enterprise create a net increase in jobs?
- will it bring any benefit to the currently most disadvantaged people or areas of the country?
- will it widen current income gaps?

Taking these factors into account does not mean that licences will only be issued to users who propose water uses that impact positively on all three of these factors. However, it does mean that when proposals are being considered which do not improve equity, alternatives should be solicited and evaluated through integrated resource planning (IRP). In this context, IRP is defined as a process to maximise social benefits whilst caring for the environment at the least total cost.

Sometimes this process leads to a clear win-win outcome. Take for example a new industry opening in an area where extensive inefficient irrigation is taking place. In such an environment, rather than developing a new water source, it is often cheaper for the industry to enter into an agreement with the irrigators to invest in capital improvements to increase water use efficiency in exchange for the irrigators making water available at a low charge. Encouraging the forestry sector to expand into poor degraded areas can also result in the maximum benefits at the least total cost, but the cost/benefit analysis for the forestry company taken in isolation may not look attractive. In such circumstances the state may well have to consider incentives, as well as refusing to issue a permit for another area, to achieve the desired outcome. But even in such circumstances it may sometimes be possible for the forestry company to share the risks and benefits by entering into agreements with small growers. Sappi KwaZulu-Natal currently supports and buys timber from over 9000 small growers. DWAF needs to facilitate such agreements by simplifying the permit system.

Regardless of the exact mechanisms used, South Africa cannot continue down its current path. The poorest 50% of the population are getting poorer by an average of 1,6% per annum whilst the richest 10% are getting richer by 1,7% per annum. Already by 1991 intra-racial class-driven inequality was contributing more to overall inequality than inter-racial apartheid-driven inequality. Since 1994

all indications are that this intra-racial class-driven inequality is continuing to grow. Whilst South Africa probably has a further 7 or 12 years to reverse the last 8 years growth in inequality, it should be acknowledged that the current situation is as unsustainable as the apartheid era. Isn't it therefore time for all South Africans to agree that **the main thrust of affirmative action must change radically from focusing on previously disadvantaged individuals and groups to focusing on individuals and areas that are currently income-impooverished and excluded from the main social-stream?**

The water sector taken as a whole may be closer to the correct path than other sectors, and it cannot change South Africa on its own. However it is still not clearly on the correct path. With DWAF support, it needs to focus more on WDM that promotes equity and sustainability rather than just counting the number of persons having a new tap installed within 200 metres of their home. In the rural and peri-urban areas, DWAF, the National Department of Agriculture (NDA), the Department of Provincial and Local Government (DPLG) and local government itself also need to focus on building up self-reliance and empowerment, right down to the village level. If they fail to do this, they will also be failing to implement 'a system of local government which is centrally concerned with working with local citizens and communities to find sustainable ways to meet their needs and improve the quality of their lives' (Minister of DPLG, Valli Moosa, in his foreword to the white paper on Local Government, March 1998). Even in urban areas, but especially in poor urban areas, a high degree of interactive participation is required to achieve these aims of local government and to set South Africa on an equitable developmental road. The following subsections take these issues further.

4.3.2 Water delivery institutions

The majority of WDM measures are motivated or implemented by water delivery institutions. As a result, as indicated in the Mogale City case study written as a support document for this study (refer volume 4 case study 1), without strong institutions with a minimum critical mass of financial resources, and skilled and motivated human resources, no WDM will take place. Instead the delivery institutions' own distribution pipework will become the source of significant water wastage. For this reason, the following two subsections examine how South African water delivery institutions, whilst contributing to equity imperatives, can obtain the necessary financial resources before they consider the best means of overcoming the other constraints to implementing WDM.

Because weak institutions cannot implement WDM and will not be sustainable if the delivery infrastructure is complex, it is recommended that no complex infrastructure be built without a feasible ongoing management, and operations and maintenance plan being put in place. For domestic water supplies, for example, it is often far better, in terms of both sustainability and WDM, to install handpumps initially, and only after building up the necessary community level management and maintenance systems to proceed directly to constructing a distribution system comprising various levels of on-site connections.

4.3.3 The development of appropriate domestic and urban industrial water delivery institutions

In South Africa both domestic and urban industrial water have been delivered by the same institution. This is a satisfactory arrangement and is not expected to change.

South Africa's Constitution, Act no 108 of 1996, mandates local government to play a critical role in facilitating the building of local communities and environments through promoting people-

empowering social and economic development. At a more mundane level, local government is responsible for ensuring that everyone has access to a variety of services. With respect to water, as the Water Services Authority (WSA) (in terms of the Water Services Act no 108 of 1997), local government is responsible for ensuring that Water Services Providers (WSPs) deliver potable water supplies and sewage disposal systems. The national government and provincial governments must support and strengthen the capacity of municipalities to manage their own affairs, to exercise their powers and to perform their functions. The responsibilities of national departments and their regional offices, like the Department of Water Affairs and Forestry, are mainly regulatory and supportive.

Along with its Bill of Rights, in decentralising power in this way the Constitution holds out great promise for the development of a strong equitable non-racial South Africa. However to enable these potentially vibrant local municipalities to work well countrywide, three things are essential:

- Substantial powers have to be devolved to local government.
- Each municipality must have sufficient revenue to carryout its functions.
- Particularly in poor areas, local government's people-empowering role must infuse the manner in which it carries out all its other responsibilities.

Generally national government devolved sufficient powers through various acts including:

- the Municipal Demarcation Act no 27 1998
- chapter 5 of the Municipal Structures Act no 117 of 1998
- chapter 3 of the Municipal Systems Act no 32 of 2000.

Serious confusion has, however, been caused in the poorer areas of the country by national government giving WSA status to category 'C' district municipalities whilst making equitable share payments to category 'B' local municipalities. In addition, chapter 11 of the National Water Act gives the Minister of Water Affairs and Forestry the power to establish and operate government waterworks (and to transfer, sell or otherwise dispose of same to any person or association) and chapter 6 of the Water Services Act makes water boards ultimately answerable to the Minister. These provisions are fully consistent with the Constitution, but this division of responsibilities does weaken local government's powers to ensure the efficient implementation of WDM.

Section 214 of the Constitution calls for nationally raised revenue to be divided in an equitable manner among the national, provincial and local spheres of government. In the 2002/3 budget the equitable share allocation to local government rose to ZAR 3,85 billion. This amount represents a mere 1,34% of the budget expenditure. It is totally inadequate for a sector in deep crisis. However it does represent a 40% increase over last year's allocation, which allows some room for hope. Allocations are based on the recurrent costs of providing basic services to poor households but do not take into account individual municipalities' ability to cross-subsidise services internally. Thus, apart from the total allocation being inadequate to provide each municipality with sufficient revenue to carry out its functions, the basis of allocation is seriously flawed. It needs rather to be based on a true understanding of the gap between each municipality's capacity to raise revenue internally and the minimum recurrent funding needed to carry out its total responsibilities. Only by improving the distributive efficiency in this manner will national government be able to afford to provide sufficient funding for the weakest municipalities. Currently poor municipalities are not adequately or

appropriately funded, and until such funding is made available municipalities will not be able to carry out their responsibilities adequately and WDM will suffer.

A paper titled 'Implementing South Africa's free basic amount of water policy' delivered at the Water Africa 2001 conference takes the concept of adequate and appropriate funding with respect to water services a step further. It proposes a method by which national water supply subsidies and levies can be paid or charged to local government. The recommended subsidies/levies are based on the level of service being provided to customers and the quantity of water being delivered. Higher levels of service, up to on-site flow-controlled connections for individual households, receive higher subsidies. A high water consumption attracts a levy. Although the paper mainly motivates the subsidy/levy on the basis of achieving equity, it has sound WDM implications.

The third essential requirement to enable local government to succeed in promoting local development and in ensuring that everyone has access to a variety of services relates to how it carries out its functions. An in-depth discussion on this issue is beyond the scope of this paper. At the same time it is clear that well managed water services are a precondition to the implementation of WDM. Thus it is essential to understand that in poor areas this will not happen unless local government responds to inclusive community demands when facilitating the construction of new water projects and thereafter appoints and capacitates community institutions as Water Services Providers (WSPs). This is known as a community empowerment process.

International experience has clearly shown that a national policy that adopts a community based empowerment strategy and encourages and empowers local government to be accountable to its electorate in this way are facilitating the attainment of affordable, effective and sustainable water supply management. This building of self-reliance and broad cooperation between communities and local government also helps lay the foundation for further local economic development, so that in the future more people will be able to pay for services. In contrast, national government departments and provincial governments seem not to trust local government or the civil society that elected them. Rather than decentralising control, they are demanding that local government officials be accountable in the first place to the regional staff of national departments rather than to the locally elected representatives of the people and to local civil society. In turn local government is not encouraged to empower civil society. Take for example the 'Generic public participation guidelines' published by DWAF in September 2001. The introduction states *Public participation does not mean that the public makes decisions together with the decision-makers. Rather, it means that the public's views and opinions are available to decision-makers and are considered in the decision-making process.* Such a dis-empowering attitude towards civil society subverts the ruling party's finest traditions, and destroys any possibility of poverty eradication in South Africa.

Far better to ensure that the performance of the regional staff of national line departments is measured in a large part by how they respond to calls for assistance from municipalities. In this way local government can ensure that national programmes and policy are adapted to local conditions and needs. It also gives local government a chance to coordinate the work of these national departments. This has been found useful in other developing countries. Lastly, municipal councillors tend to favour small developmental projects and if empowered they can often tip the scales against the implementation of unnecessary large and expensive (water?) projects proposed at a higher level. With such empowerment and a greater involvement of grass roots civic organisations, phase 1b of the Lesotho Highlands Water Scheme would have been delayed.

In conclusion, it is recommended that national government and the provincial governments empower and make adequate financial resources available to local government for it to perform the functions set out in the constitution. In this way local government, in partnership with civil society, can be empowered to set up sustainable domestic water service providers (WSPs). In poor areas this will most probably mean setting up public community partnerships (PCPs) as WSPs. In more developed areas local government may well find it more appropriate to have a water section within the municipality itself acting as the WSP or to form a separate municipal controlled non-profit public utility company (PUC) to perform the same function. NGOs and private sector development orientated consultants can play an important role as support services agents (SSAs). The primary functions of SSAs should be facilitating institutional transformation, and capacity building and skills training at both the WSA and WSP level. National government representatives and departmental officials, and other closely associated advisors, often encourage the formation of public-private partnerships (PPPs) for the delivery of essential services. This is seen as a misplaced faith in the market and foreign advisors, and a misplaced mistrust of local government. Apart from other advantages and disadvantages of PPPs, their narrowly defined profit motive makes higher order WDM just that much more difficult to implement when PPPs are appointed as WSPs.

4.3.4 The development of appropriate productive water delivery institutions

In South Africa, since the passing of the National Water Act (NWA) no 36 of 1998 all productive-water delivery institutions will be statutory bodies approved by the Minister of Water Affairs and Forestry under section 92 of the Act. Such bodies are called water user associations (WUAs). WUAs are cooperative associations of individual water users who wish to undertake water-related activities for their mutual benefit. The ability of a WUA to recover costs is obviously vital for its continued healthy existence. In terms of section 61 of the NWA, the Minister can give financial assistance to WUAs in the form of grants, loans or subsidies to support projects for the settlement of emerging farmers or the development of subsistence farmers. DWAF has not yet developed a general policy on what financial assistance is likely to be granted. Community gardens, subsistence farming and animal husbandry can all improve the quality of life of people engaged in such activities and their neighbours but may not be self sustaining in areas of deep poverty. In such cases, the Minister should consider giving up to 90% grant funding for the capital cost of basic projects, and thereafter some modest operating and maintenance subsidy, subject to some simple proof that the project is being managed effectively. Additional information and discussion on current DWAF thinking with respect to raw water supplies is given in the Agriculture sub-section of section 4.3.5.

A better approach in poor areas may be to ensure that projects and services originally motivated as domestic water supplies look more carefully at the broader economic and nutritional benefits that can be gained from implementing more integrated projects. As a study by Bruce Gross *et al* of community schemes in 15 countries concluded: schemes that take into account all the informed demands of both women and men, the poor and better off, are better sustained and managed. In addition they are more effectively and widely used in terms of improving the quality of life of the whole community.

A study of a number of rural schemes in the Bushbuckridge area of Limpopo Province by de Mendiguren and Mabelane gives some idea of the improved economic wellbeing achieved by such integrated supplies. The study also gives some idea of the resulting demand that has to be managed. Villages studied were divided into two groups: those classified as 'poorly served' with a poor water supply, and those classified as 'better served' with a better, more reliable supply. The study revealed

that good money was made from brewing beer, operating hair salons and making ice lollypops. However these activities did not involve a high percentage of households or consume much water. As this means they have little effect on the water demand they will generally not be discussed further. Other households studied were involved in the following activities: goat rearing, cattle rearing, informal building, fruit tree cultivation, and vegetable gardening. Figures 2 to 6 indicate:

- the amount of water used per household business depending on the activity,
- the percentage of households involved in each activity,
- the average gross margins achieved by households involved in each activity,
- the average gross margins per kilolitre of water used, assuming all households use the optimum amount of water for the activities as recommended by the Agriculture Research Council, and
- the cumulative effect these activities would have on the average per capita amount of water used by the total population, again assuming optimal water use.

Reference to figure 3 will reveal that some households are engaged in more than one activity. For the study, gross margins was defined as income assuming all consumed production was sold at 1997 local prices less total recurring production costs. The cost of water was excluded from the production costs because it varied so much from village to village. Also, not all consumed production was sold.

Figures 2 to 4 report on the parameters examined for villages with a poor water supply and those with a better water supply. The average gross margin for **all** households from the activities listed is ZAR 156,00 per month for the poorly served villages and nearly twice as much, ZAR 306,00 per month, for the better served villages. Thus, the study gives a rough indication of the added value of production achieved in a poor area through the availability of a poor and an improved water supply. The average income per household in the Bushbuckridge area, according to the 1996 census, is ZAR 858 per month. Thus a water supply reliably delivering a modest 43 litres per person per day for productive purposes supported activities that resulted in the production of goods with a gross margin value equal to 36% of the average household income in the area. The availability of these goods locally also improved the quality of life in the area.

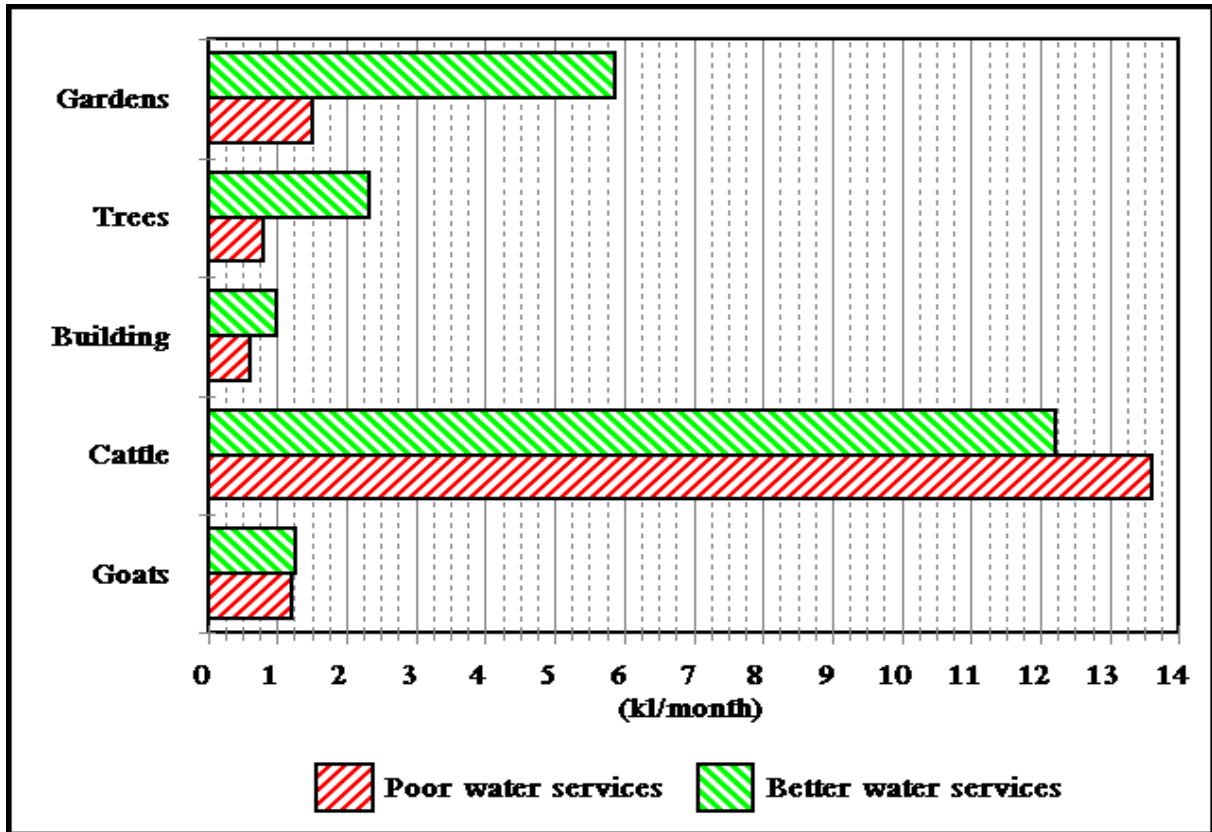


Figure 2: Water used per household business depending on the activity

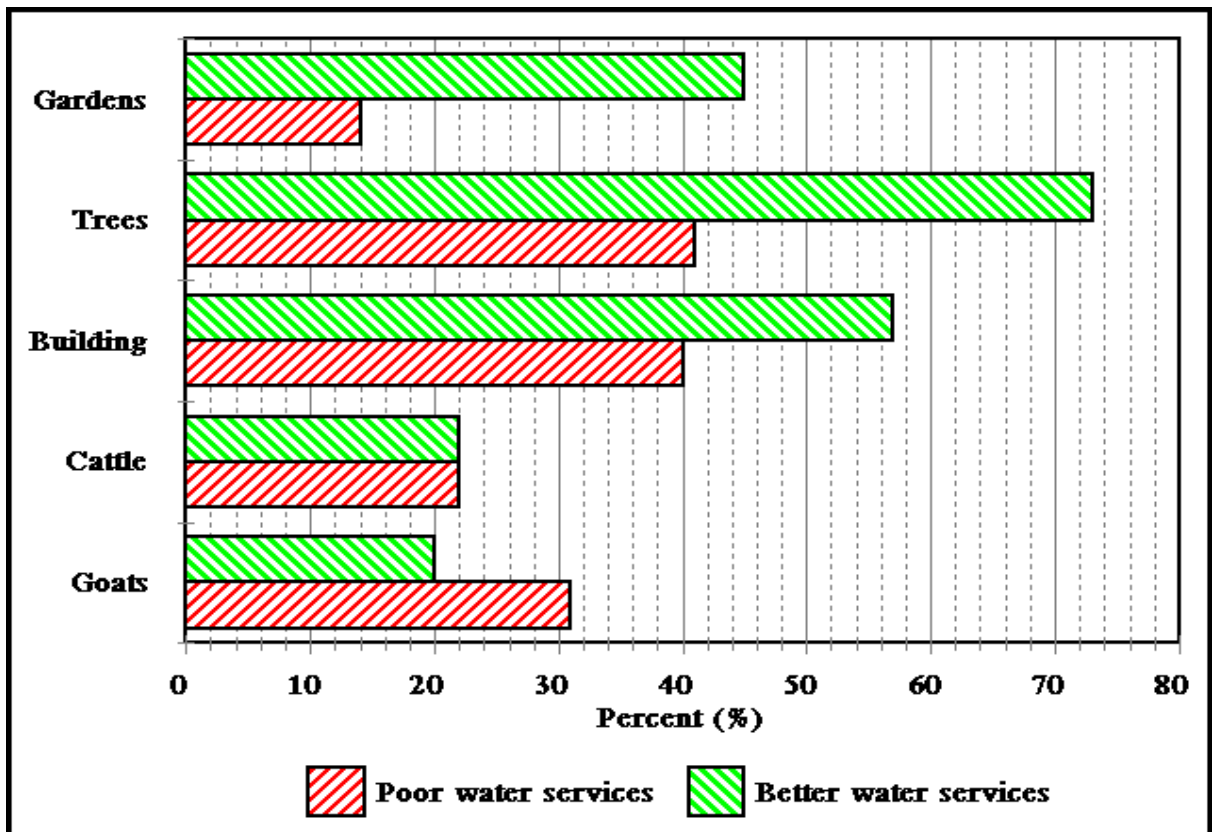


Figure 3: Percentage of households involved in each activity

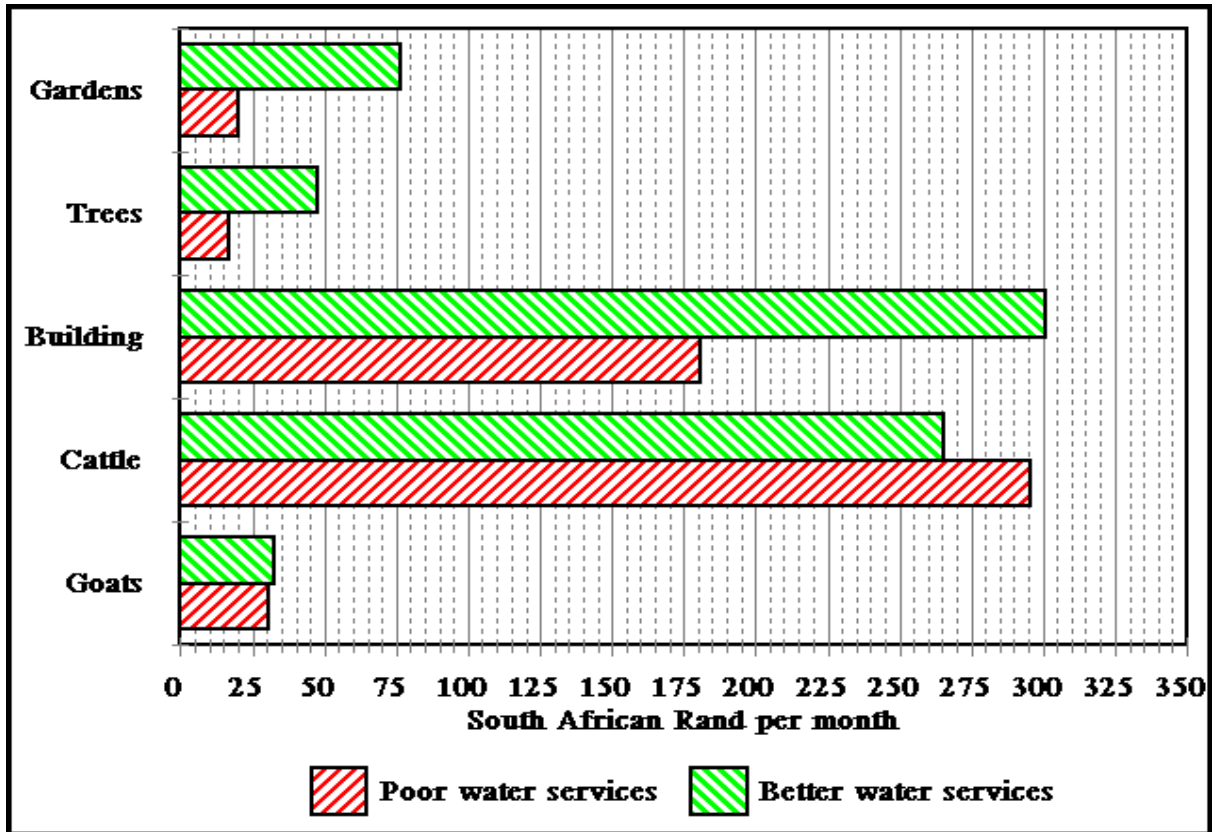


Figure 4: Gross margins per households involved in each activity

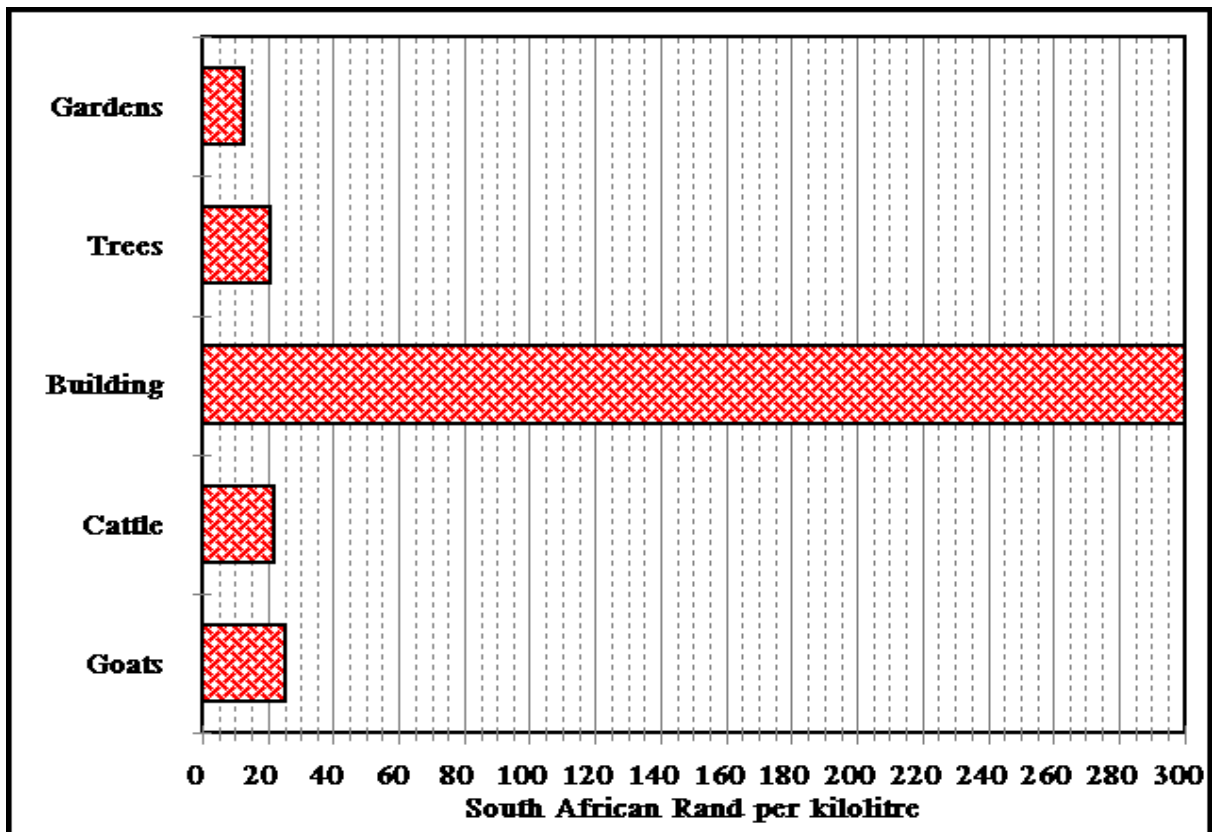


Figure 5: Gross margins per kilolitre of water used in performing each of the activities

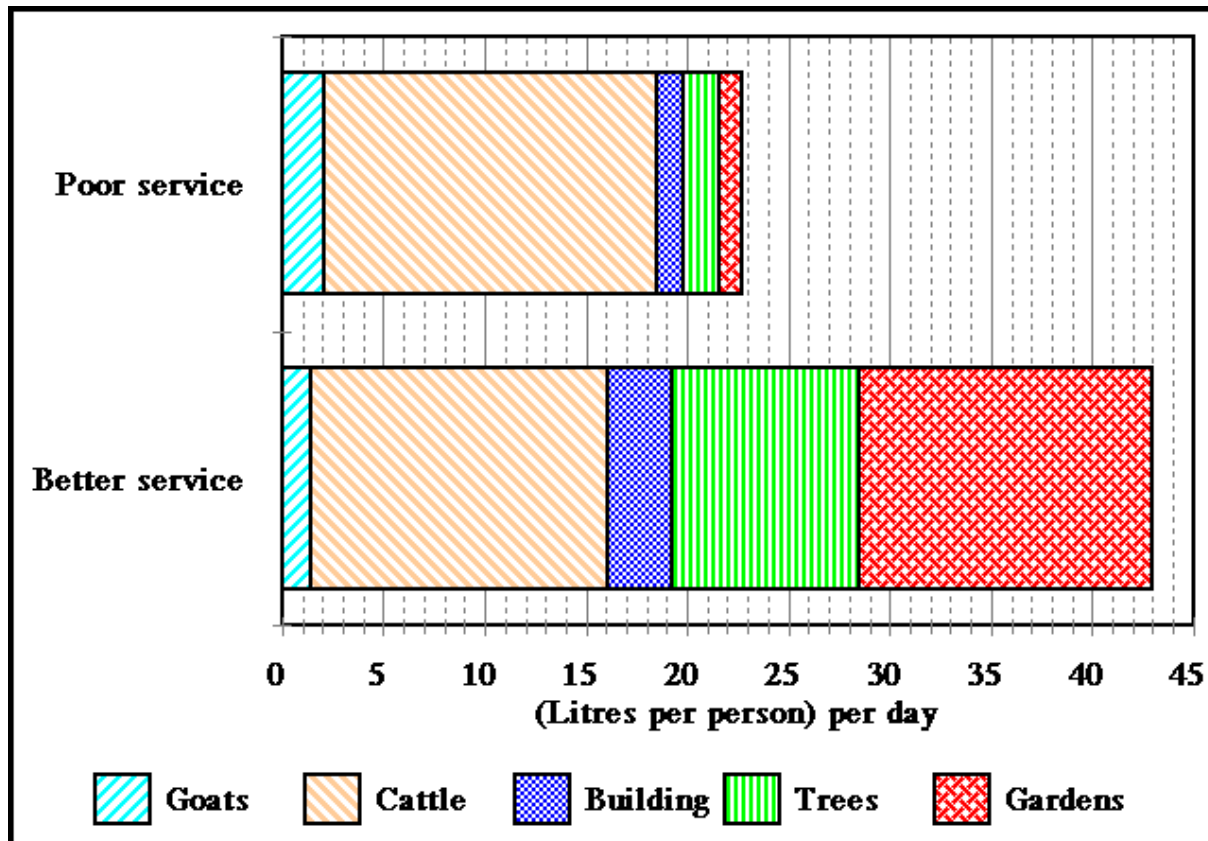


Figure 6: Water used for activities listed averaged over the TOTAL population

Equitable demand management insists that other poor and even poorer communities throughout South Africa obtain such quantities of productive water. It is likely that it will often be cheaper to make this water available by integrating it into the domestic water supply, especially if, as in the Bushbuckridge area, the household's domestic delivery point is where the customer needs the productive water delivered. With current DWAF policy such integrated grant funding is extremely difficult. But since the 2000 local government elections, rural and urban areas fall within the same municipality. It is therefore recommended that, where practical from a local water resources viewpoint, the DPLG should encourage communities to apply for grants from the Consolidated Municipal Infrastructure Programme (CMIP) on the basis of making an average of about 100 litres of water per person per day available for both basic personal and productive needs. Depending on a community's existing 'wealth', a portion of the funds required to increase the scheme's capacity from 25 to 100 litres per person per day should be raised in the community.

Figure 5 is of particular importance because it indicates that unless water costs are kept low for the typical rural activities, such as goat rearing, cattle rearing, fruit tree cultivation, and vegetable gardening, gross margins will drop significantly and the activity will not be attractive for community members. It is therefore essential that for these activities the municipality should only recover the variable delivery costs. These costs are explained in 'Water tariffs and targeted subsidies', a support document produced for this study (refer volume 4, implementation tools). The manner in which the volume of water used for these activities is measured, will vary from village to village. However for this sub-section it is assumed that the family's total usage is from a single delivery point, and that this total usage will be either controlled or measured.

The gross margin per kilolitre of water used in more urban productive activities, even when they are conducted on a low output informal basis, is generally much higher than that for typical rural activities. This is clearly illustrated with respect to building in figure 5. The source document (de Mendiguren JCP and Mabelane M, 2001) indicates that the gross margin per kilolitre of water used in beer brewing, operating hair salons and making ice lollypops is even higher than for building. Therefore no special tariffs should be made available for these activities. Assuming that the family's total water usage is from a single delivery point, from an administrative and general equity viewpoint, it is probably best to combine the productive water usage with the household's domestic usage and then charge for the combined usage at the municipality's standard domestic tariffs. Should the household need or demand a separate meter for its productive water use, then it should be given it and pay the applicable industrial or institutional connection fee and tariffs.

Where a community carries out its rural productive activities away from the domestic dwellings it may well still be sensible to integrate the community's domestic and productive water supplies. However, in such a case, to obtain water at a tariff corresponding to the municipality's variable cost the users should form a WUA, and obtain the water from a minimum number of delivery points so as not to place an undue burden on the municipality. Even, where supplies are not integrated, municipalities and WUAs should check what synergies can be obtained through sharing some administrative and technical resources.

4.3.5 Applying WDM to different sectors

Domestic

The Mogale City case study, (refer volume 4, case study no 1) written in support of this study describes broadly how to introduce WDM in the domestic water sector. The two urban domestic advocacy notes, and the three notes on implementation tools (refer volume 4), also produced in support of this study, give addition focused information on various topics associated with the implementation of WDM in the domestic water sector.

Unfortunately Mogale City is not typical of South Africa. Take for example Odi Retail, which has few middle to high-income domestic customers and few large industrial customers. In addition there is poor support for cost recovery or water usage management from the local councillors in the area. Within this environment Rand Water formed a three-year public-public partnership with the transitional local councils in the area, to help ensure that potable water supplies became technically and financially sustainable. What was achieved over the three-year period, as recorded in table 2, looks promising.

Table 2: Core technical details for Odi Retail September 1998 and September 2001

Item	Units	Sep '98	Sep '01
Registered connections	number	29 000	58 000
Bulk water purchased	kl/mth	1 700 000	1 600 000
Accounted-for water	kl/mth	700 000	1 100 000
Unaccounted-for water	%	59	31
Water usage per connection	kl/mth	24	19

As well as connections being registered and billing being improved over the period, leaks on customers' properties were fixed after a minimum night flows survey; pressure management, zonal metering and water loss management were introduced; flow restrictors were installed for non payment; and cut-offs introduced for tampering with the restrictors. After cuts-offs, illegal reconnections are common. It should be noted that the number of connections did not increase from 29 000 to 58 000. The increase in number was almost entirely due to the regularisation of unauthorised connections.

However an even briefer look at the approximate cash flow, given in table 3, indicates that Odi Retail is not sustainable without strong councillor support for customers paying their bills and without the Council making good the remaining more modest deficit. Since re-demarcation and the local government elections of 2000, the majority of Odi Retail's customers live within the boundary of the Tshwane (Pretoria) Metro Council. There are indications that the Metro and its staff will build on the foundations laid by the three-year public-public partnership and ensure the proper management of Tshwane section of Odi Retail.

Table 3: Brief financial cash flow details for Odi Retail in a typical month year 2000

Item	ZAR per month
Cost of bulk water purchased at ZAR 2 per kl	3 200 000
Cost of O&M: say ZAR 24 per connection	1 400 000
Therefore, total resultant costs =	4 600 000
Amount billed: ZAR 3 000 000	
Amount paid 40% =	1 200 000
Resultant DEFICIT	3 400 000

Other areas are even worse, with Local Councils failing to pass resolutions agreeing to water charges that begin to address financial sustainability and equity issues. It currently appears that over 50% of water service providers are giving an unacceptable quality of service to the majority of their customers, and are financially unsustainable. WDM, and in poor areas central government financial support, will be central tools in overcoming many of the challenges these utilities face. These challenges need to be faced as a matter of urgency, whilst realising that the complete transformation of some utilities will take 10 years.

It also needs to be stressed that well designed tariffs and financial support on their own will not achieve WDM and an acceptable quality of service. Sadly, there are poor urban and densely populated peri-urban and rural areas in South Africa where both these attributes already exist or are readily available, but two other essential requirements are missing. As a result, despite much noise, little progress has been achieved in the last 4 to 8 years and in many cases proper foundations for transformation have not even been laid. Currently both DWAF and local government are responsible for some of these poor performing schemes.

The first problem is that operation and maintenance staff or outsourced assistance are frustrated and demotivated in their endeavours because of poor management. In addition, the attitude of both organised and unorganised labour towards customers tends to reflect management's attitude towards them. Understanding of the concept of customer service and the 'batho pele' principles is weak. If it were stronger, even from a self-interest viewpoint, striking municipal workers in 2002 would have learned from 1995 that trashing the environment loses them vital support in their demand for higher wages and better working conditions.

The second is that a wall of distrust has grown up between service providers (local government, Eskom, etc) and their customers, and replaced the high expectations of 1994. The honeymoon is over for government and poorly served communities are mobilising again to renew the struggle. Currently there is little or no meaningful engagement between government and these new grassroots community organisations. Instead, the organisations assist households to reconnect terminated services whilst municipalities evict households from their homes for non-payment of service bills. It is estimated that some two million people have been evicted in this manner in terms of clause 104(1)(f)(ii) of the Municipal Systems Act, which allows municipalities to seize property in order to secure payment of accounts that are in arrears.

Accepted worldwide best practice and the ANC's own best traditions should never have allowed the current stand-off to develop, but it is still not too late, although current grievances are so great that a period of conflict resolution may be required before truly constructive partnerships are formed. The eventual partnerships should investigate with an open mind how in-depth community participation can best be achieved. For example, the Porto Alegre Municipality in Brazil could be examined as a model of how participatory budgets are drawn up. In Cochabamba, a city in Bolivia with a population of 500 000, central government recently handed over the management of city's water supply system, including its US\$ 35 million debt, to community organisations, coordinated by the secretary of the town's trade union federation. Can local government, organised and unorganised labour, community organisations, water users and water supply specialists in South Africa learn from this Bolivian Government decision and the pains of the community organisation's transformation from protest to management? All these groups have much to learn about inclusive partnerships and alternative technologies but, as the responsible authority, local government has the responsibility of leading the process.

The empowerment of civil society is not an important priority for government. This is because the ANC leadership in exile never fully accepted the importance of the internal mass democratic movement and social mobilisation, and because the recent revival of these movements is currently not an election threat. In fact the majority of community leaders still want to form constructive partnerships with government although criticism is becoming strident. However, even in the short-term such empowerment is essential to establish more realistic expectations, to address the causes rather than just the symptoms of alienation, to implement WDM, to reduce vandalism and to reverse community support for unauthorised connections and reconnections. Developments in Zimbabwe should warn us of an even more threatening long-term scenario. If government does not learn how to negotiate, will it give in to popular defiance in order to stay in power or will it allow itself to be defeated in a future election by a party or alliance promising broader participation and greater emphasis on social development?

Industrial

The Mogale City case study also gives extensive information on how to ensure that industry takes WDM seriously when this is necessary and on the various options that are available to implement it. It should also be remembered that pollution control is often an additional factor that can have a significant impact on industrial WDM.

Mining

The NWA gives WMA institutions wide powers in terms of allocating licences to allow stream flow reduction activities, to ensure that ecosystems are not damaged by these activities or that ground water static levels do not drop excessively. It also gives them wide powers in terms of preventing pollution. These powers allow WMA institutions to ensure that the mining sector implements all the WDM requirements discussed in section 4.2.3. However, the requirements should not be imposed by the WMA institution without taking the EIA into account and discussing alternatives with the mine. Delaying decisions unnecessarily can also be more costly to the mine than making a strict but reasonable decision timously. It should be realised that minimising de-watering does save costs by requiring less pumping as well as causing additional costs in sealing of the area to be mined.

Agriculture and livestock watering

It is proposed that government's agriculture policy should promote:

- the cost effective implementation of WDM,
- the creation of better equity,
- job creation or at least job preservation within the sector,
- a good mix of land use with increased output,
- land rehabilitation and land care,
- greater financial self-sufficiency without compromising on the earlier objectives.

Currently DWAF appears to be mainly concerned about two issues:

- the current water subsidies and low tariffs charged to the agriculture sector, and
- the danger that excessive water use by the agriculture sector will curtail economic growth in other sectors.

The 1997 'White Paper on a National Policy for South Africa' states that: *An estimated twenty billion rands worth of water resource infrastructure (for the delivery of raw water) has been built by the State (prior to 1994) for the benefit of users, many of whom do not even pay the operational management costs incurred, let alone any contribution to capital.*

In the same year DWAF published an 'Overview of water resources availability and utilisation in South Africa'. According to the overview:

- *By far the dominant growth in water requirements is foreseen in the domestic, urban and industrial sectors.*
- *Associated studies to compare the economic and social benefits of water use in urban (domestic/industrial) areas with those achievable from irrigation have shown that the benefits of water use in the urban sector far outweigh those of irrigation.*
- *Should industrial growth be stifled by a future lack of water, it would clearly be more advantageous to decommission irrigation in favour of the urban use of water.*

With respect to the low charges for raw water, the NWA enables the Government to introduce three different charges for water use for:

- funding water resource management,
- funding water resource development, and ongoing operation and maintenance costs,
- achieving the equitable and efficient allocation of water.

The Act allows for different charges to be drawn up for different WMAs, sectors and users, provided the differences are established on an equitable basis.

DWAF's current plans for the application of **water resource management charges** are to be based on estimated long-term average annual use and will thus automatically take assurance of supply into account. The charges are also to be based on recovering the total water resource management costs from the total volume of water that is available for allocation by each WMA. This will result in an under-recovery of revenue in WMAs where the total water use is less than the total water available for allocation. This under-recovery is to be made good from the National Fiscus. This is a sound method of calculating and recovering costs because:

- it will ensure that CMAs in all areas, including those in less developed areas, will have sufficient funds to manage their water resources without charging users excessively for their management duties, and
- it means that the CMA will have no incentive to allocate water for inefficient use to enable it to raise additional water resource management income.

For the agriculture sector, it is planned that **charges for ongoing operation and maintenance** will make provision for the full recovery of capital costs and for depreciation so that funds will be available to replace existing infrastructure when necessary. These new charges are to be introduced gradually in terms of an agreement made with organised agriculture. For the municipal, industrial, mining and energy sectors it is planned to calculate the ongoing operation and maintenance charges in the same way as for the agriculture sector, but to introduce them more quickly. In addition it is planned to create a surplus based on a 4% return on the replacement cost of the current assets to make provision for the funding of new developments. One of the reasons for not creating a similar surplus for the agriculture sector is that no major new developments are planned.

The concept of water charges making provision for the full recovery of capital costs in the sense of the charges being capable of servicing all loan repayments is sound, as is the concept of covering maintenance adequately. However, until some capital loans have been paid off, the concept of building up a capital reserve for replacing major assets or new developments needs to be treated cautiously for all sectors. Table 1 encourages WSIs to increase water charges gradually before major new capital works are required mainly to test the true future demand, although any capital reserve created during the exercise would be welcome. Thus much of the proposed increase in charges to the agriculture sector is supported to the extent that they should be tried. However, the results need to be monitored and evaluated carefully against all the proposed objectives for agriculture policy listed at the beginning of this subsection. If the first five objectives are not being met, water charges need targeted subsidies until external conditions are improved.

In well-developed farming areas the concept that the demand for water for agriculture purposes need not grow is likely to be correct. However in many poor WMAs with water to allocate, a lack of demand for additional agriculture water would be a reflection of a failed rural development strategy.

Therefore, in poor areas with potential for expanded agriculture, government needs to positively facilitate locally developed expansion initiatives through grants for basic infrastructure and low interest loans for more advanced bulk infrastructure. CMAs must not rely on users' applications for registration or licenses to achieve equitable water allocation. They need to be proactive in assisting poor groups and individuals to apply for and make efficient use of a fair share of available water resources. Recommendations on institutional arrangements to manage the delivery of basic productive water are given in section 4.3.4.

The third type of water use charges provided for in the NWA relates to achieving the equitable and efficient allocation of water. To date there appear to be no plans to make use of this provision. As the other two provisions for water charges included in the NWA allow for different charges to be drawn up for different WMAs, sectors and users of water, it is anticipated that this provision will never be important in relation to creating equity. It is also anticipated that the use of surcharges for inefficient water usage will be difficult to implement because of low profit margins in the sector. Thus, strict regulation through the licensing process and the use of extension officers will be required to support efficient water use.

Apart from charges, the NWA allows the Minister of Water Affairs and Forestry **wide discretion in giving financial assistance** in the form of loans, grants and ongoing subsidies. Currently DWAF is planning two forms of financial assistance related to raw water. This assistance is basically only available to emerging farmers who are members of a WUA. The first form is capital grants of up to R50000 per person for bulk water infrastructure rather than for retail water distribution infrastructure. The second is a decreasing operations and maintenance subsidy for a period of five years.

The capital grants for bulk infrastructure are to be welcomed and should be of assistance to those with access to land in the ex-homeland areas, where a lack of water infrastructure is a major constraint to achieving food security and poverty reduction. However, especially when linked with land reform, capital grants for farm distribution infrastructure are also essential. Therefore similar subsidies for such infrastructure are recommended. Farming cooperatives and imaginative worker empowerment arrangements should be eligible for such subsidies on a per member basis. Even though the maximum grants are relatively low, it is essential that all grants relate to the actual cost of the infrastructure built. They should also only be given for very elementary infrastructure, such as a single water delivery point and hose for vegetable growing, or towards high efficiency infrastructure, such as lined canals or drip irrigation distribution pipework. Larger grants are not recommended, but soft loans may need to be considered as an incentive to farmers to invest in more water efficient irrigation infrastructure.

Despite the recommendation in the previous paragraph not to increase the size of available capital grants, it must be acknowledged that the expectations of land reform beneficiaries with regard to new irrigation development are staggeringly high. Moreover, many will require additional support to make a success of their new enterprises. At present, the Department of Land Affairs appears to be oblivious to water issues, believing its responsibility ends with the handover of land. Equally DWAF does not seem to take much interest in land reform. When water is available to land reform beneficiaries, there appear to be no extension staff to promote its efficient use. When no allocatable water is available, there appears to be nobody to make use of this excellent opportunity to ensure that WDM is implemented among existing users, with the definite aim of making water available for this new and important category of land user.

The operational subsidy needs to be much more carefully thought out. As motivated in section 4.3.4, water tariffs for typical rural activities in poor areas should be based long-term on recovering the variable water delivery costs, subject to some simple proof that the water is being managed effectively. For farmers in typical commercial agriculture areas there is likely to be a need to grant a sliding scale rebate when the total water used by a farmer for particular activities is less than an agreed figure. The purpose of this subsidised tariff would be to support small farmers, both emerging and established.

As reported in section 4.2.4, it is anticipated that there will not be many opportunities for implementing WDM of a nature that requires capital expenditure because of low profit margins in the agriculture and cattle farming industries, despite prices for good quality products being at an all time high. That said, it is still important that good scheduling practicing is introduced to make the best use of poor infrastructure, to stop run-off causing unnecessary pollution and to stop poor irrigation practices degrading land. In some areas it may even be worthwhile for government or downstream users to consider soft loans as an incentive to farmers to invest capital in more environmentally friendly and water efficient irrigation practices.

In addition, pressures that discourage irrigators from continuing with their farming practice need to be avoided. The current food shortage in southern Africa, at the beginning of May 2002, indicates that food security needs to enjoy high priority in agricultural policy. The selling of agricultural water licences at prices above the administration and water management costs should not be supported. It follows that holders of licences that have been obtained at cost should revert to the state if the water is not used or if the ongoing water management fee is not paid. This means it should not be possible to sell such licences. Where water licences have reverted to the state or farmers are not making use of their water rights, government should examine the practicality of purchasing the land for emerging farmers as part of its land reform programme. Although water users are already being registered in terms of the NWA, the issuing of licences is not expected to be complete for a further 15 to 20 years.

Current registered water usage in the agriculture sector is based on an **assessment** of the average annual crop irrigation water requirements, areas irrigated, in-field irrigation losses and the efficiency of irrigation management, using the results of the most recent research publications. Frequently actual water usage is not measured. Because of this lack of water usage records, DWAF has budgeted for 5 million ZAR expenditure in the current year to buy satellite data to prevent farmers staking a claim under existing water usage for previously non-irrigated areas. In contrast, other farmers are under-registering their water usage to minimise the annual fees they have to pay to DWAF. They seem to be unaware of the fact that such action can result in them losing their existing water rights and is also likely to have substantial negative consequences if they wish to sell their farms. The department is also considering using satellite data to detect unregistered water usage and theft. Whilst such technology can be used cost effectively to detect areas of irrigated land, it is useless when it comes to measuring actual water usage and irrigation efficiency. For WDM, it is therefore essential that all raw water supplies be measured or controlled. The regulations promulgated in terms of sections 9(1) and 73(1)(j) of the Water Services Act already make such measurement or control compulsory for all (potable) water services. Similar regulations are required for raw water services.

The above discussion looks at creating greater self-sufficiency with respect to farmers paying for water and at implementing WDM in the agriculture sector. It also looks at ways of creating better equity, stabilising the number of jobs provided directly by the sector and helping to increase agriculture output. However with or without accelerated land reform and effective farmer expertise support programmes, the outcome will not reduce the deep poverty existing in most of the rural areas of South Africa. A final requirement is an expansion of the government's current National Landcare programme and the broadening of its aims beyond land rehabilitation to include the prevention of overgrazing and other harmful agriculture practices. Each project carried out under this programme has three potential benefits: improved equity, improved food security and reduced dam siltation. The most urgent needs for the expanded programme exist in all the ex-homelands and TBVC states but there are other pockets of degraded land in the old South Africa.

The above recommendations will require additional central government funding. To keep this funding to a minimum, a moderate land tax should be seriously considered as a means of funding some of the initiatives. Levying such a tax is preferred to increasing water tariffs because:

- Many large landowners do not make good use of all their land. Thus such a tax would encourage them to sell land not being used productively.
- It will not encourage farmers to switch to game ranching.

Despite the perceived gains from introducing such a tax, the resultant outcomes would need to be monitored and evaluated carefully.

South Africa's industrial cities and towns will never create a better life and environment for all without true development across all the rural areas and rural towns of the country. Current government policies are biased in favour of the urban areas. This promotes unacceptably high, chaotic rates of urbanisation which are unsustainable, as people flee the poverty stricken rural areas in desperation. At the same time, a rural economy that is over dependent upon central government funding would create an unacceptable drain on the urban economy. It is therefore incumbent on Government, led by the Ministries and Departments of Agriculture and Land Affairs, and Water Affairs and Forestry, to use well targeted subsidies and taxes, and well trained and motivated extension staff, to create wealth and equity in all the rural areas. Land reform in both the ex-homelands and old white South Africa, and appropriate WDM will play important roles in achieving these results. Under such circumstances, excessive water will not be used by the agriculture sector, and rural areas will support economic growth in the other areas, rather than curtailing it, through the creation of additional markets for industrial production.

Forestry

The commercial forestry industry in South Africa is generally well managed, although monitoring of the industry should continue at the same level as previously. In section 4.2.5 some recommendations have already been made to promote equity through ensuring that expansion of the industry mainly takes place in less developed areas through the use of government incentives and small growers.

Beyond these recommendations there is also an urgent need to promote wood-lots in the rural areas to broaden the most cost-effective means of rehabilitating degraded land and to provide cost effective energy. Regardless of the sincerity of the Tripartite Alliance drafters of the ANC local government elections 2000 manifesto, where they state 'Women want electricity not firewood', such an all-

embracing statement is unlikely to promote sustainable rural development but rather create unnecessary dependency. There is no shortcut to progress and equity, but a reversal of the growing intra-racial inequality can be achieved through sound central government support for wise investments that promote greater self-reliance.

Encouraging more local trade within communities is necessary for rural development. Beneficial external trade increases as a result of development; generally it does not bring about that development. The same applies nationally, although to a different degree. The reliance of our top leadership on foreign investment and global trade, rather than on what we can do better for ourselves, is a misplaced faith in first world technology and the market. But worse, this attitude encourages the adoption of first world technical solutions within an environment in which they are non-sustainable, rather than encouraging the use of integrated resource planning, as described in section 4.3.1, within a participatory framework, to select an appropriate sustainable solution. Such solutions are often not only sustainable but, like wood-lots, can lay the foundation for further sustainable local development.

As noted previously, South Africa has a well managed alien vegetation removal programme, called the Working for Water programme. This programme needs to continue at the same level of activity, with care being taken that areas are revisited as necessary until the vegetation is permanently cleared and the fragile bared land is rehabilitated.

Unfortunately, indigenous forests in poor areas are under serious threat from local impoverished communities. Where these forests are close to tourist areas, for example, the Dukuduku Forest near St Lucia, the local population needs to benefit from the tourist trade. In other areas the poverty trap needs to be broken in other ways.

Refer also volume 4, advocacy note on overcoming WDM constraints in the forestry sector.

4.3.6 *Handling the need to augment supplies*

It is assumed that no further large-scale irrigation development will take place. Although this may be due to government's general financial austerity towards poor areas and the currently disadvantaged, rather than to sound water resources management, this scenario is generally supported.

Thus even after implementing all the WDM measures recommended in this paper, the dominant growth in water requirements is expected to be the industrial and urban domestic sectors. Section 5 of DWAF's 'Water conservation and demand management national strategy framework' suggests that this should be done using 'Integrated least cost planning'. Taking this in simple economic terms could mean reallocating water that is being used inefficiently in the agriculture sector to the industrial and urban domestic sectors. But, after the construction industry, agriculture employs more people per unit of capital invested, and employment in associated supporting industry doubles this figure. Therefore when social factors are also considered, rather than transferring the total allocation of the agricultural water to another sector, it is recommended that the sector seeking augmentation or a new water supply invests in the agriculture sector so that it can generate the same output using less water. The agriculture sector can then allocate the water saved to the sector requiring augmentation. Some details will still need to be carefully considered as farmers regularly work on assurance of supply figures of only 7 years out of every 10, whereas industry and mining may require an assurance of up to 49 years out of every 50.

When all inefficiently used agriculture sector water, in an area, has been re-allocated to the industrial or urban domestic sectors, and these latter sectors are still demanding more water, it is time to reassess if they can benefit more by implementing additional water demand management rather than obtaining additional water from a new source.

4.3.7 WMA institutions

Eventually, through the creation of CMAs, WMA should become the water sector's regulator in South Africa and the custodians of DWAF's Nation Information System (NIS). The regulator's primary brief needs to be supportive rather than punitive, although in the last resort the regulator needs the power to punish or intervene.

As the custodian of DWAF's NIS, an important function of CMAs will be to **negotiate** what information is to flow between itself and all classes of WSIs. The information should satisfy the **minimum** needs of all stakeholders and be **appropriate for the simplicity/complexity** of the WSI doing the reporting. It should be consistent but not uniform.

Current multiple reporting requirements must end. Some WSPs are expected to submit different sets of information to customers, municipal councils, district level authorities, provincial authorities, the decentralised offices of various national departments, different directorates within these departments, the national offices of the same and other departments, overseas bilateral and multilateral disbursers of grants and loans, persons doing research studies like this one, and various branches of the UN. With all these various requests, is it any wonder that the seekers of information are rarely satisfied with the replies they receive and that the WSPs often fail in performing their WDM and other management functions? To measure is to know, but weighing sheep a hundred times does not make them fat. Instead it absorbs the time that should have been spent feeding them!

Through the issuing of water licences, CMAs will have a special responsibility with respect to creating equity. The provision in the NWA, which allows CMAs, in certain circumstances, to allocate licences on the basis of public auction or tender, should be removed as it compromises both equity and the broader requirements of WDM.

5 CASE STUDIES

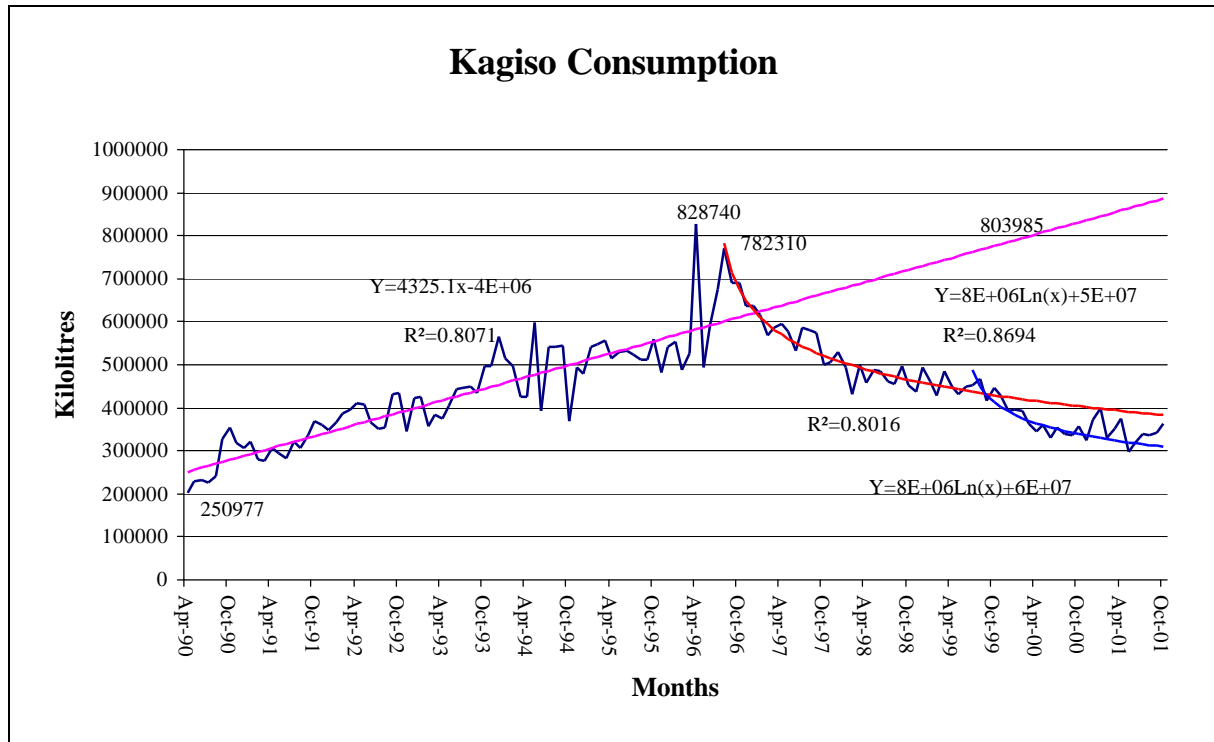
Figures 7 and 8 show two examples of successful WDM in South Africa. They both indicate that past trends can be dramatically altered.

In the case of Figure 7, the change in trend in the volume of water delivered to Kagiso per month, from April 1990 to September 1999, was brought about by extensive communications with customers, and basic improvements in the quality of service and the management of the distribution system. Further reductions were obtained after September 1999 by the installation of household water prepayment meters.

Figure 8 shows that Eskom continuously reduced the volume of water used per unit of electricity sent out from its coal-fired power stations between 1989 and 2000. A small percentage of the reduction was achieved by managing water use at all the power stations more effectively, but it was mainly achieved by constructing some of the new ones with non-evaporative cooling as the method of condensing the exhaust steam leaving the turbines. On the newest Eskom evaporatively cooled power stations water usage is approximately 2 litres per kWh sent out. For non-evaporatively cooled

power stations the corresponding figure is approximately 0,2 litres, one tenth of the water usage on the most efficient evaporatively cooled stations.

Both these case studies demonstrate that large reductions in water demand can be achieved and that without proper liaison with the various stakeholders, to obtain an understanding of what is being planned, demand forecasting from trend lines can give completely inaccurate results.



(Source: Taken directly from Mogale City Local Municipality, July 2001 to June 2002 water sector business plan, compiled by Michael Rabie, Deputy Director, Water)

Figure 7: Water delivered to Kagiso, kilolitres per month, from April 1990 to October 2001

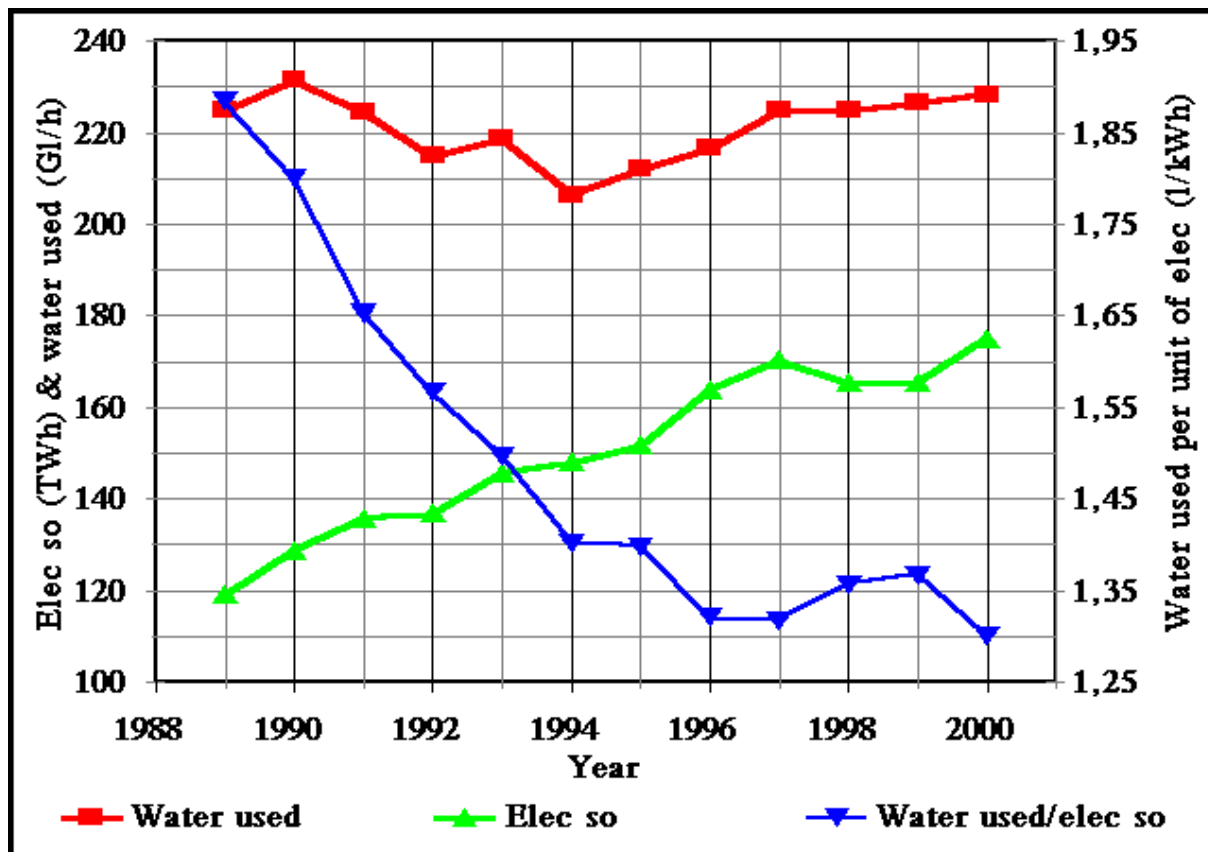


Figure 8: Water usage at and electricity sent out from Eskom’s coal fired power stations, for the years 1989 to the year 2000, together with the calculation of water used per unit of electricity out

6 SUMMARY CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

South Africa has a highly developed water supply industry, which already uses about 65 % of the country’s available water resources. Despite this, in the year 2000 DWAF estimated that 17,5 million South Africans did not have a basic water supply as defined in section 3 of the regulations relating to compulsory national standards and measures to conserve water. This simple profile indicates that there is a need to implement WDM so that an acute shortage of water does not seriously curtail the quality of life of the next generation. However, even more importantly, it also indicates the need to implement WDM to help release nearly half the country’s population from its current acute water shortage.

This latter need calls for the measurement and/or control of water to all users, to curtail wastage and free up water for more equitable and important use. The exclusive focus being placed on the supply of water for domestic and hygiene purposes is also depriving many people of any access to water for productive purposes and keeping them trapped in poverty. WDM strategies should, therefore, aim to supply each community member with at least 25 litres of potable water per day for domestic purposes and an average of an addition 75 litres of suitable quality water per day for productive purposes. Other critical needs for WDM include the prevention of overexploitation and actions that adversely affect the quality of water to an unacceptable degree. This management is required to protect the environment, to ensure that there is sufficient water available during droughts and to prevent water degradation reducing the availability and usefulness of the country’s water resources.

In areas where the water demand is approaching the yield of the source or the capacity of the infrastructure, there is a need to examine the current water usage to see if it can be reduced at a cost that is less than the cost of providing any new demand.

6.2 Constraints to WDM implementation

The introduction of effective WDM is constrained by a lack of ongoing water management, and operating and maintenance financial resources. This in turn leads to poor managerial leadership, a lack of institutional capacity and skills availability and practically no interaction with customers. Although this lack of capacity is most noticeable in the domestic water supply sector, it is probably even more critical in the agriculture and mining sectors. In the agriculture sector the resources allocated to the Landcare Programme are also far too meagre.

6.3 Overcoming critical WDM constraints

6.3.1 Phasing the implementation of WDM

To overcome the constraints to WDM implementation cost effectively it is necessary to consider all the sectors and classes of customers using water or affecting its quality and to phase in implementation in a manner that continuously optimises the benefits. First order WDM comprises ongoing recurrent tasks. These tasks include reducing non-revenue water delivery, controlling all activities that may degrade the areas water resources or environment and ensuring improved equity. Second order WDM includes using strategic planning to ensure that all capital expenditure by stakeholders is carried out using a 25 to 30 year framework. Third order WDM is required as soon as the water demand for any scheme approaches its current capacity. As this happens ongoing accurate demand forecasting becomes essential. In addition the price of water delivered to high volume users should be gradually increased to the price it would be after the development of a new resource so that the true future demand is known. This is the time actively to consider investing capital in more water efficient devices and processes. In addition, central government should promulgate compulsory regulations that prohibit the development of new water resources before a full investigation of WDM alternatives has been carried out. Similar prohibitions are required before the capacity of existing infrastructure is increased.

The preceding paragraph gives an overview of the report's recommendations of the 'what and 'when' aspects of aspects of WDM. The subsequent paragraphs summarise the 'how' and 'by whom' aspects. In keeping with the aims of the NWA, the recommendations prioritise overcoming WDM constraints that impact negatively on equity.

6.3.2 Creating the right conditions for the successful implementation of WDM

A fundamental premise of this report is that it is not possible to implement effective water schemes in areas of pervasive poverty and that the current situation in which the rich are getting richer and the poor are getting poorer is not sustainable. For a middle income country, South Africa's current level of taxation at 24 % of GDP is quite low. It is therefore recommended that government consider increasing the overall level of taxation and expenditure by about 20 % to build a more equitable society in which WDM can be successfully implemented countrywide. Looking at the 2002/03 budget estimates, a 20 % increase in tax would net an additional ZAR 53 billion in revenue. Current expenditure in many important sectors, such as health and education, is comparable with other middle income countries and one can only look to more effective expenditure rather than higher expenditure in these sectors. (A 1998 report by the Financial and Fiscal Commission, on *Public*

expenditure on basic social services in South Africa, supports this view whilst recommending additional spending on water and sanitation as well as on an integrated, preschool nutrition programme.) The increased expenditure should rather be used for the following three objectives:

- To introduce a universal basic income grant (UBIG) (DSD 2002 pp 61-66). The aim of such a grant would be to provide a minimum social security safety net to all South Africans in a manner that best assists broader economic transformation objectives. In the poorest areas, for example, it would help create a market for locally produced food.
- To increase equitable share payments to local government (RSA 1996 clauses 214 and 227). Such payments should be made to assist poor municipalities to cover the recurrent costs of providing residents with a free basic amount of basic services. The ability of a municipality to use internal cross-subsidies from high volume service users to recover costs should be taken into account when deciding the size of equitable share payments. The revenue raising capacity of the six metros and a further two to five district municipalities suggest that they can fund their entire recurrent expenditure needs internally and that they do not require any equitable share payments.
- To kick-start LED in poor areas. Most of this expenditure should be related to grants and soft loans for capital investment. Channels for such capital investment could include increasing disbursements through the CMIP, the MIIU, the land reform programme, the landcare programme, and DWAF support to emerging farmers and community woodlots. Some expenditure will be required to cover recurrent costs related to LED. Examples include subsidies:
 - for CMAs in areas where the total registered water use is less than the total water available for allocation,
 - for a basic amount of water used by small farmers, and
 - for farmer extension officers in poor areas and areas with emerging farmers.

The above recommendations on making more money available for various sectors, including the water sector, do not reduce the need for the most effective use to be made of available resources. Past experience indicates that much of the capital expenditure in potable water infrastructure in the rural areas has been effected without community participation, sustainability or ease of ongoing WDM implementation being central design criteria. This needs to change. There have only been a few *ad hoc* turn-around projects associated with ongoing water scheme management, operation and maintenance. As a result, it is difficult to evaluate them, except to say that a lack of follow-up threatens long-term effectiveness. In the future, appropriate monitoring, evaluation and corrective action will be required to build effective turn-around programmes.

6.3.3 Institutional arrangements, skills training, and advocacy

To create equity and to manage water resources and supplies requires institutions. In fact in an article in the 2001 November 23 issue of the Mail & Guardian Mike Muller and Junior Potloane, the DG and a DDG of DWAF respectively, clearly indicated that 'institutional issues are the greatest challenge' in providing effective water services and keeping them working.

It is recommended that South Africa continues to decentralise the implementation of water supply and management functions within a framework of clear national laws, and enabling support and auditing. The laws or associated regulations should specify medium term planning requirements and regular self-monitoring, evaluation and reporting requirements for all water institutions and

independent water users. To date, support from national government and DWAF have been inadequate and in poor areas this is regarded as the prime constraint to implementing effective WDM. Recent laws generally set out a workable framework for institutional development although decentralisation to the community level is not sufficiently facilitated or encouraged. In addition, the rights of community organisations and customers need to be strengthened, and reporting requirements to both customers and CMAs need to be expanded.

Care also needs to be taken to ensure that institutions formed in terms of the NWA, and institutions formed in terms of the Water Services Act, cooperate closely with each other. The Management institutions related to government waterworks CMAs and WUAs are institutions formed in terms of the NWA. Water Boards, WSAs and WSPs are organisations formed in terms of the Water Services Act. Literature on the establishment of CMAs tends to stress the relationship between CMAs and WUAs. It is essential that CMAs have ongoing interaction, from the initial stages of their establishment, with all water supply institutions and independent persons and organisations that affect water availability. The distinction between WUAs and WSPs originates in the different functional areas of National and Local Government competence set out in the Constitution. This should not, however, stop WSAs and CMAs ensuring that WUAs and WSPs cooperate fully with each other and even carry out each other's functions in terms of formal contracts where this is beneficial to stakeholders. All water institutions except WSPs are *de facto* and *de jure* non-profit organisations. Non-profit organisations can and should, where equitable, generate a surplus. Their non-profit status merely precludes them from using the surplus for any other purpose than operating, maintaining or expanding their water businesses. It is recommended that WSPs be similarly constituted.

To overcome current constraints to the implementation of WDM, some of the additional financial resources need be used for institutional capacity building, skills training, and advocacy. Institutions that require particular attention are CMAs, WSAs, WSPs and WUAs. Advocacy needs to involve politicians but particularly local councilors, civil society organisations and individual water users as well as institutions. As set out in volume 1 of this study, in pages 16 and 17 of the synthesis report, special turn-around interventions and additional interim funding are required to break the spiral of poor quality service, little to no WDM, and the low income for operation and maintenance associated with many existing schemes. Along with the need to develop equity by accelerating the current programmes to provide infrastructure where none exists to deliver basic domestic and productive water supplies there is a need to balance this programme with a programme to turn-around existing poorly performing schemes. This is absolutely essential for the success of WDM. Without such a programme it is also impossible to restrict the development of new water resources and the expansion of the capacity of existing infrastructure in line with the conditions set out in section 6.3.1.

6.3.4 Overcoming other constraints to WDM

It also needs to be stressed that financial support and institutional capacity building on their own will not achieve WDM and an acceptable quality of service without creating good relations between scheme managers, operational staff, community organisations and scheme customers. This is dealt with in section 4.3.5 of the report.

The already high utilisation of available water resources in South Africa is causing fears that 100% utilisation will occur by 2030 and that somewhere in the future economic growth will be stifled by

this lack of water. It has also been stated that the benefits of water use in the urban sector far outweigh those of irrigation. Great care needs to be taken not to use this claim to favour urban development over rural development. Equity and food security demand that rural development be accelerated rather than thwarted. In addition, opportunities still exist to greatly increase the efficiency of water use and decrease water degradation in all sectors. Thus, with the necessary commitment to WDM by both government **and** water users, water will not be a major factor in defining the limits of sustainable growth in either the rural or urban areas of South Africa during the current century. Sufficient water can be made available for all. Without that commitment the situation will be very different. There will be worsening inequity, industrial and rural development will be held back and average household water bills will be higher than average household electricity bills.

6.3.5 Regional WDM

The SADC has drawn up a protocol on shared watercourse systems in the region. The protocol does not specify in detail how the sharing is to be implemented but it does oblige member states to share relevant water resource information and to establish appropriate institutions to develop and manage the shared basins. In keeping with the protocol, South Africa's NWA specifically requires that water allocations make provision for the needs of neighbouring countries with which it shares water basins. It also makes provision for the Minister of Water Affairs and Forestry to set up institutions to implement international water sharing agreements.

In terms of this act the Minister of Water Affairs and Forestry must also develop a National Water Resource Strategy. This strategy will give details of the total water available and details of allocations for certain categories of water use for each WMA. These categories include South Africa's international obligations. It is hoped that the publication of this information will encourage South Africa and its neighbours to strengthen and broaden the scope of the existing international water management institutions. Thereafter they should aim to manage the shared river basins to the equitable and sustainable benefit of all the people living in the basins as if the national boundaries did not exist. Such an objective would help to ensure that WDM was implemented synergistically on a regional basis.

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ANNEXURE A: QUESTIONNAIRE FOR WATER RETAILING ORGANISATION

Interviewer: _____ Date of interview _____

1 Respondent's details

1.1 Name of respondent: _____

1.2 Name of organisation: _____

1.3 Job title: _____

1.4 How long in current job: _____

1.5 A brief description of your **overall** responsibilities: _____

1.6 A brief description of your responsibilities related to **WDM**: _____

1.7 Contact details: _____

Street address _____

Postal address _____

Tel _____ Fax _____

Cell _____ E-mail _____

2 Organisation basics

2.1 Table

Total	Domestic	Other
No of connections		
Water demand (please state units clearly)		
Revenue (please state units clearly)		
Composition of total population	Rural %?	Urban %?

Information on tariffs and connection charges

2.2 Any overview reports available?

3 The organisation's attitude towards water management and WDM

3.1 How important are water management and WDM to your organisation?

Very:	Important:	Slightly:	Not important	Not sure
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3.2 Describe briefly how the organisation tries to ensure that water is managed effectively by the organisation and its customers?

3.3 Describe any negative attitudes that exist towards WDM in the organisation?

3.4 Do you have any approximate figures for the short-term and long-term potential financial gains to be made by your organisation and customers by implementing additional WDM and the gains already achieved from previous and current implementation?

4 Categories of constraints

4.1 Constraints related to implementing WDM may be divided into three main categories as indicated below. Please prioritise these constraints from 1 to 3

- Constraints imposed by external group interests
- Constraints within the water suppliers own organisation
- Constraints related to customers or groups of customers

4.2 Describe briefly the constraints in the category you prioritised as 1 that you think need to be overcome because of their potential to reduce demand in a beneficial way

Can you put the priority 1 category of constraints we have discussed in order of importance

4.3 Describe some of the constraints in the category you prioritised as 2 that you think need to be overcome because of their potential to reduce demand in a beneficial way

Can you put the priority 2 category of constraints we have discussed in order of importance

5 Equity

5.1 We are also interested in equity. What % of customers and potential customers have:

- No access to safe water
- An adequate private supply
- Shared access to safe water more than 200m away
- Shared access to safe water up to 200m away
- Individual household access in yard or dwelling

% or info not available (n/a)

5.2a Describe briefly the constraints preventing all households from having safe water access in their yard or dwelling

5.2b How do you think these constraints can/should be overcome?

5.3a In the poorer areas with access to a safe water supply is the supply reliable and sustainable

Reliable?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Sustainable?	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

5.3b How do you think any constraints to reliability or sustainability can be overcome

5.4 Rural communities usually need water for 'productive uses', ie livestock watering, vegetable gardens, building, small business etc. If your organisation delivers water to rural communities, how does it ensure such demands are effectively met?

6 Implementation of WDM

6.1a At a basic level WDM is often indicated by:

- A decrease in the demand curve or a drop in demand for bulk water,
- A decrease in unaccounted-for water, and/or
- An increase in income from customers

Do you have any figures and/or reports that show such indications of WDM for your organisation or for any specific areas served by your organisation?

6.1b Give a brief description of how these changes were achieved?

6.2a Has your organisation implemented any other WDM projects/programmes? If yes please describe these initiatives and the gains achieved briefly

6.2b Do you have any reports on these initiatives?

7 Your organisations 3 largest customers (as possible choices for individual interviews)

Name of organisation	Contact person	Tel or cell no	Usage m ³ /mth

8 How can the IUCN assist countries/organisations to implement beneficial WDM?

8.1 Outputs planned for our multi country study include notes and reports as listed below. Please rate the likely usefulness of these outputs on a scale of 1 to 4 where 1 = most useful, 2 = very useful, 3 = useful and 4 = of little use to help the team prioritise

▪ Motivational notes indicating the advantages of WDM	
▪ Notes illustrating particular tools for implementing WDM	
▪ Notes for a specific sector giving an overview of constraints, the need for WDM and recommended methods of implementation	
▪ Case studies	
▪ Country reports giving an overview of constraints in different sectors and how to overcome them	
▪ A report giving a synthesis of what is in the country reports	

8.2 Are there other issues to which this study team or the IUCN should be paying particular attention?

8.3 Assuming access to adequate funding, on a scale of 1 to 4, please rate the likely effectiveness of the following methods of disseminating the outputs of this and other IUCN WDM studies.

Website: Hard copies:
 Decentralised short courses: Decentralised workshops:
 Other (describe): _____

8.4 When planning the dissemination of information prioritise the following categories of audiences from 1 to 4.

Influential external groups Water sector officials
 Water sector customers: Schools:

8.5 Besides facilitating studies and disseminating the results, what other activities should the IUCN be facilitating to accelerate the implementation of WDM in southern Africa?

Thank you very much for your time and cooperation

ANNEXURE B: QUESTIONNAIRE FOR INDUSTRIAL WATER USERS

Interviewer: _____ Date of interview _____

1 Respondent's details

1.1 Name of respondent: _____

1.2 Name of company: _____

1.3 Job title: _____

1.4 How long in current job: _____

1.5 A brief description of your **overall** responsibilities: _____

1.6 A brief description of your responsibilities related to water and effluent management

1.7 Contact details:

Street address _____

Postal address _____

Tel _____ Fax _____

Cell _____ E-mail _____

2 Details of make-up water supplied to and effluent discharged from your company

2.1 How much make-up water does your company use
(include water from sources on your property eg
boreholes and run-off water harvesting) _____ kl/month

2.2 How much effluent does your company discharge _____ kl/month

2.3 Please give details of the make-up water supplied to your company

Supplied by	Quality	Quantity kl/month	Cost Rand/month
Make-up water totals			

2.4 Please give details of the effluent discharged by your company

Effluent source	How discharged	Quantity kl/month	Cost Rand/month
Effluent discharged totals			

2.5 Give details of what happens to the make-up water

	Quantity kl/month	%
Evaporates whilst performing a cooling function		
Leaves premises as part of an end product		
Leaves premises as effluent		
Other describe		
Is unaccounted for		
Total make-up water		

2.6 Do you have a simple flow diagram depicting how water is used and managed by your company?

3 Water and effluent management

3.1a Describe any processes used by your company to reduce the quantity of make-up water used or to pretreat the make-up water so that it is fit to use

3.1b Describe any processes used by your company to reduce the **quantity** of effluent discharges

3.1c Describe any processes used by your company to improve the **quality** of effluent discharged

3.1d Describe any general strategies used by your company to manage day-to day water make-up, to prevent water wastage and to prevent environmental pollution

3.2a What is the **recurrent** monthly cost of implementing the water and effluent management processes and strategies described in 3.1a to 3.1d? (Exclude costs included in 2.3 and 2.4. Subtract any money earned through the sale of by-products) _____ Rand/month

3.2b What is the approximate **replacement capital cost** of the infrastructure used to implement the water and effluent management processes and strategies described in 3.1a to 3.1d? _____ Rand

3.2c What percentage of the capital cost recorded in 3.2b would you regard as a reasonable figure to convert the capital cost into an equivalent recurrent **per month** cost _____ % per annum

3.2d Therefore, the equivalent recurrent cost of capital investment equals _____ Rand/month

3.3a Water make-up, effluent discharged and water and effluent management costs your company approximately 2.3 total + 2.4 total + 3.2a + 3.2d = _____ Rand/month

3.3b What does this figure represent as a percentage of monthly sales made by your company? _____ %

3.4 What motivated your company to implement the water and effluent management processes and strategies described in 2.3a to 2.3d? Place % points in each box below so that they total 100%

Water costs	%	Effluent discharge costs	%
Legal environmental requirements	%	Other describe below	%

4 Possible future scenarios

4.1 Given current circumstances, is your company planning to take any further action to enable it to use water more efficiently? If yes please describe and explain the gains to be made.

4.2 Are there any actions external water suppliers, effluent receivers or other stakeholders could take that would help you or other industries to use water more efficiently, to ward off higher costs or to comply with environmental legislation? If yes, please describe and explain the benefits that might result.

5 Benchmarking

5.1 In the thermal power generation industry, litres of make-up water per kWh of electricity sent out is used as a common 'benchmarking' figure. Please quote the water make-up to your company in benchmark terms

_____ litres of water per _____ produced

5.2 What is the range of benchmark figures commonly found in your industry

From a minimum of _____ to a maximum of _____
litres of water per _____ produced

5.3 Monitoring your company's water and effluent management efficiency

5.3a Does your company use benchmarking as a regular check on its water management efficiency Yes No

5.3b Does your company use benchmarking as a regular check on its effluent management efficiency Yes No

5.3c Does your company use actual water make-up as a regular check on its water management efficiency Yes No

5.3d Does your company use actual effluent discharged as a regular check on its effluent management efficiency Yes No

5.3e How often does your company check its water management efficiency?

Daily Weekly Monthly Quarterly

5.3f How often does your company check its effluent management efficiency?

Daily Weekly Monthly Quarterly

5.4 Can benchmarking be used by external stakeholders to measure the water and effluent management efficiencies of industries similar to yours? If you think it can please describe how you think this is best done.

6 How can the IUCN assist countries/organisations to implement beneficial WDM?

6.1 Outputs planned for our multi country study include notes and reports as listed below. Please rate the likely usefulness of these outputs on a scale of 1 to 4 where 1 = most useful, 2 = very useful, 3 = useful and 4 = of little use to help the team prioritise

▪ Motivational notes indicating the advantages of WDM	
▪ Notes illustrating particular tools for implementing WDM	
▪ Notes for a specific sector giving an overview of constraints, the need for WDM and recommended methods of implementation	
▪ Case studies	
▪ Country reports giving an overview of constraints in different sectors and how to overcome them	
▪ A report giving a synthesis of what is in the country reports	

6.2 Are there other issues to which this study team or the IUCN should be paying particular attention?

6.3 Assuming access to adequate funding, on a scale of 1 to 4, please rate the likely effectiveness of the following methods of disseminating the outputs of this and other IUCN WDM studies.

Website: Hard copies:
 Decentralised short courses: Decentralised workshops:

Other (describe):

6.4 When planning the dissemination of information prioritise the following categories of audiences from 1 to 4.

Influential external groups

Water sector officials

Water sector customers:

Schools:

6.5 Besides facilitating studies and disseminating the results, what other activities should the IUCN be facilitating to accelerate the implementation of WDM in southern Africa?

Thank you very much for your time and cooperation

ANNEXURE C: STAKEHOLDER INTERVIEWS

Thursday 14 February 2002: Mr Dugald Ross, Operations Manager, Retail Water Services Department, Rand Water, Gauteng

Friday 15 February 2002 informal interview: Mr Ronnie McKenzie, Director Water Resources Planning, Pretoria

Friday 15 February 2002: Mr Mike Rabie, Deputy Director Water, Mogale City Local Municipality, Gauteng

Tuesday 19 February 2002: Mr Richard Castle, UAW Executive, and Mr Mark Lautré, Support Operations Manager, Johannesburg Water

Tuesday 26 February 2002: Mr Chris van Heerden Acting General Manager Limpopo Province, and Mr Gift Bhebhe, Marketing Manager Limpopo Province, Water and Sanitation Services South Africa (a joint Group Five and Ondeo Services company), Polokwane

Friday 15 March 2002: Mrs Eustathia Bofilatos, Deputy Director Catchment Management, and Mr Derek Weston, Assistant Director Catchment, Department of Water Affairs and Forestry, Head Office, Pretoria

Wednesday 20 March 2002: Mr Pieter Pretorius, Director Water Utilisation, and Mr Johan Wessels, Deputy Director Water Apportionment, Department of Water Affairs and Forestry, Head Office, Pretoria

ANNEXURE D: DETAILS OF INDUSTRIAL STAKEHOLDERS AND ANY ACTION TAKEN

Note: the table below gives details of the highest water usage customers of the three municipalities in the centre of Gauteng and a few additional industries elsewhere. Although only **three industries** completed the questionnaire for industrial water users the full list of customers from the different municipalities is given to indicate the wide range of customers that are included in their highest usage lists. For example Johannesburg Metro's largest customer is a hospital. Other municipalities have shopping malls that also contain offices amongst their highest water users.

Organisation/Action	Name and position	Tel/fax/cell/e-mail
Miscellaneous Mondi Paper Durban Completed questionnaire received 05 Mar 2002	Mr Tony Robson Spoke to Renitha Water usage: +-1 000 000kl/mth	Tel: 031-451-2700 Dir Tel: 031-451-2111 Gen Eml: tonyr@paperman.co.za
Cato Ridge Abattoir Completed questionnaire received 21 Mar 2002	Mr Ronnie Moodley, Effluent Plant Manager Water usage: +- 35 000kl/mth	Tel: 031-784-1641 Fax: 031-784-1034 Eml: Not available
Pyramid Abattoir Questionnaire faxed 12 February 2002	Mr Nicki Labuschagne	Tel: 012-545-0011 Fax: 012-545-0381 Eml: not available
Karen Beef, Balfour No action taken	Mr Ray Senior Water usage: +-35 000kl/mth	Tel: 017-773-0352 Eml:
Sulzer Cooling Did not keep appointment	Alan Loudon	Tel: 011-820-6000 Fax: 011-820-6200 Cell: 082-573-2875 Eml: alan.loudon@sulzer.co.za
Johannesburg Metro	Mr Andre van Rooyen	Eml: andrevr@jwater.co.za
Chris Hani Bara Hospital Faxed questionnaire 28 February 2002	Ms Enrita van der Westhuizen Water usage: +-190 000kl/mth	Tel: 011-933-8159/37 Tel: 011-933-8000 Fax: 011-933-3135
Coca Cola - ABI, Devland E-mailed questionnaire 27 February 2002	Mr Trevor Sanderson Secr: Alida Wehmeyer Water usage: +-45 000kl/mth	Tel: 011-933-6300 Eml: trevors@abi.co.za
Yeastpro E-mailed questionnaire 28 February 2002	Mr Kobie van der Westhuizen SB: Freda Water usage: +-35 000kl/mth	Tel: 011-248-8200 Eml: kvdwesthuizen@anchor.co.za
Adcock Ingram Critical Care E-mailed questionnaire 28 February 2002	Mr Ray Beaton Secr: Caroline Water usage: +-25 000kl/mth	Tel: 011-494-8000 Fax: Eml: rbeaton@adcock.co.za
Sandton City (Liberty Life) E-mailed questionnaire 27 February 2002	Mr Barrington Goudge Secr: Jacqui Water usage: +-25 000kl/mth	Tel: 011-883-2011 Fax: 011-883-0978 Eml: goudgeb@libertyproperties.co.za

Eskom Waterval E-mailed questionnaire 27 February 2002	Mr Roger Diss/ Mr Donald Mellows Water usage: +-20 000 kl/mth	Tel: 011-800-2895 Eml: roger.diss@eskom.co.za
Liberty Life Properties Head Office Braamfontein No action taken	Freek Eefting Services Manager South Africa	(Control +-20 office blocks/ shopping malls countrywide)
Mogale City Local Municipality Chamdor Abattoir E-mail note 14 February 2002	Mr Mike Rabie Secr: Mrs Anita van Rensburg Mr Gus Farquesson	Tel: 011-951-2365 Eml: miker@mogalecity.gov.za Tel: 011-762-1205 Fax: Eml: mumal@mweb.co.za (Pvt)
SAB Chamdor E-mailed questionnaire 25 February 2002	Mr Vernon Keys Secretary: Ms Sharon Spiller	Tel: 011-951-2600 Eml: sharon.spiller@sabreweries.com
Ekurhuleni Metro	Mr Sam Herman	Eml: hermans@boksburgcouncil.co.za
Ekurhuleni Metro: Springs admin area	Mr Hannes Pelser	Eml: hannesp@springstc.co.za
SAPPI Springs Completed questionnaire received 27 Feb 2002	Mr Freddie Viljoen Water usage: +-1 110 000 kl/mth	Tel: 011-360-0269 Fax: Eml: freddie.viljoen@za.sappi.com
Kimberly-Clark E-mailed questionnaire 22 February 2002	Mr Bob Heimann Water usage: +-160 000 kl/mth	Tel: 011-360-7210 Fax: Eml: bheimann@kc.co.za
Mondi Board Springs E-mailed questionnaire 25 February 2002	Mr Chris Storm Secr: Marie-Ann van Vuuren Water usage: +-140 000 kl/mth	Tel: 011-360-4300 Fax: Eml: chris_storm@mondi.co.za
Zincor Faxed questionnaire 21 February 2002	Mr Rex Ingle Water usage: +-135 000 kl/mth	Tel: 011-812-9500 Fax: 011-363-3344 Eml:
ERGO E-mailed questionnaire 25 February 2002	Mr Hennie Geldenhuys Water usage: +-55 000 kl/mth	Tel: 011-742-2610 Fax: Eml: hgeldenhuys@anglogold.com
McCain Faxed questionnaire 21 February 2002	Mr Neels Rossouw/Liz Water usage: +-35 000 kl/mth	Tel: 011-365-3000 Fax: 011-363-1341 Eml:
Ekurhuleni Metro: Germiston admin area	Switchboard Mrs Storm: water, elec etc	Tel: 011-874-5911 Tel: 011-874-6485
Coca Cola ABI Wadeville Faxed questionnaire 01 March 2002	Mr James Donlin Secr: Barbara	Tel: 011-879-9600 Fax: 011-455-5292 Eml:
African Products No action taken	Mr Ouboet Bertani	Tel: 011-876-0692

Scaw Metals No action taken	Mr Martin Snyman	Tel: 011-902-1001
Enterprise Foods E-mailed questionnaire 01 March 2002	Mr Clement Minnaar	Tel: 011-622-3070 Eml: cminnaar@entfoods.co.za
Bedford Centre No action taken		
Ekurhuleni Metro: Alberton admin area SAB Alrode No action taken	Switchboard Mr Johan Steyn Mr John Harris	Tel: 011-861-2000 Tel: 011-861-2337 johan@alberton.org.za Tel: 011-389-1139 Cell: 083-288-3536 Eml: john.harris02@sabreweries.com
Fedgas No action taken	Mr Jorge Ramos	Tel: 011-389-7250 Eml: jorger@messer.fedgas.co.za
NF Die Casting No action taken	Mr Russel Lambert	Tel: 011-908-3060
Alberton City (Liberty Life) No action taken	Mr Louis v d Westhuizen	Tel: 011-907-9400
Cas Ice cream No action taken		Tel: 011-864-5120
Rand Sporting club No action taken		Tel: 011-907-9753